ONcore ATM Switch/Control Module Installation and User's Guide

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Model Number: 6416SW

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UK General Approval Statement

The ONline System Concentrator and the ONcore Switching Hub are manufactured to the International Safety Standard EN 60950 and as such are approved in the UK under the General Approval number NS/G/12345/J/100003 for indirect connection to the public telecommunication network.

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How to Use This Guide

This guide presents information on how to install and configure the 3Com ONcore ATM Switch/Control Module (Model Number 6414SW) in the 3Com ONcore Switching Hub. It describes how to diagnose and solve problems associated with the operation of the 6416SW module, and describes some of the principles of asynchronous transfer mode (ATM) technology on which the 6416SW module is based.

This guide also describes how to install and configure a management console for the 6416SW module. The ATM commands that you enter at the console to manage the ATM subsystem in the ONcore hub are described in the *ONcore Switching Hub*, *CELLplex 4000 Workgroup Switch*, *ATM Command Reference Guide*, Document Number: 17-00866.

Who Should Use this Guide

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

ATM network administrator

ATM network operator

Hardware installer.

How to Use this Guide

This guide contains seven chapters and six appendixes:

Chapter 1, "Introduction to ATM" gives an overview of the main functions of the 6416SW module.

Chapter 2, "Installation" describes how to install the 6416SW module in the ONcore hub. It also describes how to connect a console to the 6416SW module in order to perform configuration tasks.

Chapter 3, "ATM Addressing" describes the components of an ATM Campus network, guidelines for defining ATM addresses for the 6416SW, how to set up trunk connections within and between networks, and how to use Permanent Virtual Connections (PVCs). It also describes how to connect a console to the 6416SW module in order to perform configuration tasks.

Chapter 4, "Setting-Up and Using a Configuration Console" describes how to set up and configure the 6416SW management console, set an ATM address, and configure facilities for SNMP management and remote login.

Chapter 5, "Configuring the ATM Switch/Control Module" describes how to configure the 6416SW module after installing it in the ONcore hub.

Chapter 6, "Network and Switch Management" provides guidelines for managing and maintaining the ATM Switch/Control.

Chapter 7, "Troubleshooting" describes how to diagnose and solve problems associated with the installation and operation of the 6416SW module, 6416SW console, and ATM subsystem in the ONcore hub.

Appendix A, "Technical Specifications" describes the technical specifications for the 6416SW module.

Appendix B, "RS-232 Cable and Modem Requirements" describes the RS-232 cable requirements and pin assignments for connecting a console or modem to the 6416SW module's RS-232 Console port. It also describes how to configure a modem connection.

Appendix C, "Error and Information Codes" describes the return codes displayed for the Q.2931 protocol and Maintenance mode.

Appendix D, "Configuring AIX for Download and Upload Operations" describes how to configure a server running AIX* for TFTP file transfers with ATM ONcore hubs.

Appendix E, “ONcore ATM Address Formats” describes the ATM addressing formats.

Appendix F, “Technical Support” describes the support services provided by 3Com Corporation.

Prerequisite Knowledge

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

Features and characteristics of the 3Com ONcore Switching hub, as described in *3Com ONcore Switching Hub Installation and Operation Guide*, 17-00362.

Principles of asynchronous transfer mode (ATM) technology

ATM Forum UNI Specifications V3.0 and V3.1.

ATM Forum LAN Emulation Specifications V1.0.

Conventions Used in This Guide

The following text conventions are used in this guide:

Text Convention	Meaning	Example
Bold	Text emphasis	**Selective backpressure** temporarily stops one virtual connection. **Global backpressure** temporarily stops an ATM link.
Italics	Special term	This is known as a *hot swap*.
	Document titles	Refer to the *ATM User-Network Interface Specification - Version 3.0* for more information.
`Monospace`	Command syntax (parameters and variables)	`SET PORT slot.port ENABLE`
	User input (including carriage return)	To display detailed information, enter the following command: `show port 4.2 verbose [ENTER]`

	System messages and screen displays	`Port display for ONcore ATM 155 Mbps Module:`
		`Port Type Mode Status`
		`---`
		`4. 2 NNI enabled UP-OKAY`

Related Documents

This section provides information on supporting documentation, including:

3Com Documents

Reference Documents

3Com Documents

The following documents provide additional information on 3Com products:

ONcore Switching Hub Installation and Operation Guide 17-00362 - provides information on the installation, operation, and configuration of the ONcore Switching Hub. This guide also describes the principal features of the ONcore Fault-Tolerant Controller Module.

ONcore Distributed Management Module User's Guide 17-00370 - provides information on the ONcore Distributed Management Module's operation, installation, and configuration. This guide also describes the software commands associated with the Distributed Management Module.

Distributed Management Module Commands Guide 17-00372 - describes each management command by providing detailed information on the command's format, use, and description.

ONcore Switching Hub/Cellplex 4000 Workgroup Switch ATM Command Reference Guide 17-00866 - describes each ATM command by providing detailed information on the command's format, use, and description.

For a complete list of 3Com documents, contact your 3Com representative.

Reference Documents

The following documents supply related background information:

Case, J., Fedor, M., Scoffstall, M., and J. Davin, *The Simple Network Management Protocol,* RFC 1157, University of Tennessee at Knoxville, Performance Systems International and the MIT Laboratory for Computer Science, May 1990.

Rose, M., and K. McCloghrie, *Structure and Identification of Management Information for TCP/IP-based internets,* RFC 1155, Performance Systems International and Hughes LAN Systems, May 1990.

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This section describes:

- Warranty Information
- Software Subscription Service
- Support

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- Bill to address
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- Current software version
- Original purchase order

Note: You can buy SSS for less that a full year period so that all software products have the same renewal date for your convenience.

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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 3Com ONcore ATM Switch/Control (6416SW) module is based. It also describes how ATM is implemented in the 3Com ONcore Switching Hub and shows how an ONcore-based ATM campus network can be built by interconnecting ATM subsystems.

3Com ONcore ATM Subsystem

By interconnecting 3Com ONcore 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 ONcore hub to permit existing LANs (such as Token-Ring) to coexist with the new ATM technology.

In the 3Com ONcore 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 Switch/Contol Module (6416SW) module (two may be installed in 17-slot 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 a 6416SW module. 6416SW modules are installed in slot positions 9 and 10 in the ATM backplane of 10-slot 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 1-1.

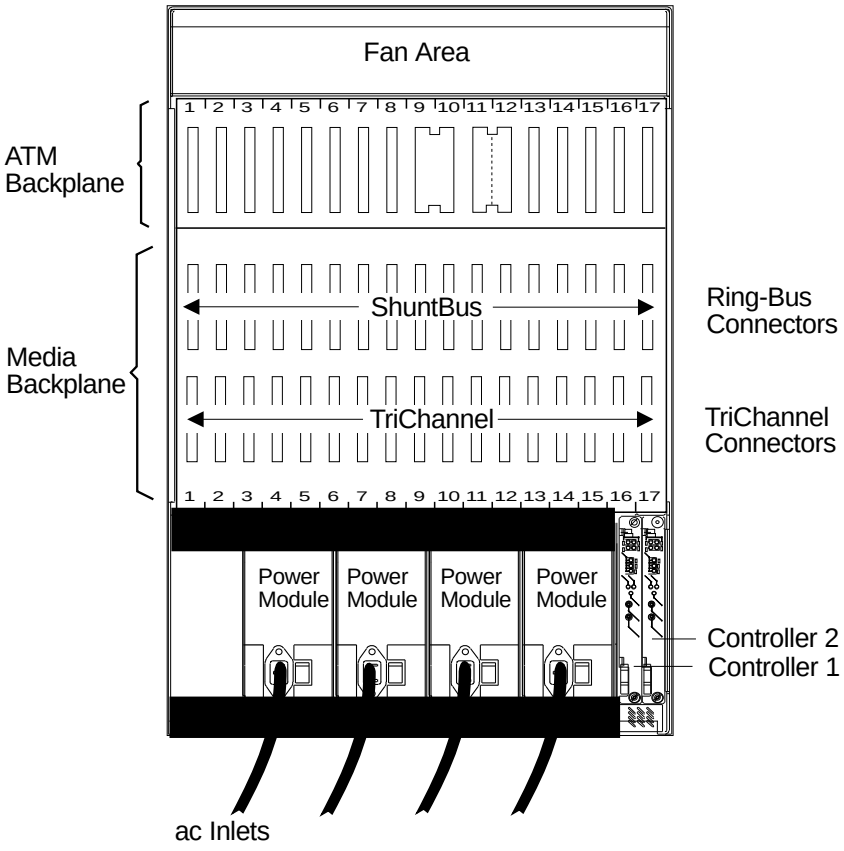
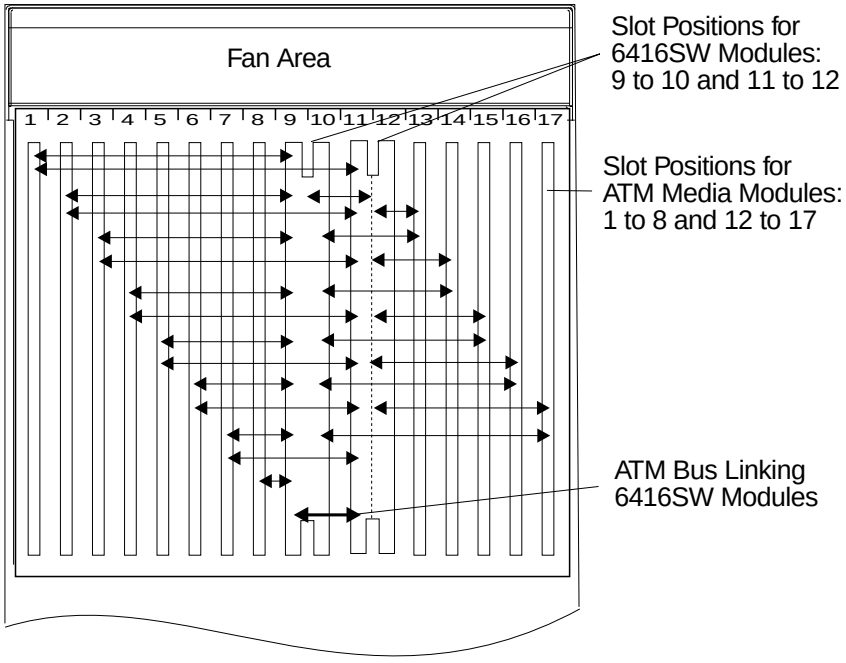


Figure 1-1. ATM Backplane in the 17-slot 3Com ONcore Hub

Two 6416SW modules may be installed in the 17-slot models. This allows for 6416SW redundancy (see page “ATM Switch/Control Redundancy” on page 1-13).

The major difference between the ATM backplane and other ONcore hub LAN backplanes is that each ATM media module has a dedicated set of connections to the 6416SW 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 6416SW module is at the center. The wiring topology used in the ATM backplane is shown in Figure 1-2.



6416SW = ATM Switch/Control

Figure 1-2. Wiring Star Topology in ATM Backplane (17-slot model)

The main characteristics of the ATM backplane are as follows:

- Modular structure
- Full floating ATM media modules
- Support of two 6416SW modules for reliability and redundancy (in 17-slot models)
- Full coexistence with existing legacy LAN modules.

ATM media modules can be hot-swapped 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 6416SW modules. After installing the module, you must configure it for operation by entering a series of commands from the 6416SW local console or from a TELNET session. The commands are detailed in the *3Com ONcore Switching Hub/CELLplex 4000 Workgroup Switch, ATM Command Reference Guide* 17-00866, SA33-0385 (hereafter referred to as the *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*).

ATM Switch/Control Module

The ATM Switch/Contol Module (6416SW) module used in the ONcore 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 ONcore 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 3Com ONcore 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 6416SW module. This allows the ONcore ATM subsystem to use a distributed control system with the following advantages:

Each ATM module benefits from the fault-tolerant design of the 3Com ONcore chassis.

Continued ATM network operation is ensured in case of a failure at a single point in the network.

The 3Com ONcore Switch 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 6416SW module.

Table 1-1. ATM Connections Supported in ONcore 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, ONcore ATM networks provide for availability, scalability, and growth.

Each 3Com ONcore Switch/Control 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 1-2 on page 1-15

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
- 3Com 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 6416SW 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 3Com extensions. It can be driven by SNMP managers, such as IBM NetView for AIX . The 3Com ATM management application, Transcend ONcore ATM Campus Manager, 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 ONcore hub 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 3Com ONcore 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 3Com ONcore 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 ONcore hub.

Via the 6416SW module, which contains a subset of DMM, when the ONcore hub is only running ATM. (Check the Release Notes for the level of 6416SW code required).

Note: If a DMM module is present, or hot-inserted, in the hub, the DMM module will assume chassis management, and 6416SW 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 *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*.

