

Compaq StorageWorks

Modular Data Router

User Guide

Fourth Edition (March 2001)
Part Number 133834-004
Compaq Computer Corporation

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About This Guide

Purpose and Scope

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades.



Important Safety Information

Before installing this product, read the *Important Safety Information* document provided.

Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase.
<i>FILENAMES</i>	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in uppercase.
Type	When you are instructed to <i>type</i> information, type the information without pressing the Enter key.
Enter	When you are instructed to <i>enter</i> information, type the information and then press the Enter key.

Symbols in Text

The following symbols are found in the text of this guide to indicate different types of information.



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.



CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Symbols on Equipment

The following symbols are placed on equipment to indicate the presence of potentially hazardous conditions:



This symbol in conjunction with any of the following symbols indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.



This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.



This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.



This symbol on an RJ-45 receptacle indicates a Network Interface Connection.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.



These symbols on power supplies or systems indicate the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.



This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

Weight in kg

Weight in lb

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

Rack Stability



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - The stabilizing feet are attached to the rack if it is a single rack installation.
 - The racks are coupled in multiple rack installations.
 - Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.
-

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Compaq Technical Support

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the Compaq website. Access the Compaq website:

<http://www.compaq.com>

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. Access the Compaq website:

<http://www.compaq.com>

Compaq Authorized Reseller

For the name of your nearest Compaq authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

Chapter 1

Introduction

The Compaq *StorageWorks*™ Modular Data Router (MDR) is a 1U (1.75-inch tall), multi-purpose, highly modular storage controller.

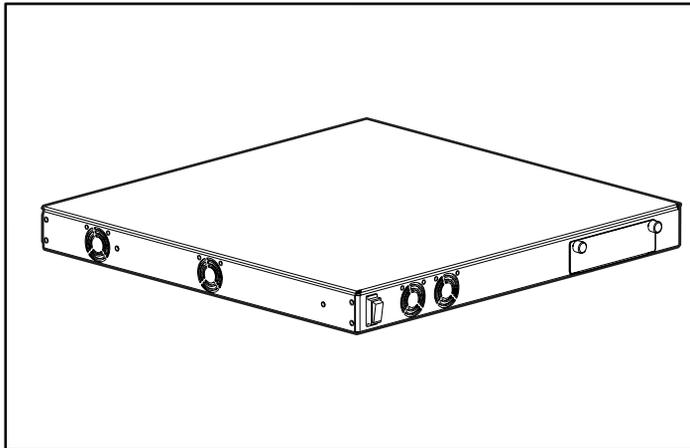


Figure 1-1. Compaq Modular Data Router

Features

- Four module slots
- Seven modules
 - Management Module
 - Single Port Fibre Channel Module
 - Dual SCSI Module with High Voltage Differential (HVD)
 - Dual SCSI Module with Low Voltage Differential (LVD)
 - Dual Port Fibre Channel
 - Quad SCSI (HVD)
 - Quad SCSI (LVD)
- One DB-9 serial port
- Power LED and Power Switch
- High performance data movement architecture
- Mounts easily in a rack with little physical configuration required
- Can be placed on a desktop
- Allows easy upgrades to future Fibre Channel, SCSI, or other Input/Output (I/O) modules

Front Panel

The front panel of the Compaq MDR contains the power switch ❶ and one option module slot ❷.

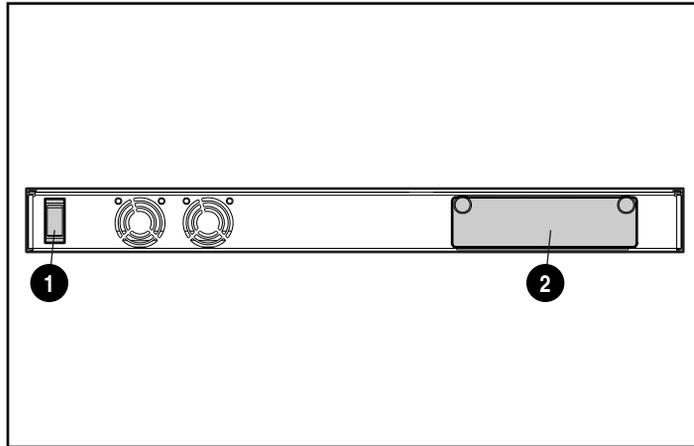


Figure 1-2. Identifying the front panel

If a fourth module is to be installed, place the Management module in this front slot; otherwise, leave this slot empty. See Appendix E, “Management Module Removal and Reinstallation,” for information on removing and reinstalling the Management module.