ATM Switch/Control Redundancy

By installing a second 6416SW in a 17-slot hub, a backup to the active 6416SW is provided (check the Release Notes for the level of 6416SW and the level of code required). If the active 6416SW fails, the standby will take over control. The active 6416SW continually updates the tables in the standby 6416SW to ensure that the backup configuration is current, and to reduce the impact should a switch to the standby be required. The active 6416SW checks every one second to determine if the standby 6416SW 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 6416SW also periodically requests that the standby 6416SW perform diagnostics to ensure that it is capable of assuming control if required.

Which 6416SW 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 *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide* for details). This choice is considered at next reset when electing the active 6416SW. Maintenance mode can be entered for the backup 6416SW, but this mode will be ended should the active 6416SW fail or enter Maintenance mode.

Note: The standby 6416SW does not support Telnet. There are two console modes available, basic dialog mode and maintenance mode.

Benefits of Using ATM in the ONcore Hub

The use of ATM in the ONcore 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 ONcore hub management functions
- Distributed switching across ONcore 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 6416SW 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 1-2 lists the correspondence (in bytes):

Table 1-2. 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 6416SW module. Before you unpack the module, please follow the precautions in “Before You Start.”

Before You Start

Take the following precautions before unpacking the 6416SW module:

Do not remove the 6416SW module from its anti-static shielding bag until you are ready to insert it into the ONcore hub. This avoids the possibility of having electrostatic discharge damage static-sensitive devices in the 6416SW cards.

Always use a foot strap and grounded mat or wear a grounded static discharge wrist strap whenever you inspect or install the 6416SW module. Or else, touch a grounded rack or another source of ground before handling the 6416SW module.

Verify that the 6416SW 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 6416SW module, follow these steps:

1. Remove the 6416SW module from the shipping carton.
2. Remove the 6416SW 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 3Com dealer or 3Com representative.

3Com suggests that you keep the shipping carton and the anti-static shielding bag which your 6416SW module was delivered in, in case you later want to repackage the module for storage or shipment.

3Com also suggests that you record the serial number of your 6416SW module and other information about the modules in your ONcore hub in the Hub Planning Chart provided in your ONcore Switching Hub Reference Library.

Installing the 6416SW Module

To install a 6416SW module in the ONcore hub, follow these steps:

1. Install the ONcore hub in its rack or on a desktop by following the instructions in the *3Com ONcore Hub Installation Guide* (17-00362).
2. Insert the 6416SW 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 2-2 on page 2-4.)
3. Make sure that the module is plugged into the connectors on the ATM backplane.

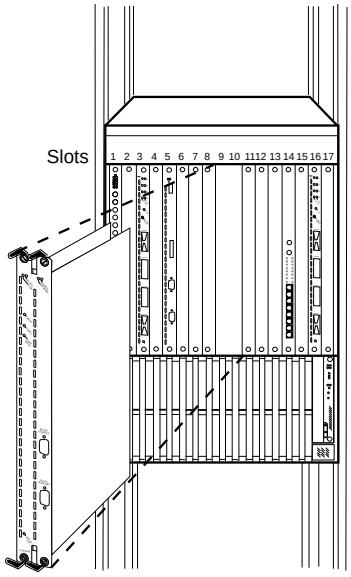


Figure 2-1. Installing the 6416SW Module in an ONcore Hub

4. Close the top and bottom ejectors simultaneously.

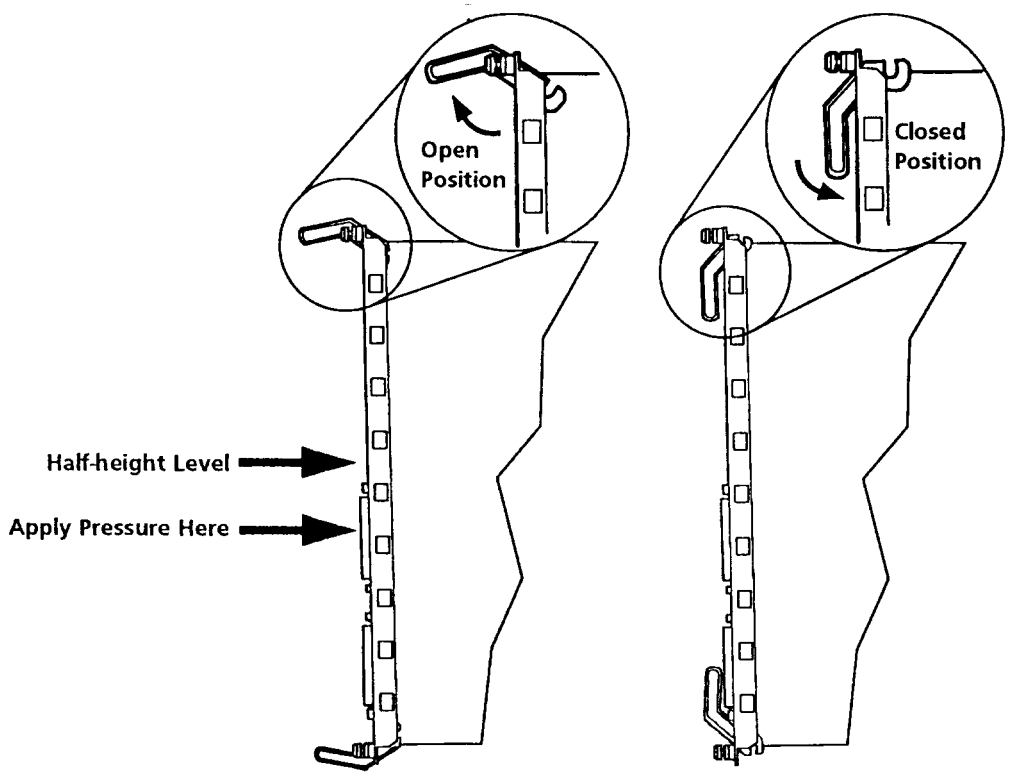


Figure 2-2. ONcore Module Ejectors

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 6416SW module. The connection can either be local or via modems.

   If you use the modem cables that are delivered with the ONcore hub, you must also use the null modem adapter supplied with the 6416SW module.

   Verify that the console and modems (if used) meet the factory defaults of the 6416SW module. If they are not compatible with the factory defaults, you will not be able to communicate with the module. The default 6416SW 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 4-1 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 6416SW 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 B-1 for more information on the exact RS-232 cable that you need.

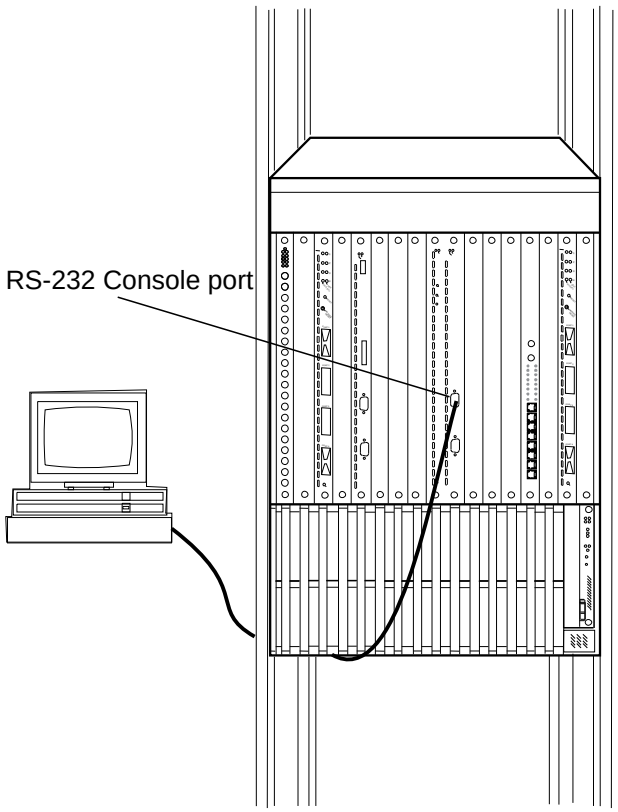


Figure 2-3. Attaching a Terminal to the 6416SW RS-232 Console Port

9. Attach cables to the ATM media modules and ATM user devices you want to use. Then enter 6416SW commands from the console (as described in Chapter 5, “Configuring the ATM Switch/Control Module” on page 5-1) to configure the ATM subsystem.

10. Enter the SAVE ALL command from the console once you have configured all ATM media modules. The 6416SW module saves the configuration information in nonvolatile memory.

Verifying Normal 6416SW Operation

After installing the 6416SW 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 2-4 on page 2-9.

The RUNNING LED on the module should light (yellow).

The ACTIVE LED should light (yellow) if the 6416SW 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 Switch/Control Module
(c) Copyright IBM Corp. 1994, 1996. All rights reserved.
```

Now you can enter 6416SW commands from the local console to set up your system defaults and configure ATM media modules as explained in Chapter 5, “Configuring the ATM Switch/Control Module” on page 5-1. If you have problems while configuring your ATM subsystem, refer to Chapter 7, “Troubleshooting” on page 7-1.

How to perform wrap tests on ATM ports is described in the *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*.

The next section describes the front panel of the 6416SW module and the meaning of each LED.

Front Panel

The front panel of the 6416SW 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 3Com service personnel)
- ATM Reset button that resets all ATM modules (6416SW and ATM media) in the ONcore hub.

The position of these components on the front panel is shown in Figure 2-4 on page 2-9

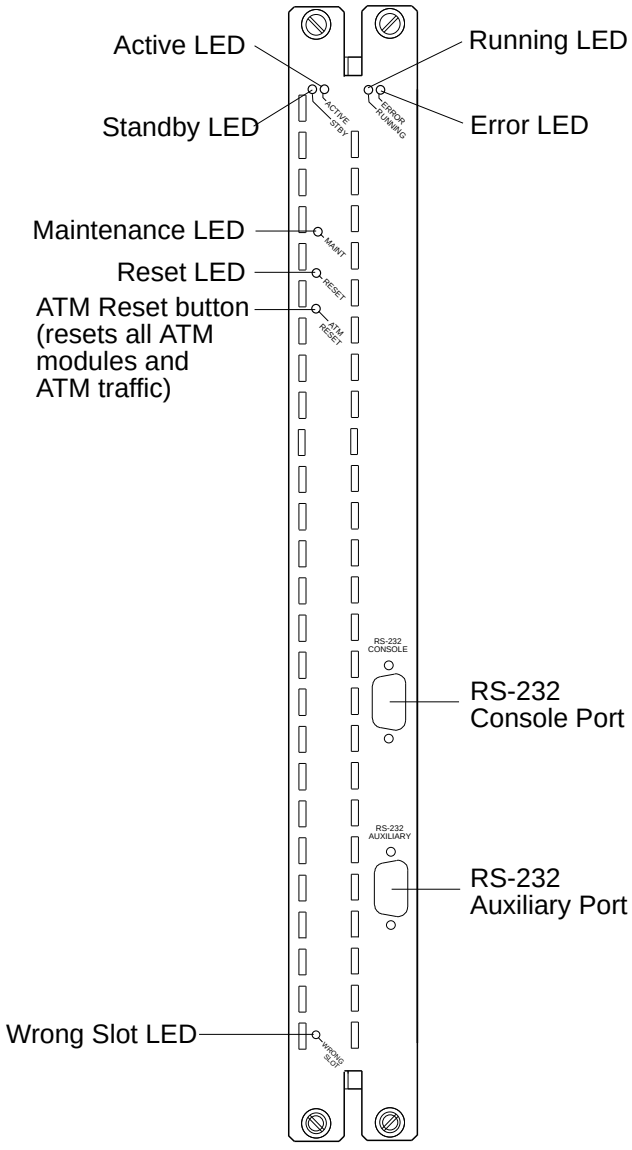


Figure 2-4. Front Panel of 6416SW Module

Meaning of the LEDs

Table 2-1 shows the meaning of each LED on the front panel of the 6416SW module.

Table 2-1 (Page 1 of 2). Meaning of the 6416SW LEDs

LED Name	Color	State	Meaning
Active	Yellow	OFF	6416SW module is not able to control ATM traffic and ATM media modules.
		ON	6416SW module is able to control ATM traffic and ATM media modules.
Standby (STBY)	Yellow	OFF	Either a second 6416SW module is not installed or, if a second 6416SW is installed, it is not active.
		ON	The second 6416SW module is installed and active.
Running	Yellow	OFF	6416SW software is not running. The Error LED or the Maintenance LED lights up.
		ON	6416SW software is started and running properly.
Error	Red	OFF	6416SW module is functioning properly.
		ON	6416SW module is not operational because of an error. See Chapter 7, “Troubleshooting” on page 7-1.

Table 2-1 (Page 2 of 2). Meaning of the 6416SW LEDs

LED Name	Color	State	Meaning
Maintenance (MAINT)	Yellow	OFF	6416SW module is functioning properly.
		ON	Maintenance mode is active.
Reset	Yellow	OFF	6416SW module is functioning properly.
		ON	6416SW and ATM media modules in hub are being reset.
Wrong Slot	Yellow	OFF	Normal operation.
		ON	6416SW module is not installed in the correct slots.

ATM Reset Button

The ATM Reset button resets the 6416SW and all ATM media modules in the ONcore 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 6416SW 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 6416SW module at installation.

Enter 6416SW network management commands (described in the *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*).

Download new software versions.

Table 2-2. 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 the 6416SW 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 3Com service engineers. No device should be connected to it during normal hub operation.

Table 2-3. RS-232 Auxiliary Port Pin Assignments

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

This chapter describes:

- The components of an ATM Campus Network
- Guidelines for defining an ATM Address for the ATM Switch/Control
- 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.

3Com ATM subsystems can be interconnected in order to build a local, privately owned and administered ATM network called an **ATM Campus Network**.

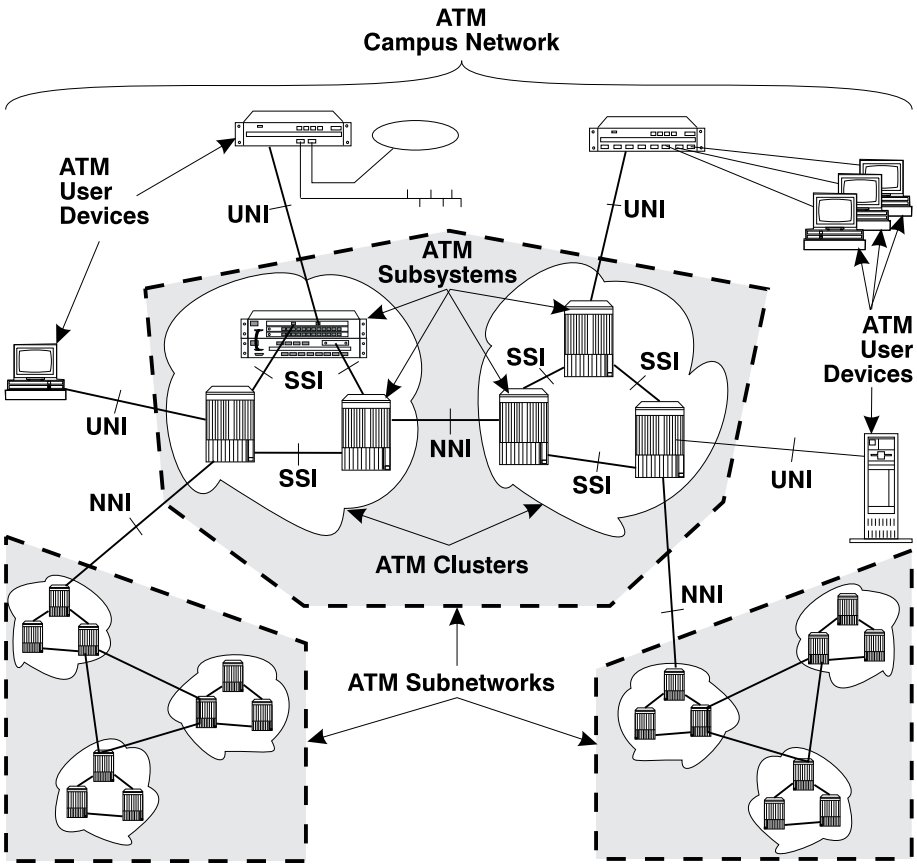


Figure 3-1. Components of an ATM Campus Network

Network Components

The various parts of the ATM address form a hierarchy of network components, as shown in Figure 3-2.

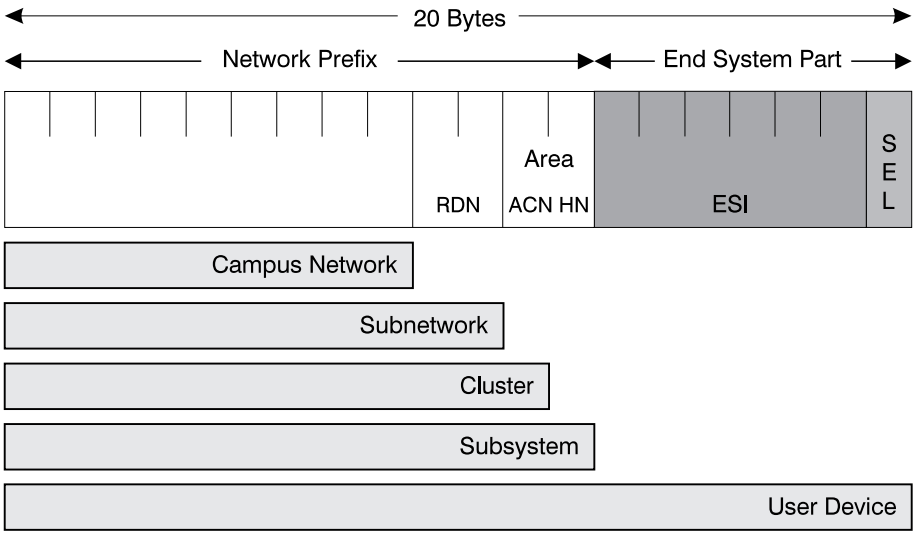


Figure 3-2. ATM Address Hierarchy

For a full description of the ATM address formats supported by the 6416SW, see Appendix E, “ONcore ATM Address Formats” on page E-1.

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 Switch/Control module functions
Devices connected to the ATM ports
ATM media modules installed
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 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 6416SW 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 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 3Com 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 6416SW

A default ATM address is provided with the 6416SW. You can continue to use this default address only if you use your 6416SW as a stand-alone ATM switch.

If you want to connect the 6416SW 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 6416SW 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 6416SW belongs.

HN If the ATM cluster contains multiple ATM subsystems, this byte specifies the number of this 6416SW in the cluster.

This address is assigned to the 6416SW 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 3-3 shows an example of logical links between pairs of ATM clusters from a boundary hub in each cluster.

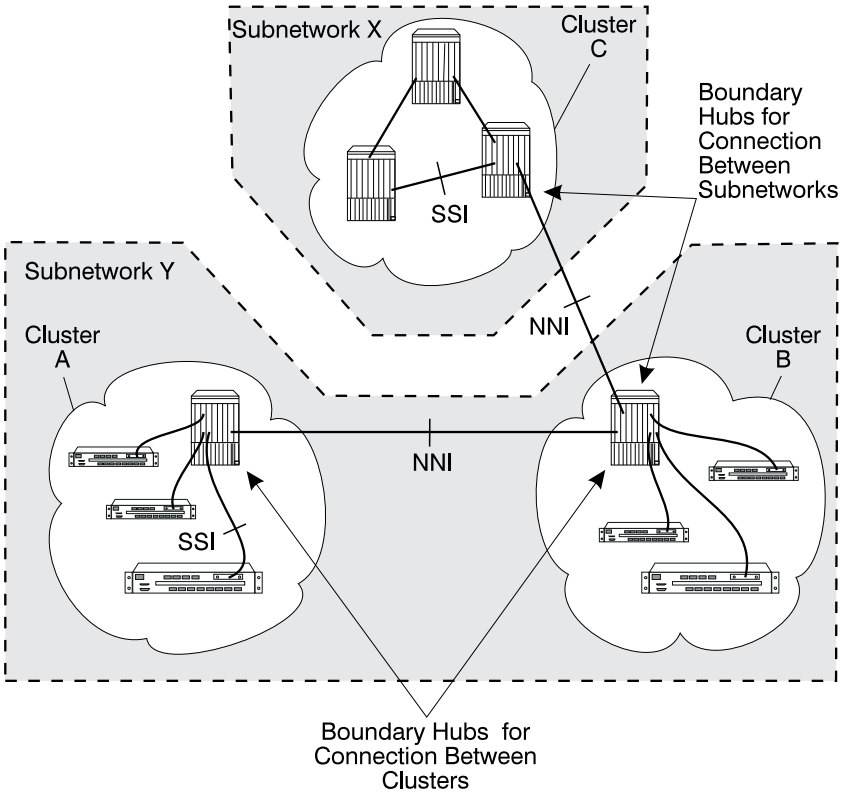


Figure 3-3. ATM Logical Links Used to Connect ATM Clusters

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 an ONcore/CELLplex 4000 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 3-4 on page 3-12), 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.

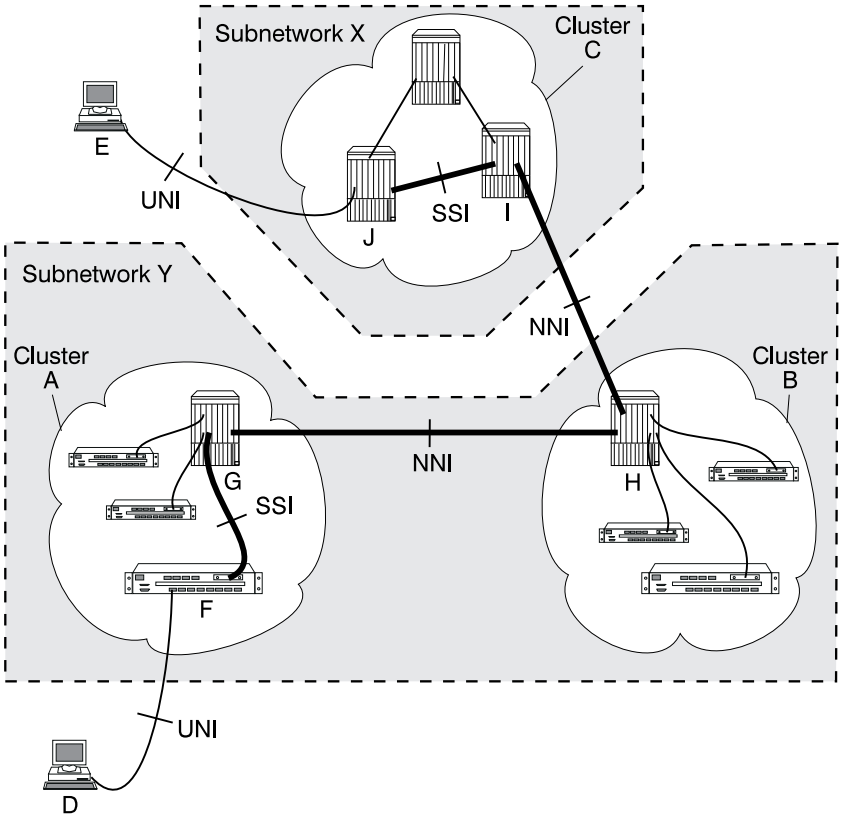


Figure 3-4. Using Static Route Mappings to Connect User Devices Across Subnetworks

Using Permanent Virtual Connections

Permanent virtual connections (PVCs) for virtual channel and virtual path connections are created via the SET PVC command. See the *ONcore Switching Hub/CELLplex 4000 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 6416SW configuration console
- How to set up the 6416SW configuration console in Normal (ASCII) mode
- How to set up the 6416SW configuration console via a SLIP protocol connection
- How to access the 6416SW from a remote console via TELNET
- How to reconfigure configuration console settings.

Overview

The commands for configuring the 6416SW 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 4-7 for instructions on connecting a configuration console to the 6416SW in Normal mode.

SLIP mode

In SLIP mode, commands are entered via a TELNET session between an IP workstation and the 6416SW.

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 ONcore. (See “Uploading and Downloading Operations” on page 6-5.)

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 4-8 for instructions on connecting a configuration console to the 6416SW 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 4-12.

Using an SNMP management application, as described in Chapter 6, “Network and Switch Management” on page 6-1.

Before You Start

The following section describes keystrokes and the command syntax to use to enter 6416SW commands from a configuration console. For a complete description of all 6416SW configuration commands, see the *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*.

Entering 6416SW Commands

By entering commands at the prompt on the 6416SW configuration console, you can configure various functions of the 6416SW. The management prompt appears as follows:

```
ONcoreATM>
```

6416SW 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 *ONcore Switching Hub/CELLplex 4000 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 6416SW 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 6416SW 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 6416SW commands, type ? on the command line and press Enter. For example, to see what commands start with the word SAVE, you would enter:

```
ONcoreATM> 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 6416SW commands. An example is shown here:

```
ONcoreATM> ?       [ENTER]

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

Command Completion

The 6416SW 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:

```
ONcoreATM> sa
```

The system automatically fills in the rest of the command:

```
ONcoreATM> 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:

```
ONcoreATM> save comm
```

The rest of the parameter is automatically entered:

```
ONcoreATM> 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 6416SW commands:

1. Connect an ASCII-type terminal to the RS-232 console port on the front panel of the 6416SW.
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 6416SW so that the configuration console and the 6416SW can communicate. The factory-set default settings for the 6416SW 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. As no factory password is provided for administration first Logon, press Enter.