Rear Panel

The rear panel of the Compaq MDR contains a DB-9 serial port ❶, a Power LED ❷, three module slots ❸, and an AC power connector ❹.

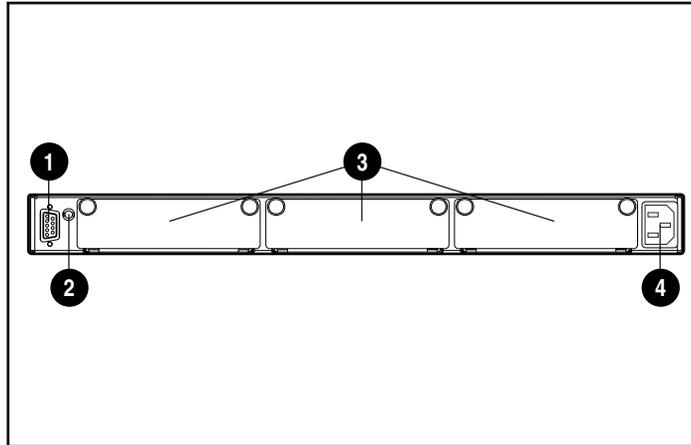


Figure 1-3. Identifying the rear panel

Table 1-1
Rear Panel

Callout	Description	Function
❶	DB-9 Serial Port	A male serial port which may be connected to a host system (for example, a personal computer, workstation, et cetera) with a standard 9-pin female to 9 pin female null modem cable. This port can be used to perform initial configuration or to perform local management diagnostic tasks.
❷	Power LED	Indicates active AC power.
❸	Module Slots	The base MDR supports any combination of I/O options.
❹	AC Power Connector	Connects the unit to electrical power once installation is complete. Use the AC power cord provided with your kit.

Module Configurations

The MDR is capable of many different configurations to meet your needs.

Three-Module Configuration

The three-module configuration can contain a Single Port Fibre Channel module ❶, a Dual SCSI module ❷, and a Management module ❸.

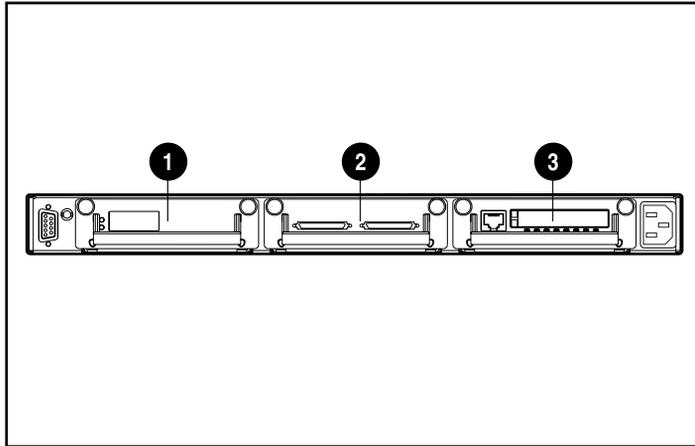


Figure 1-4. Three-module configuration, first example

The three-module configuration can also contain a Dual Port Fibre Channel module ❶, a Quad SCSI module ❷, and a Management module ❸.

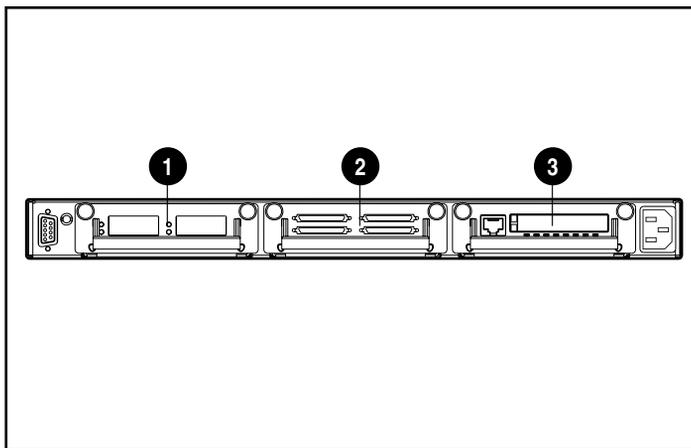


Figure 1-5. Three-module configuration, second example

Four-Module Configuration

The four-module configuration can contain a Single Port Fibre Channel module ❶, a Dual SCSI module ❷, a second Dual SCSI module ❸, and a Management module in the front panel slot (not shown).