```
Welcome to system administrator service on ONcore.
ONcoreATM>
```

You can now proceed to configure the 6416SW, as described in Chapter 5, "Configuring the ATM Switch/Control Module" on page 5-1.

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 6416SW 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 6416SW 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 4-7.
3. If a data transmission rate **other than 9600** is required, use the SET TERMINAL BAUD command to configure a data transmission rate.

```
ONcoreATM> set terminal baud 192        [ENTER]
```

4. Set the local IP address (6416SW) and remote IP address (workstation) for the SLIP protocol using the SET TERMINAL SLIP_ADDRESSES command.

```
ONcoreATM> set terminal slip_addresses      [ENTER]
Enter local ip address : 9.1  .86.139       [ENTER]
Enter remote ip address : 9.1  .86.138      [ENTER]
ONcoreATM>
```

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

```
ONcoreATM> 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 6416SW and verify the 6416SW-to-workstation connectivity by issuing a PING request.

```
C:\ping 9.1  .86.138       [ENTER]
```

8. Start a TELNET session to the 6416SW.

```
ONcoreATM> telnet 9.1  .86.139       [ENTER]
```

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

```
Password:

Welcome to system administrator service on ONcore.
ONcoreATM>
```

You can now proceed to configure the 6416SW, as described in Chapter 5, “Configuring the ATM Switch/Control Module” on page 5-1.

Returning to Normal Mode

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

```
ONcoreATM> set terminal console_port_protocol normal      [ENTER]
```

Note: An 6416SW 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 6416SW.

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

1. Use `Custom` command, then SLIP interface
2. Select `SL` 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 6416SW.

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 6416SW download and upload operations.
7. Set terminal speed with the `mode com1` command.
8. PING the IP address of the remote 6416SW.

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 6416SW's remote login feature allows you to log on to an 6416SW from a remote configuration console or network workstation that supports the TELNET protocol.

You can remotely log on to only one 6416SW at a time.

Minimum Local Configuration

Before you can log on to the 6416SW 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 6416SW

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 6416SW

Set the IP address of the 6416SW

Enable the port that will be used for the TELNET session.

LAN Emulation

Set the ATM address of the 6416SW

Start the LEC.

These steps are described in Chapter 5, "Configuring the ATM Switch/Control Module" on page 5-1.

Logon Procedure

You specify the 6416SW by entering its IP address with the TELNET command:

```
C:\ telnet 123.94.2 2.9              [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 6416SW 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 6416SW accessed through your configuration console. The following message is displayed with the local management prompt:

```
ATM2 logout                          [ENTER]

Bye

Remote session completed
C:\
```

Figure 4-1 shows an example of an 6416SW remote login. Note that once you are connected to 6416SW A, you can remotely log on and manage the 6416SW modules in either hub B or hub C.

Note: The TELNET protocol is not routable.

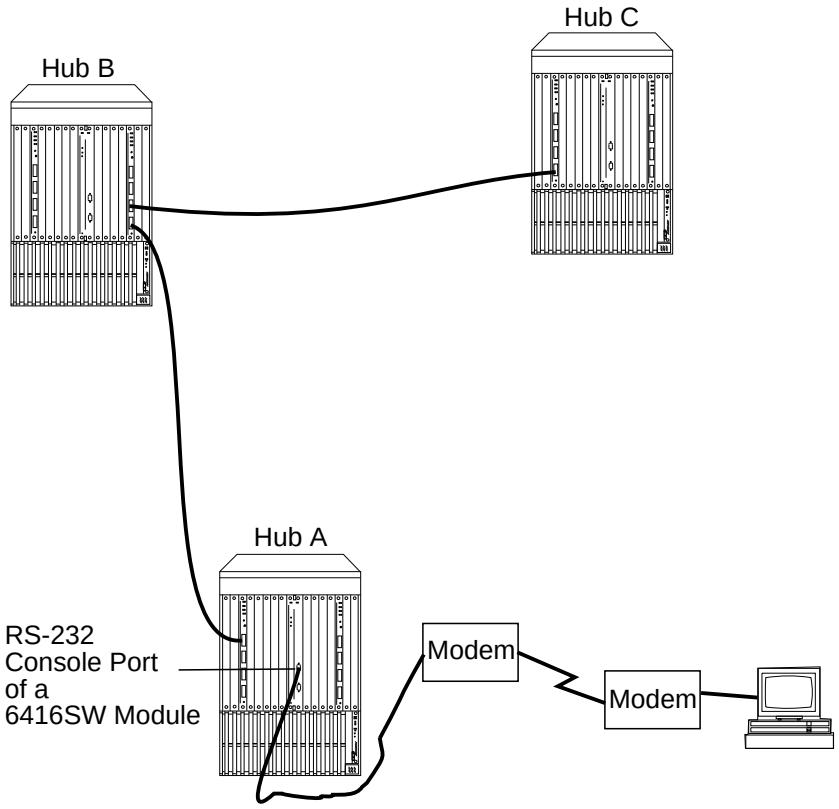


Figure 4-1. Working in Remote 6416SW Sessions

You can set a timeout period for a remote 6416SW by entering the SET TERMINAL TIMEOUT command. When this value is exceeded, the system automatically logs you off the remote 6416SW 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 6416SW. To save these changes, you must re-establish the remote session and enter the SAVE command.

Reconfiguring 6416SW Configuration Console Settings

Carry out the procedures in this section only if you need to connect another device (besides the 6416SW configuration console) to the 6416SW, and if the other device runs at a slower baud rate, uses a different parity, or has a different data bit value than the 6416SW's pre-configured factory settings.

For example, if you want to connect a 4800 baud modem to the 6416SW 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:

```
ONcoreATM> set terminal baud 48    [ENTER]
```

See the *ONcore Switching Hub/CELLplex 4000 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 6416SW, 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 6416SW, 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 *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*.

Automatic Modem Hangup

If you use a modem to connect to the 6416SW, you can use the SET TERMINAL HANGUP command to automatically hang up the modem connection when you log off the 6416SW. 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 6416SW. The command is set by default to `disable` so that the modem does not automatically hang up.

```
ONcoreATM> set terminal hangup enable  [ENTER]
```

Chapter 5. Configuring the ATM Switch/Control Module

This chapter describes:

- How to enter the commands needed to configure the 6416SW module
- How to save, modify and revert configuration settings
- How to use 6416SW commands for fault management.

Before beginning the procedures listed below, make sure that:

1. You have installed the 6416SW module correctly (see Chapter 2, “Installation” on page 2-1)
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 4-1).

Configuration Summary

To configure the 6416SW, follow the steps listed below. Each of these steps is described in a subsequent section of this chapter.

1. Set the 6416SW user and administrator passwords.
2. Set the internal clock.
3. Set the local 6416SW parameters such as:

   Switch name
   Switch location
   Service contact information
   Console prompt
   Console timeout

4. Define the ATM address of the 6416SW. 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 ONcore to one or more clusters or subnetworks in an &agenatrm.-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 6416SW, 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 6416SW.

Some of these procedures are **mandatory**; others are recommended. They are summarized in Table 5-1 on page 5-4. For a detailed description of each 6416SW configuration command, see the *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*.

Table 5-1 (Page 1 of 2). 6416SW Configuration Commands		
Procedure	**6416SW Command**	**Priority**
Set user and administrator passwords	SET DEVICE PASSWORD	Mandatory
Set the internal clock	SET CLOCK	Recommended
Set 6416SW name	SET DEVICE NAME	Recommended
Set hub location	SET DEVICE LOCATION	Recommended
Set contact information	SET DEVICE CONTACT	Recommended
Set 6416SW console prompt	SET TERMINAL PROMPT	Optional
Set console timeout value	SET TERMINAL TIME_OUT	Optional
Set 6416SW 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

Table 5-1 (Page 2 of 2). 6416SW Configuration Commands		
Procedure	**6416SW Command**	**Priority**
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 6416SW 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 6416SW 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 6416SW Passwords

It is necessary to set two levels of 6416SW passwords:

Administrator password that provides access to **all** 6416SW commands with read-write (configuration) access

User password that provides access to a **subset** of 6416SW commands including most SHOW commands, PING and TELNET.

See the *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide* for more information on access to 6416SW commands.

Administrator Password

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

```
ONcoreATM> 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:

```
ONcoreATM> save device
```

Then press Enter.

You will need to enter the new administrator password the next time you log on to the 6416SW. 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 6416SW using the administrator password.
2. At the management prompt, type the SET DEVICE PASSWORD USER command:

   ```
   ONcoreATM> 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:

   ```
   ONcoreATM> save device
   ```

   Then press Enter.

Setting the Internal Clock

You need to set the 6416SW's 24-hour internal clock only once, when you install the 6416SW. 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:

```
ONcoreATM> set clock 16:44 1996/ 9/3        [ENTER]
```

The 6416SW internal clock uses its own battery and functions even when the 6416SW fails to operate.

Setting Local 6416SW Parameters

The 6416SW is pre-configured with default settings that may need to be changed before you can use the switch. To modify these 6416SW parameters, you must log on using the system administrator password. Then use the SET command to change the values for any of the following:

- 6416SW 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 *ONcore Switching Hub/CELLplex 4000 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 6416SW. You can then use this name instead of the IP address to identify the 6416SW.

To set a unique name for the 6416SW, enter the SET DEVICE NAME command and press Enter.

```
ONcoreATM> set device name [6416SW name]      [ENTER]
```

Service Contact Information

After installing and logging on to the 6416SW, you should enter the location of the 6416SW and the name of the appropriate person to contact in case of a failure in the ATM subsystem or with the 6416SW

To do so, enter the following commands:

SET DEVICE LOCATION to specify where the 6416SW is installed

SET DEVICE CONTACT to specify the name of the service personnel to contact.

Console Prompt

3Com also recommends that you customize the prompt used by each 6416SW console. This helps you to easily recognize the 6416SW to which you are connected when you are logged on to a remote switch.

The default prompt is:

```
ONcoreATM>
```

Suggestion: To make it easier to recognize the 6416SW by its command prompt, set the prompt to the name of the 6416SW used in the SET DEVICE NAME command. See the *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide* for more information.

To customize the 6416SW management prompt, use the SET TERMINAL PROMPT command.

```
ONcoreATM>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 6416SW console without entering any data from the keyboard. This prevents unauthorized users from accessing the 6416SW 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 . 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.

```
ONcoreATM>set terminal timeout 2      [ENTER]
```

Setting the ATM Address of the 6416SW

A default ATM address is provided with the 6416SW. You can use this default address only for a stand-alone (isolated) 6416SW. For all other 6416SW configurations, a new ATM address must be defined. See “Defining the ATM Address of the 6416SW” on page 3-7 for more information.

To set the ATM address for the 6416SW, you use the SET DEVICE ATM_ADDRESS command:

```
ONcoreATM> set device atm_address       [ENTER]

ONcoreATM>Enter ATM address: 39.11.FF.22.99.99.99.  .  .  .  . 1.49.11.11.11.11.
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:

```
ONcoreATM> 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 5-15.

Enabling ATM Ports and Interfaces

Before you can use the devices attached to the ATM media ports in the 6416SW, 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:

```
ONcoreATM> 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 3-6 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:

```
ONcoreATM> set port 1.2 disable       [ENTER]
```

Setting Up Trunks (Logical Links)

To connect the 6416SW to another ATM switch, you must create a trunk using the SET LOGICAL_LINK command.

See “Setting-Up ATM Trunk Connections” on page 3-8 for a description of the strategy for setting up trunk links in an ATM network.

The *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide* 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:

```
ONcoreATM> set static_route 453377415312   1 2 4   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 the 6416SW from an SNMP workstation, you may access the 6416SW 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 over ATM subnetwork (IP)

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

802.3 LAN Emulation over ATM 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 6416SW

For example, the following command sets a unique IP address for a Classical IP over ATM subnetwork on the 6416SW and a subnetwork mask for an ATM class C device:

```
ONcoreATM> set device ip_address atm 195.44.45.48 FF.FF.FF.        [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:

```
ONcoreATM> set device ip_address atm 195.44.45.48 FF.FF.  .        [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 6416SW.

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, connected to an ONcore hub.
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:

```
ONcoreATM>set device lan_emulation_client eth ip_address 9.1  .2 .55   [ENTER]

Client starting.
ONcoreATM>
```

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 6416SW 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:

```
ONcoreATM> 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:

```
ONcoreATM> set device arp_server 39.11.FF.22.99.99.99.  .  .  .  . 1.49.11.11.11.
11.11.11.49       [ENTER]
```

Community Table (IP & LE)

The Community table defines which SNMP stations in the network can access information from the 6416SW, and which station(s) will receive a trap from the 6416SW 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 6416SW:

```
ONcoreATM> 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 6416SW local console and network management stations, you use the SET ALERT command. See the *ONcore Switching Hub/CELLplex 4000 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:

```
ONcoreATM> 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 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 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.

```
ONcoreATM>set lan_emul configuration_server active_wka|inactive_wka
ONcoreATM>Enter ATM address: 39.99.99.99.99.99.99.  .  .99.99. 1. 2.  .8 . 5.A9.
92.9F.        [ENTER]

Entry set.
ONcoreATM>
```

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 6416SW 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:

```
ONcoreATM> 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:

```
ONcoreATM> set port 1.3 enable UNI          [ENTER]
Port set
ONcoreATM> save module_port                [ENTER]
ONcoreATM>
```

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:

```
ONcoreATM> logout               [ENTER]
Bye
```

If, when logging off, you have changed 6416SW configuration parameters but forgotten to save them, the following message appears:

```
ONcoreATM> 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 6416SW. 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 6416SW session to more easily identify it.

```
ONcoreATM> 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.
ONcoreATM>
```

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 6416SW 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:

```
ONcoreATM> 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     ONcore ATM 1   Mbps UNI Module
 5      n       n        n     -
 6      n       n        n     -
 7      n       n        n     -
 8      n       n        n     -
 9      Y       Y        Y     ONcore ATM Switch/Control Module
1       Y       n        n     -
11      n       n        n     -
12      Y       n        n     -
13      Y       Y        Y     ONcore ATM 155 Mbps Module
14      Y       n        n     -
15      Y       n        n     -
16      n       n        n     -
17      n       n        n     -
ONcoreATM>
```

The following example shows the output of a SHOW MODULE n VERBOSE for a 6404M-100 module and a 6402M-155 module.

```
ONcoreATM> show module 4 verbose      [ENTER]

Slot Install Connect Operation General Information
-------------------------------------------------
  4    Y      Y       Y    ONcore ATM 1   Mbps Module

status: connected / hardware OK
       enable / normal

P/N: F 4FFFF  EC level: G 4GGG Manufacture: I 41
Operational FPGA version : 7
    Backup FPGA version : 7


    Type  Mode     Status
-------------------------------------------------------------------------------
 4. 1:UNI enabled  UP-OKAY
 4. 2:UNI enabled  UP-OKAY
 4. 3:SSI enabled  UP-OKAY
 4. 4:UNI enabled  UP-NO ACTIVITY

ONcoreATM> show module 2 verbose      [ENTER]

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

status: connected / hardware OK
       enable / normal

P/N: F 2FFFF  EC level: G 2GGG Manufacture: I 41
Operational FPGA version : 6
    Backup FPGA version : 6


    Type  Mode     Status
-------------------------------------------------------------------------------
 2. 1:NNI enabled  UP-OKAY
 2. 2:UNI enabled  UP-NO ACTIVITY

ONcoreATM>
```

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 5-25 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 6416SW 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 6416SW, you enter:

```
ONcoreATM> show port all      [ENTER]

Port display for module ONcore ATM 1   Mbps UNI Module

Port   Type   Mode     Status
-------------------------------------
4. 1   UNI    disabled  UP-OKAY
4. 2   NNI    enabled   UP-OKAY
4. 3   UNI    disabled  UP-NO ACTIVITY
4. 4   UNI    disabled  UP-OKAY
----- more -----
Port display for module ONcore ATM 1   Mbps UNI Module

Port   Type   Mode     Status
-------------------------------------
12. 1  NNI    enabled   UP-OKAY
12. 2  UNI    enabled   UP-NOT IN SERVICE
12. 3  SSI    disabled  UP-NO ACTIVITY
12. 4  SSI    disabled  UP-OKAY
ONcoreATM>
```

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

```
ONcoreATM> show port 1.1  verbose           [ENTER]

 1.1 :SSI enabled  UP-OKAY
SSI Bandwidth       : 25    kbps
Connector          : RJ45
Media              : none
Remote device is active
IX status          : IX OK
Port speed         : 25    kbps
ONcoreATM>
```

Chapter 6. Network and Switch Management

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

The three methods for managing the ATM Switch/Control

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 a 6416SW.

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

Remote login from 6416SW consoles via TELNET. Management traffic flows via the network. You can start only one remote session on a 6416SW.

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

From a network management station running Transcend ONcore ATM Campus Manager or another network management application that supports SNMP protocols and the ONcore 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 6-2. For instructions on how to access the Internet library to view the available MIB commands, see “Accessing MIB Files” on page 6-3.

SNMP Support

In a campus environment managed by the Simple Network Management Protocol (SNMP), the 6416SW module acts as an SNMP agent allowing you to configure all ATM modules in the hub using SNMP.

6416SW 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 6416SW module sends alerts to the IP addresses in the community table that have either `trap`, `read-trap`, or `all` assigned. The 6416SW and ATM media modules can be configured via SNMP from stations whose IP addresses have either `read-write` or `all` assigned. The 6416SW 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 6416SW community table, the 6416SW 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 a 6416SW 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.

How to access the MIB files on Internet is described on page F-6.

Security Control

To prevent unauthorized access to an ATM subsystem, the 6416SW module provides two password levels to protect against network tampering and unauthorized access to the 6416SW console.

The **administrator password** allows full use of all 6416SW commands; the **user password** allows use of a limited set of 6416SW commands that does not let you change configuration settings. See the *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide* for more information.

The ports of an ATM media module are disconnected the first time you install the module in a ONcore hub. This is an additional security feature to prevent unauthorized access to the ATM subsystem. You must then enable the ATM ports using 6416SW commands. All other ATM functions are set to their default values.

Uploading and Downloading Operations

The picocode or microcode for your 6416SW 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 6-1.

For more information on the commands used to start these operations, see the *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*.

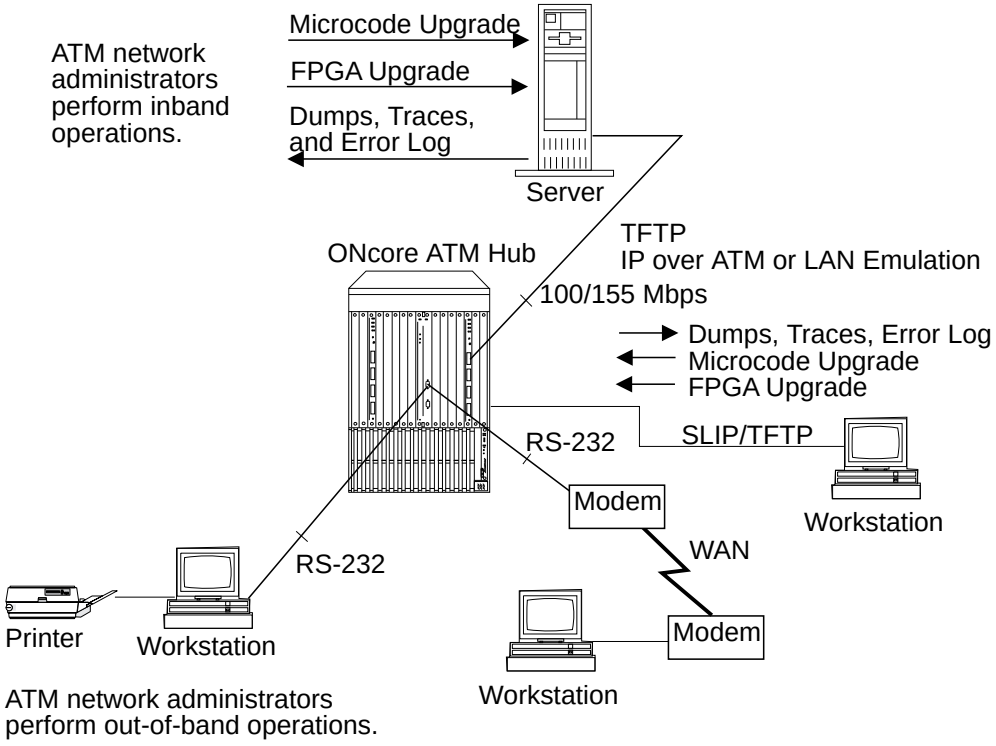


Figure 6-1. Upgrade Operations for ATM Microcode

Inband Operations

To upgrade ATM microcode, ATM network administrators perform inband operations from a server connected to a ONcore hub, using a workstation connected to the 6416SW module as the 6416SW 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 6416SW microcode.

Upgrade hardware picocode in the Field Programmable Gate Array (FPGA) of the 6416SW and ATM media modules.

Upgrading 6416SW Microcode

To upgrade 6416SW microcode, enter the following 6416SW 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 6416SW microcode).
5. SWAP MICROCODE (to reboot the 6416SW module with the new code).

Upgrading FPGA Picocode in ATM Modules

To upgrade hardware picocode in the FPGA of 6416SW 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 6416SW 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 6416SW 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 6416SW 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 6416SW 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 6416SW 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 6416SW commands at the directory prompt:

1. SET TFTP SERVER_IP_ADDRESS (to define the server connected to the 6416SW 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).

Out-of-band Operations

ATM network administrators can upgrade 6416SW 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 6416SW module.

After locating the directory where the microcode updates are stored, use the workstation as the 6416SW 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 6416SW 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.

Chapter 7. Troubleshooting

This chapter describes how to diagnose and solve problems associated with the installation and operation of the 6416SW 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 6416SW 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 Switch/Control Module” on page 5-1 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 6416SW 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.

Phase 1: Installation and Power Problems

This section describes the troubleshooting operations for problems that occur after you turn ON the ONcore hub and wait for the 6416SW ACTIVE LED to light ON (yellow). “Verifying Normal 6416SW Operation” on page 2-7 describes the other LED conditions.

Phase 1 problems concern the installation tasks described in Chapter 2, “Installation” on page 2-1 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 6416SW LEDs
- Power supply problems.

After solving Phase 1 problems, the 6416SW ACTIVE LED lights ON (yellow). A yellow ACTIVE LED indicates that the 6416SW module is ready to control the ATM subsystem and that you can begin configuring the ATM subsystem in the ONcore hub as described in Chapter 5, “Configuring the ATM Switch/Control Module” on page 5-1.

Prerequisites for ATM Troubleshooting

In order to determine the cause of a problem during installation of 6416SW and ATM media modules or after turning ON the hub:

The correct microcode must be installed.
6416SW LEDs must function properly.
6416SW 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 Fault-Tolerant Controller (RCTL) code is at least v1.01. If it is not, the hub slots in which ATM media modules are installed may not receive power.
2. Make sure that the 6416SW 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 6416SW and ATM media LEDs are functioning properly by pressing the LED Test button on the Fault-Tolerant Controller (RCTL) module. If one or more LEDs on a 6416SW or ATM media module do not light ON, replace the module(s).

Diagnosing Problems from the ATM Media LEDs

The following section details problems that can occur with ATM media modules.

WRONG SLOT LED is ON.

Explanation: Either the ATM backplane is not installed in the ONcore or the ATM media module has been inserted in an incorrect slot.

Steps to Take:

1. Check that the backplane is installed (in the upper part of the ONcore).
2. Check that the ATM media module has not been inserted in an incorrect slot (slot 9, 10, or 11), which is reserved for ATM Switch/Control modules.

No LED is ON.

Explanation: This is the default behavior when you install an ATM media module that has never been used; the ports are disabled so no light is on. If this is not the case, follow the steps below.

Steps to Take:

1. Check that the module is 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 2-2 on page 2-4.)
2. If the ports are not enabled, check that the module is working correctly by issuing the SHOW MODULE and SHOW PORT commands.
3. Check that the power budget has not been 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 *3Com ONcore Hub Installation and Operation Guide* (17-00362) to see if there is a problem associated with the power budget.

4. Check that the power of the slot has not 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 6416SW LEDs

After installing the 6416SW module, the following should occur when you turn ON the ONcore 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 6416SW module after you turn on the ONcore hub and the actions to take to solve them are shown below. 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 7-9.

WRONG SLOT LED is ON.

Steps to Take:

1. 6416SW module is inserted in the wrong slot. Re-insert it in slots 9 and 10 or in slots 11 and 12.

   Note: Slots 11-12 on 17 slot models are used by the backup 6416SW. To use them, make sure that slots 9 and 10 have a 6416SW installed.

After turning ON the hub, no LED stays lit except for the WRONG SLOT LED which lights (ON) and then turns OFF.

Steps to Take:

1. Refer to the *3Com ONcore Switching Hub Installation and Operation Guide* (17-00362) to see if there is a problem associated with the power budget.
2. Refer to the Power Management chapter in the *3Com ONcore Distributed Management Module User's Guide* (17-00370).

Power is ON but the RUNNING LED does not light (yellow).

Steps to Take:

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 6416SW module has been installed correctly by following the installation procedure in Chapter 2, “Installation” on page 2-1.
3. Press the ATM Reset button on the 6416SW module.
4. If the RUNNING LED still does not light, call your 3Com dealer or your 3Com representative.

ERROR LED lit (red) to indicate a severe error.

Steps to Take:

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 6416SW module has been installed correctly by following the installation procedure in Chapter 2, “Installation” on page 2-1.
3. Press the ATM Reset button on the 6416SW module.
4. If the ERROR LED remains lit, call your 3Com dealer or your 3Com representative.

ACTIVE LED is not lit.

Steps to Take:

1. If the diagnostics are enabled and running, wait at least 7 seconds.
2. See if the 6416SW module is installed in slots 11 and 12. If it is, re-insert it in slots 9 and 10.
3. Press the TEST LED button on the power supply module to verify that the ACTIVE LED is not burned out.
4. Verify that the 6416SW module has been installed correctly by following the installation procedure in Chapter 2, “Installation” on page 2-1.

5. Press the ATM Reset button on the 6416SW module.
6. If the ACTIVE LED still does not light, call your 3Com dealer or your 3Com representative.

MAINT LED is lit and you have not entered the MAINTAIN command.

Steps to Take:

1. Make sure that the console cable is plugged into the topmost RS-232 port on the front panel of the 6416SW module.
2. Enter the BOOT command.

MAINT LED is lit, ONcore stays in Maintenance Mode.

Steps to Take:

1. The 6416SW is badly plugged. Replug the 6416SW. When you feel that the module is almost inserted, use the levers to push it in completely. (see Figure 2-2 on page 2-4.)
2. A pin is bent on one of the 6416SW connectors. Check the rear of the 6416SW.
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 C-5.

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 below. If you cannot solve the problem and if the 6416SW ACTIVE LED does not light ON, contact an 3Com service representative before configuring the ATM subsystem.

There is a power supply failure due to poor power prioritization (configured with the SET POWER command from the Distributed Management Module).

Steps to Take:

1. Refer to the *3Com ONcore Hub Installation and Operation Guide* (17-00362).

An ATM module is not in service.

Steps to Take:

1. Use the SHOW PORT command to verify that the module's status is `hardware K0` and `failure`.
2. Replace the module.

The power load capacity has been set to a higher value than the power supply capability.

Steps to Take:

1. Refer to the *3Com ONcore Hub Installation and Operation Guide* (17-00362).

Phase 2: Problems During ATM Configuration

The problems in this phase occur after you turn ON the ONcore hub and the 6416SW ACTIVE LED lights ON (yellow). This indicates that the 6416SW module is ready to control the ATM subsystem.

Phase 2 problems concern the configuration tasks described in Chapter 5, “Configuring the ATM Switch/Control Module” on page 5-1 and are divided as follows:

- Problems concerning the operation of the 6416SW console
- Problems concerning the configuration of 6416SW 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 3Com service representative before attaching an ATM device.

Diagnosing Problems Concerning the 6416SW Console

The following section describes the problems that may arise after attaching the local console to the 6416SW module through the RS-232 Console port. If you find that the problem does not concern the 6416SW console, continue troubleshooting with “Diagnosing Problems with ATM Modules” on page 7-14.

No prompt appears on your console screen when you press ENTER.

Steps to Take:

1. Check that the RS-232 cable meets the specifications described in Appendix B, “RS-232 Cable and Modem Requirements” on page B-1.
2. Check that the RS-232 cable is securely plugged into the 6416SW module and the console in the correct ports.
3. The terminal parameters do not match the ONcore communications parameters.

   Use Telnet to modify the terminal parameters, using the SET TERMINAL command.

   Use the SHOW DEVICE command to check the 6416SW 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 6416SW. 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.

Characters appear on the screen but they are not legible.

Steps to Take:

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.

You cannot enter commands reserved for the ATM network administrator, or the SET commands do not work.

Steps to Take:

1. Make sure that you are logged on as the administrator.

After you enter the first part of a 6416SW command and press the space bar, the rest of the command is not automatically filled in.

Steps to Take:

1. Enter more letters in the command in order to distinguish it from other commands that are written similarly. Then press the space bar again.

Random characters are lost.

Steps to Take:

1. Set the flow control on the console to XON/XOFF.

Some characters are lost when you are connected to the 6416SW module through a modem.

Steps to Take:

1. Make sure that the STOP_BITS parameter on the console is set to 1.

The passwords do not work or you forgot a password.

Steps to Take:

1. Enter `force` at the password prompt. Then press the ATM Reset button on the front panel of the 6416SW module within 3 seconds. This will reboot the 6416SW to the factory default settings.

When you turn ON the hub, your last configuration settings are not loaded. A different configuration is activated.

Steps to Take:

1. Re-enter the configuration settings and save them using the SAVE command.

The >> prompt appears on the screen and you have not entered the MAINTAIN command.

Steps to Take:

1. The 6416SW module is running in maintenance mode. To return to normal operation mode, enter the BOOT command. This resets the ATM subsystem.

The >>*abcd*>> prompt appears, where *a,b,c,d* are 4 hexadecimal digits.

Steps to Take:

1. The 6416SW entered maintenance mode because of an error, which is indicated by the error-code prompt. Refer to “Maintenance Codes” on page C-5 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 6416SW 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 *ONcore Switching Hub/CELLplex 4000 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 K0` 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 below.

Status: Unknown

Explanation: Port status is not available because port is not reachable.

Steps to Take:

1. Use the SHOW MODULE command to check if the ATM media module is connected to the 6416SW 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 6416SW. Check the prerequisites in the release Note..
4. If the problem persists, replace the ATM media module.

Status: Error

Explanation: An internal error is detected on the port.

Steps to Take:

1. Reset the ATM media module using the RESET MODULE command.
2. If the problem persists, replace the ATM media module.

Status: No Activity

Explanation: No physical layer activity is detected (either there is no cable/fiber attached, or there is no signal on the Receive cable/fiber.

Steps to Take:

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`. li.If the port is enabled, make sure that the remote device is operational and that its adapter is securely plugged in.
3. Make sure that the fiber/cable is securely plugged on the hub.
4. Enter the WRAP command to perform a wrap test.
5. If the wrap test result is K0, the problem is associated with the hub.
6. For SC-type connectors, check that the receive and transmit cables/fibers are not swapped.
7. For SSI ports, make sure that you are using UTP/STP (ATM standard) cables to interconnect between ONcore/4412SW switches.

Status: Not In Service (UNI port)

Explanation: 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.

Steps to Take:

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. 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 ONcore

    Check that you have an LECS address configured in your ONcore 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.

Status: Not in Service (SSI Port)

Steps to Take:

1. Use the command SHOW PORT slot.port VERBOSE command to determine the problem.
2. 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 0KAY, perform the Wrap test as described in the *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*. If you find that the module is faulty, replace it. For assistance, contact your 3Com 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 3Com 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 *ONcore Switching Hub/CELLplex 4000 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 “Diagnosing Problems with ATM Ports” on page 7-15.

   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 7-22.

   Perform the the Wrap test as described in the WRAP EXTERNAL command in the *ONcore Switching Hub/CELLplex 4000 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 “Diagnosing Problems with ATM Ports” on page 7-15.

   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 hub 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 a ONcore 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 ONcore 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 E, “ONcore ATM Address Formats” on page E-1 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 ONcore 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 ONcore hub.
5. Contact your 3Com 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, ONsemble ATM 25 Mbps Concentrator, 25Mbps client, and so on), check the following:

If the attached device is an ONsemble ATM 25 Mbps Concentrator, enter the SHOW PORT command to see if the port's status is 0KAY. If the status is not 0KAY, follow the steps in “Diagnosing Problems with ATM Ports” on page 7-15.

If a trap or error message is displayed on the client when you start the ONcore hub, enter the SHOW PORT command to make sure that the ATM media port's status is 0KAY. If the status is not 0KAY, restart the client.

If the port's status does not change to 0KAY, run a trace by entering the SET TRACE and UPLOAD INBAND commands. Then contact your 3Com 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 ONcore hub's ATM address table.

If the ATM media port's status does not change to 0KAY, contact your 3Com 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 ONcore hub is 0KAY.
- The LES is configured with the ATM network prefix used by the ONcore 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 0KAY.

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

3000 per ONcore 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 3Com service representative.

ONcore Cannot PING the ARP Servers and Vice-versa

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

Cause Code: 31

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

Steps to Take:

1. Change the IP address or IP subnet mask of the ONcore hub.

Cause Code: 1

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

Steps to Take:

1. 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 ONcore hub (by entering the SHOW DEVICE command).

Cause Code: 3

Steps to Take: If the ARP server is in the same cluster (SSI links):

1. 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.

2. The ATM address of an ONcore hub 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 3Com representative.

Cause Code: 3

Steps to Take: If the ARP-server is in another cluster (NNI links):

1. 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.

2. No logical-link has been defined for the NNI port.

   Define the logical link, using the SET LOGICAL_LINK command.

3. 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.

4. No static route has been defined, if the ONcore and the ARP-server are in different ATM subnetworks.

   Define the static routes using the SET STATIC_ROUTE command.

5. A static route was badly configured.

   Check the static routes, using the SHOW STATIC_ROUTE command.

6. The VP-tunnel is defective.

   Ask your VP-tunnel provider to test it.

ONcore Hub Cannot PING an ARP Client

Steps to Take: Check if the ONcore hub can ping the ARP server. If not, then see “ONcore Cannot PING the ARP Servers and Vice-versa” on page 7-25. If it can ping the server:

1. 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.

2. 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.

3. If the ONcore hub 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.

4. The SVC between the ONcore hub and the ARP client cannot be established.

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

ONcore LEC Cannot PING another Client and Vice-versa

Steps to Take:

1. 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.
2. The LEC does not support the same Ethernet type as the ONcore LEC.

   Check that the LEC is emulating IEEE 802.3
   Ethernet frames.
3. If the ONcore 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

Steps to Take:

1. 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

Steps to Take:

1. 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.
2. The hardware connections may be failing, in which case replug the cables attached to the devices.
3. 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.

ONcore LEC Cannot Initialize to the LES/BUS

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

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 Code: 1

Explanation: 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.

Steps to Take:

1. 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 ONcore.

Cause Code: 3

Steps to Take:

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

1. 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.
2. The ATM address of an ONcore hub 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 3Com representative.

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

1. 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.
2. No logical-link has been defined for the NNI port.

   Define the logical link, using the SET LOGICAL_LINK command.
3. 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.
4. No static route has been defined, if the ONcore hub and the LE server are in different ATM subnetworks.

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

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

   Ask your VP-tunnel provider to test it.

Cause Codes: 16/31

Explanation: The connection has been voluntarily rejected the LE server. The reason depends on LE server implementation.

Cause Codes: 18/102

Explanation: The LE server is present, but not started.

Cause Code: 47

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

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 *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*.

Cause Cod: 1

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

Cause Code: 2

Explanation: The ONcore LEC parameters are incompatible with the LES/BUS. For example, the emulated LAN type of the ONcore LEC (IEEE 802.3) does not correspond to that of the LES.

Steps to Take:

1. Change the LES ATM address to reach a LES with the same LAN type (IEEE 802.3).

Cause Code: 4

Explanation: The same MAC address is already registered to the LES.

Steps to Take:

1. Change the ONcore hub 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 ONcore hub (PING,Telnet,TFTP,SNMP/ATMC).

PING: Your ONcore hub cannnot ping your management station.

Steps to Take:

1. Since all the management services are running over IP, you have to ensure that your ONcore hub 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.

Telnet: You cannot Telnet to your ONcore hub from your management station.

Steps to Take:

1. If the ping does not work, see previous sections on ping failures.
2. Someone is already logged on the ONcore hub by another Telnet session. It is not possible to have more than one Telnet session per ONcore hub.

   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 ONcore hub (interface 1). You will then know the ATM addresses of the remote ends, as well as the ONcore hub 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.

TFTP: Upload fails from your ONcore hub

Explanation: 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 ONcore hub.

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.

Steps to Take:

1. Messages: **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. Messages: **Cannot connect to Host/no-response-from-host**.

   Check that you can ping the host from the ONcore hub. If the ping fails, see the previous sections on ping failures.

3. Message: **Connection lost/connection-lost**.

   The SVC connection between the ONcore hub and the host has been cleared during the file transfer. Retry the upload. Look at all the Clear Tables of all intermediate ONcore hub/CELLplex 4000s that are on the path between your ONcore hub and the host. To do that, use the ATMC Control Panel (Statistics) and choose 'node' and 'Call-Logging' for all the intermediate ONcore hub/CELLplex 4000s.

4. Message: **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. Message: **File too big/file-too-big**.

   There is no space left on the server. Check that space is made available before retrying the upload.

TFTP: Download Inband fails from your ONcore hub

Explanation: 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 ONcore hub.

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. Messages: **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. Message: **Cannot connect to Host/no-repsonse-from-host**.

   Check that you can ping the host from the ONcore hub. If the ping fails, see the previous sections on ping failures.

3. Message: **Connection lost/connection-lost**.

   The SVC connection between the ONcore hub and the host has been cleared during the file transfer. Retry the download. Look at all the Clear Tables of all intermediate ONcore hub/4412SWs that are on the path between your ONcore and the host. To do that, use the ATMC Control Panel (Statistics) and choose 'node' and 'Call-Logging' for all the intermediate ONcore hub/4412SWs.

4. Message: **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. Message: **File too big/file-too-big**.

   You tried to download an operational code to the boot sector of the ONcore. Check the filetype for the download, and check the file name of the file to be downloaded.

6. Messages: **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 3Com Service. If the size is correct, contact your 3Com representative.

7. Message: **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 3Com Service or 3Com representative.

8. Message: **Flash memory failure/hardware-error**.

   Try to download several times. If it always fails, contact your 3Com representative.

9. Message: **Target Blade Mismatch**.

   You tried to download FPGA picocode that is incompatible with the target module number. Check the type of module (6404M-100, 6402M etc.) and the TFTP parameter.

ATM hub cannot restart after a download inband operation is performed and TFTP-supported services are operational.

Steps to Take:

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 6416SW module in the hub.
3. Contact your 3Com 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 (ONsemble ATM Workgroup Concentrator) and bridges (4404B), the external IBM LAN Emulation Server (LES), workstations (WS), ATM Workgroup Switches (4412SW), and the ONcore hubs.

A workstation/bridge cannot connect to another workstation/bridge.

Steps to Take:

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 ONcore hub/CELLplex 4000 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 3Com representative for investigation, or re-boot the LES.

LES Monitor Statistics: Default Vccs counter oscillating, too few registered workstations.

Steps to Take:

Explanation: 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 (ONsemble ATM Workgroup Concentrator) that has been disconnected from the switch for a short time.

Note: You can check whether the station is registered in the ONcore by using the command SHOW ATM_ESI.

1. Wait a few minutes for the new registration to take place.

Clear Table: a lot of SVCs were cleared with Clause 31.

Explanation:

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.

Some ATM stations cannot talk to LAN stations behind PARALLEL bridges.

Explanation:

The 4404B bridge has a limitation of 256 ATM connections. One would think that multiplying the number of 4404B 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 4404B bridges (bridges registered to the same LAN Emulation Server, and connected to the same LAN), there may be collisions in terms of connections. Indeed, when an ATM station calls a LAN station behind the 4404B bridges, each 4404B 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 4404B, some stations will not be able to connect until the bridges clear their SVCs that are unused (aging out process).

Steps to Take:

1. Wait up to 4 minutes (aging time on the 4404B bridge), or avoid parallel bridging.

LES Monitor: after 3 minutes, the workstation is de-registered from the LES (valid only for IBM proprietary LAN emulation).

Explanation: The workstation did not send the re-registration message within 3 minutes.

Steps to Take:

1. Ensure that the port for the workstation is connected properly.
2. Ensure that the cable between the ONcore and the workstation is connected properly.
3. Shutdown, then power off the workstation and restart.

If the problem persists, contact your workstation/adapter supplier.

In a multi Token-ring bridges configuration, a Token-ring bridge cannot register to the LES. (valid only for IBM proprietary LAN emulation).

Explanation: Different ring numbers are assigned to the ATM ports of two bridges connected to the same LES.

Steps to Take:

1. 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.

LES Monitor: Bridge is on General Multicast Tree, but not on Bridge Multicast Tree. (valid only for IBM proprietary LAN emulation).

Explanation: The bridge did not send its route descriptors to the LES.

Steps to Take:

1. The bridge is faulty. Contact your 3Com representative.

At workstation reboot: the ATM adapter initialization failed.

Explanation: The switch or concentrator port attached to the workstation is not enabled, or is not a UNI port.

Steps to Take:

1. From the console, or from the SNMP Manager (ATMC), enable the corresponding port as a UNI port.

A station cannot register to an LES located behind a WAN (VP-tunnel).

Explanation:

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 ONcore hub/CELLplex 4000 error-log is full of messages like 'Invalid Message Length'.

The WAN (public network providing the VP-tunnel) uses the VCI=5 for its own purposes, and there is a conflict with the ONcore hub/CELLplex 4000 which also uses VCI=5 (ATM-Forum Signalling VCI).

Steps to Take:

1. Ask your public network provider if they use the VCI=5. If necessary, put an ATM device between the WAN and the ONcore hub/CELLplex 4000 to do the translation of Signalling VCI to a value other than 5.

No Traffic in a Client Environment.

Steps to Take:

1. Make sure that each LES client does not have more than 12 virtual connections.

Problems between two LAN-emulated stations, or between a LAN-emulated station and a LAN station located behind a bridge (valid only for IBM proprietary LAN emulation).

Steps to Take:

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 Transcend ONcore ATM Campus Manager and LAN emulation server, which can provide you with a lot of information through the LES monitor.

   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.

   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.

   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 C-2.

   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 ONcore/4412SW 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 C-2.

Other Problems

Cannot create a PVC between two ONcore hub/CELLplex 4000s located in different clusters.

Explanation:

This is normal. The ONcore hub/CELLplex 4000 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.

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.

Explanation: The frame size on the ATM server is larger than the maximum frame size allowed by the bridge.

Steps to Take:

1. 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.

ONcore hub/CELLplex 4000 Terminal/Telnet very slow or Ping to ONcore hub/CELLplex 4000 very slow.

Explanation: The ONcore hub/CELLplex 4000 is congested by Signalling Calls.

Steps to Take:

1. If you cannot be in front of the ONcore hub/CELLplex 4000, perform a remote login 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.

2. If you can be in front on the ONcore hub/CELLplex 4000, log on to the console, make sure that the trace is not active, then if the ATM switch is an ONcore, look at the traffic LEDs and disable the for which the traffic LED is constantly lit. If your ATM switch is a CELLplex 4000, 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.

Problems of ATM connections/performance through a WAN (VP tunnel).

Steps to Take:

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 a 6402M module, 100 Mbps for a 6404M-100 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 6402M 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 a CELLplex 4000 or an ONcore hub 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 ONcore hub/CELLplex 4000 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 ONcore hub/CELLplex 4000 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 3Com representative.

ATM Connection Problems

No Connection between Two ATM Hub in the Same Cluster

Steps to Take:

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 7-20.

2. Make sure that the bandwidth specified is the same at both ends of the trunk.

3. Contact your 3Com service representative.

No Connection Between Two ATM Clusters in the Same Subnetwork

Steps to Take:

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 7-20.

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 3Com service representative.

No Connection Between Two ATM Subnetworks

Steps to Take:

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 7-20.

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 3Com service representative.

Using 6416SW Trap Messages

A trap message is sent to the 6416SW 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 a ONcore 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 7-1. The other fields of information that can appear are self-explanatory and depend on the type of trap received.

Table 7-1. 6416SW 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 Your 3Com Service Representative

To get technical help to solve installation and operation problems with the ATM subsystem in a ONcore hub, call your local 3Com Customer Support center. Depending on the phase in which the problem occurs, an 3Com 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 3Com 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).

ONcore 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).

ONcore hub information configured using 6416SW 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 6416SW 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 *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide* for more information.

Troubleshooting Phase 3 Problems

To troubleshoot Phase 3 problems, an 3Com 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 3Com 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 *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*.

   Types and slot numbers of all modules installed in the hub, displayed by the SHOW MODULE ALL VERBOSE command.

   ONcore 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.

   ONcore hub information configured using 6416SW 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 6416SW 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 *ONcore Switching Hub/CELLplex 4000 ATM Command Reference Guide*.

Troubleshooting Phase 4 Problems

To troubleshoot Phase 4 problems, an 3Com 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 7-52. For information on how to upload the trace or error log file, see “Uploading and Downloading Operations” on page 6-5.

Types and slot numbers of all modules installed in the hub, displayed by the SHOW MODULE ALL VERBOSE command.

ONcore 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.

ONcore hub information configured using 6416SW 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 6416SW 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 ONdemand ATM Campus Manager 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. Technical Specifications

General Specifications

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 MC 68EN360 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) or 16 Mbytes Dynamic RAM (two 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 Switch/Control cards (one for each card). Two 7A (+5V) for the Switch/Control 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 6416SW 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 6416SW module

RS-232 cable pin assignments used for connecting a console, modem, or server to the 6416SW module.

Requirements for using a modem with the 6416SW module.

Attaching a Console, Modem, or Server

When attaching a console, modem, or server to the 6416SW module, use the RS-232 cable and the two adapters provided in the package provided with the ONcore 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 6416SW module. For the exact position of the Console port, see Figure 2-4 on page 2-9.
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 B-2 describes the pin assignments for console, modem, and server attachments.

RS-232 Cable Requirements

RS-232 Connector

The RS-232 connector is the 9-pin female connector on the 6416SW that attaches to an EIA 232 cable. Table B-1 lists the signal name associated with each pin on this connector, and Figure B-1 shows how the pins are numbered.

Table B-1. 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	—	—

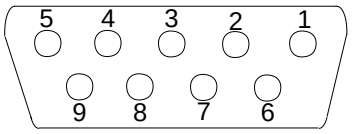


Figure B-1. RS-232 Connector

9-Pin/9-Pin Cable

Figure B-2 shows the pin assignments for the 9-pin to 9-pin RS-232 cable used to attach a console to the 6416SW Console port:

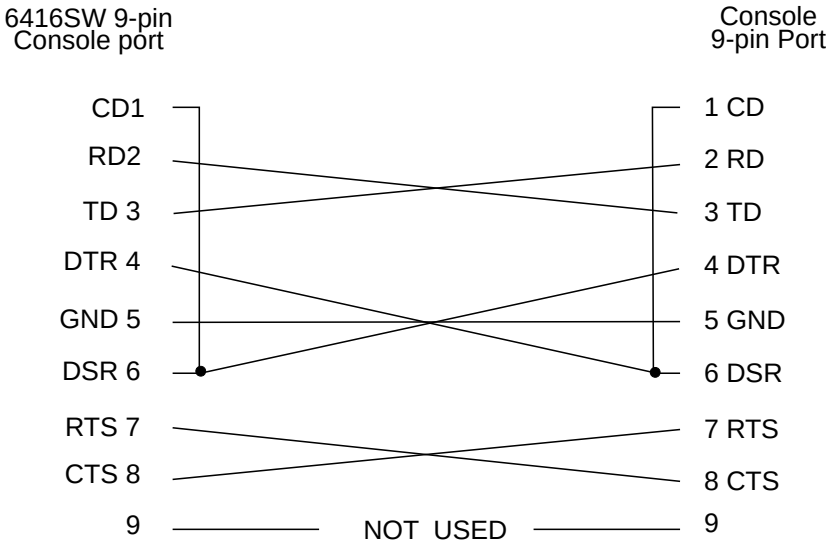


Figure B-2. Console Attachment: 9-pin to 9-pin RS-232 Cable

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 B-3 shows the pin assignments for the 9-pin to 25-pin RS-232 cable used to attach a console to the 6416SW Console port.

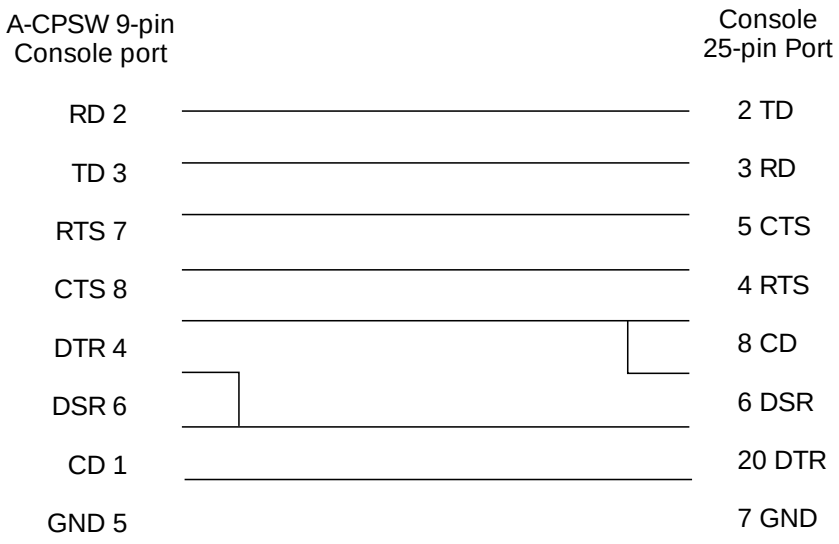


Figure B-3. Console Attachment: 9-pin to 25-pin RS-232 Cable

Null-Modem Interposer

Figure B-4 shows the pin assignment of the interposer (null modem) used for a console attachment. The RS-232 interposer is shipped with the ONcore hub.

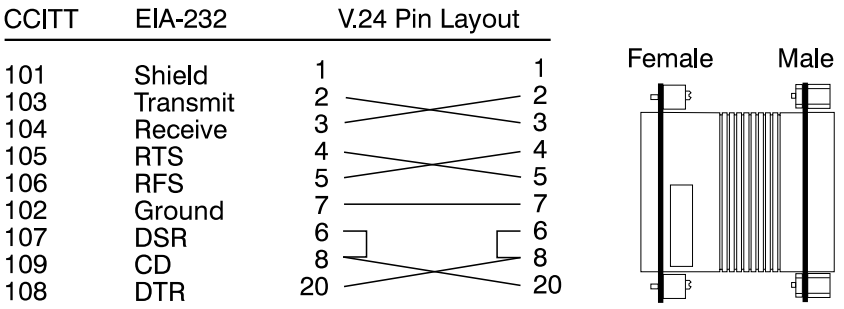


Figure B-4. Pin Assignment: RS-232 Interposer

After attaching a console to the 6416SW RS-232 Console port, make sure that the console is set up for asynchronous serial communication.

Modem Attachment

Figure B-5 shows the pin assignment for the RS-232 cable used to attach a modem to the 6416SW Console port.

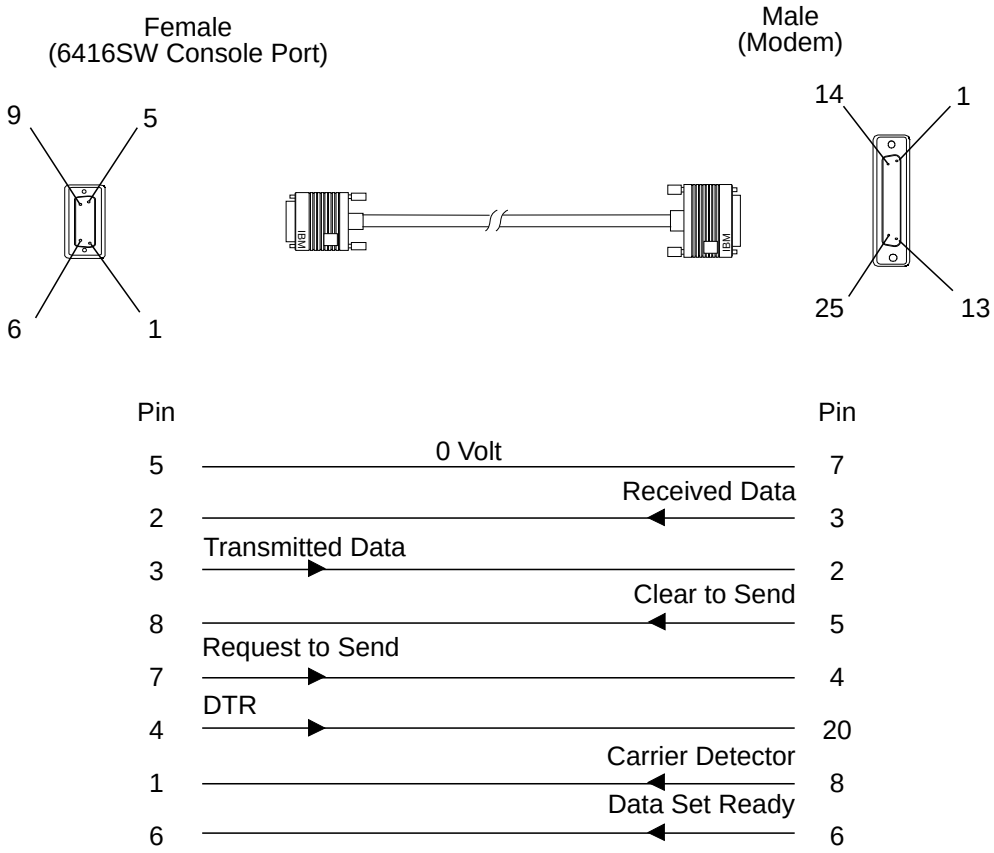


Figure B-5. Pin Assignment: RS-232 Modem Cable

After connecting a modem to the to the Console port, configure the modem by following the procedure in “Modem Requirements” on page B-7.

Modem Requirements

The 6416SW 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, 4800, 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&d` 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 `ats =1` and press Enter (to auto-answer on the first ring).
4. Type `ats ?` 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 B-6 on page B-8.

```
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>... 43  <ESC>(/5 )... 5
   Signals  7855 to DTE
                  RFS(1 6)        RFS On....ALWAYS
                  RLSD(1 9)       RLSD On...ALWAYS
                  DSR(1 7)PSN     DSR On....ALWAYS
        DTR(1 8)Drop     Polling...NO  DTR Off...V24  DTR Delay...
        Break Signals    From DTE...QUICK  From Telco.QUICK
   Commands,Results
        Async Characters  <CR>......... 13  <LF>... 1   <BS>...  8
        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..96   TC
   LL Telco Speed   LL bps...96   TC
   Type of Network  Network......PSN
   DataFlow Control  Telco Flow....NO
   Adaptation
        PSN
               Dialing         Dial Mode...TONE
               Dial Delays     First Delay..  7  Other Delay..  1
               Calling Tone    Call Tone....V25
               Call Process    Detect.......ALL
               Calling Timer   Call Abort... 6
               Answering       Auto Answer..YES  Rings........  2
               Attachment      PSN Level..FIXED  Guard Tone..18
               Disconnect
                 From TELCO line  Disconnect RLSD  CD loss(/1 ). 15
                 To TELCO line   Call End..REMOTE
                 Inactivity      On Hook......YES  No Data(min). 3
        General
               Receiver        Echo Adapt....NO  Receiver Setup.
               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 72   bps   72   bps......NO
               Fall Back       FallBack......NO
               Fall Forward    Fall Forward..NO
        Change Timing  For FF and SNBU  Check Line...YES  Check(x5min). 24
        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 B-6. Example: IBM 7855-10 Modem Configuration

Appendix C. 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 C-1 lists the error codes from the Q.2931 protocol for clear causes generated by ONcore hubs and other ATM devices in an ONcore-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 C-1 (Page 1 of 3). Q.2931 Error Codes for Clear Causes in ONcore-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)

Table C-1 (Page 2 of 3). Q.2931 Error Codes for Clear Causes in ONcore-based ATM Networks

Error Code (decimal)	Error Code (hex)	Meaning of Clear Cause
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.
73*	0x49*	Unsupported combination of traffic parameters.
81*	0x51*	Invalid call reference value.
82	0x52	Identified channel does not exist.
88	0x58	Incompatible destination.

Table C-1 (Page 3 of 3). Q.2931 Error Codes for Clear Causes in ONcore-based ATM Networks

Error Code (decimal)	Error Code (hex)	Meaning of Clear Cause
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 ONcore hub are shown with an asterisk (*).

Maintenance Codes

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

Table C-2. 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 6416SW 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 C-3. IBM LAN Emulation Server Error Codes

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

Appendix D. 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'
   ```

Appendix E. ONcore ATM Address Formats

The ONcore 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 E-1 on page E-2, the 6416SW 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).

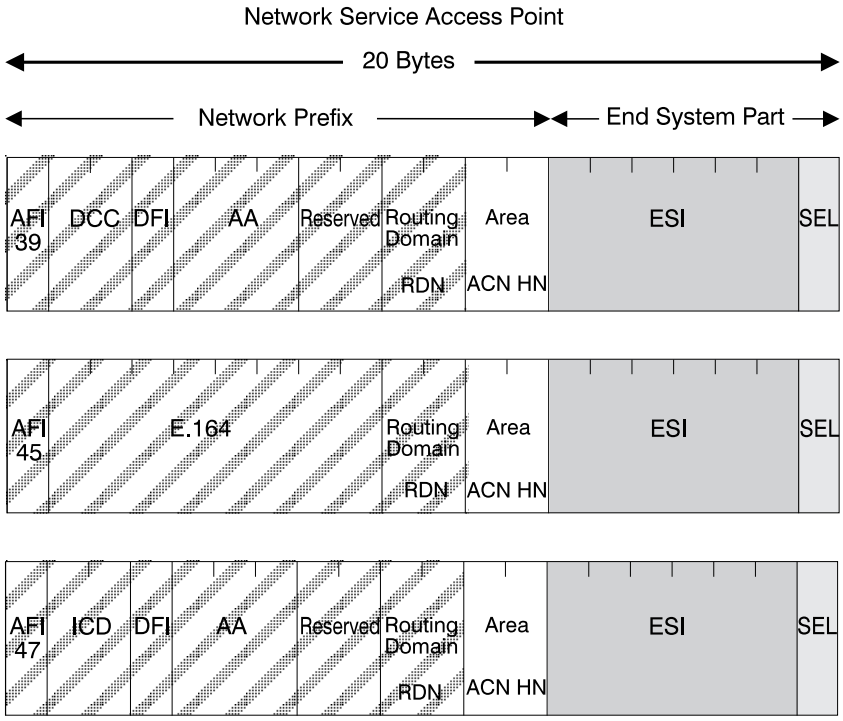


Figure E-1. NSAP Address Formats Supported in the ONcore ATM Subsystem

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 ONcore 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 ONcore 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 F. Technical Support

3Com provides easy access to technical support information through a variety of services. This appendix describes the following services:

Online Technical Support

Support from Your Network Supplier

Support from 3Com

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Online Technical Support

3Com offers worldwide product support through the following online systems:

- E-mail Technical Support
- World Wide Web Site

E-mail Technical Support

You can contact the Integrated Systems Division (formerly Chipcom) on the Internet for technical support using the e-mail address: techsupp@3com.com.

World Wide Web Site

You can access the latest networking information on the 3Com World Wide Web site by entering our URL into your Internet browser:

`http://www.3com.com/`

This service features news and information about 3Com products, customer service and support, the 3Com latest news releases, selected articles from 3TECH , the 3Com award-winning technical journal, and more.

You can contact the Integrated Systems Division on the World Wide Web by entering our URL into your Internet browser:

`http://www.3com.com/`

There are links between both WWW pages to view information from all 3Com divisions.

Support from Your Network Supplier

If additional assistance is required, contact your network supplier. Many suppliers are authorized 3Com partners who are qualified to provide a variety of services, including network planning, installation, hardware maintenance, application training, and support services.

When you contact your network supplier for assistance, have the following information ready:

- Diagnostic error messages
- A list of system hardware and software, including revision levels
- Details about recent configuration changes, if applicable

If you are unable to contact your network supplier, see the following section on how to contact 3Com.

Support from 3Com

If you are unable to receive support from your network supplier, technical support contracts are available from 3Com.

For direct access to customer service for Integrated Systems Division products in:

U.S.A. and Canada - call (800) 724-2447

Asia Pacific - call (508) 787-5151

Europe - refer to the table below. For European countries not listed, call 31 30 60 299 00.

Country	Telephone Number	Country	Telephone Number
Belgium	0800 71429	Netherlands	06 0227788
Denmark	800 17309	Norway	800 11376
Finland	0800 113153	Spain	900 983125
France	05 917959	Sweden	020 795482
Germany	0130 821502	U.K.	0800 966197
Ireland	1 800 553117	U.S.	800 876-3266
Italy	1678 79489		

For access to customer service for all 3Com products, call (800) 876-3266.

You can also contact the Integrated Systems Division (ISD) on the Internet by using the e-mail address techsupp@3com.com.

Returning Products for Repair

A product sent directly to 3Com for repair must first be assigned a Return Materials Authorization (RMA) number. A product sent to 3Com without an RMA number will be returned to the sender unopened, at the sender's expense.

To obtain an RMA number for Integrated Systems Division products (formerly Chipcom), use the following numbers.

Country	Telephone Number	Fax Number
U.S. and Canada	(800) 724-2447	(508) 787-3400
Europe	(44) (1442) 275860	No Fax
Asia Pacific	(508) 787-5296	(508) 787-3400

Accessing the 3Com MIB and atswitch.mib

The 3Com Management Information Base (MIB) for the Integrated Systems Division describes commands that enable you to manage 3Com SNMP-based products. The MIB is available over the Internet on an anonymous FTP server. Updates to these MIBs are released as new 3Com products are introduced.

To access Internet versions:

1. FTP to `ftp.3com.com` (192.156.136.12).
2. Enter the login name `anonymous`.
3. Enter your full Internet e-mail address as the password (for example, `jdoe@company.com`).
4. Change to the mib or schema directory using the `cd /pub/3com-mibs` command.
5. To view the 3Com MIB, OID, or schema entries, enter the `ls -l` command.

   To pause the display, press [CTRL-S].

   To continue the display, press [CTRL-Q].
6. Copy the MIB, OID, or schema files to your current directory using the appropriate command (for example, `get atswitch.mib`).
7. To exit the FTP session, invoke the `quit` command.

3Com Technical Publications

If you have comments or questions on 3Com Integrated Systems Division Technical Publications documents, please contact the Technical Publications group at one of the following:

On the Internet: writers@msmailer.3com.com

By fax: (508) 229-1551.

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