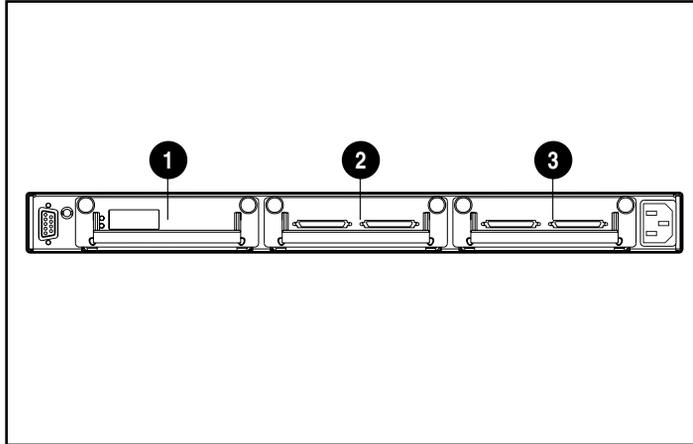


Figure 1-6. Four-module configuration, first example

The four-module configuration can also contain a Dual Port Fibre Channel module ❶, a Quad SCSI module ❷, a second Quad SCSI module ❸, and a Management module in the front panel slot (not shown).

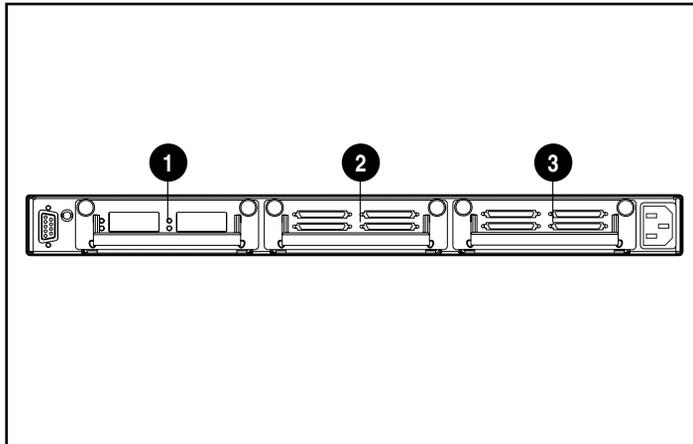


Figure 1-7. Four-module configuration, second example

Chapter 2

Installing the Modular Data Router (MDR)

This chapter provides information on preparing and installing the Compaq StorageWorks Modular Data Router (MDR) in a rack or on a desktop.

Rack-mounting installations require an industry-standard, 19-inch electronic enclosure rack or a Compaq 19-inch electronic rack. The rack installation procedures provided in this guide are for the Compaq rack only. The desktop installations require a flat, level surface, and the attachment of four rubber feet on the bottom of the chassis.



WARNING: Risk of electrical shock. Do not attempt to open this product. There are no user-serviceable parts inside. Refer all service to a Compaq authorized service provider.



WARNING: To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
 - Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
 - To disconnect power from the MDR, unplug the power cord from the electrical outlet or from the AC power connector on the unit.
-

Installing the MDR in a Rack

The rack must be set up first before installing the MDR. Complete rack installation instructions are available on the Rack Products Documentation CD shipped with the Compaq rack. In addition, a Rack Builder Pro Configuration Utility CD kit and Rack Series Products Audio-Visual (AV) CD kit are included. The information contained on these CDs can also be obtained from the Compaq website at www.compaq.com.

The entire Rack Resource CD kit ships with all Compaq racks. Contents for each CD include the following:

- Rack Products Documentation CD kit

This resource information shipped on this CD allows you to view, search, and print documentation for Compaq racks and rack options. The information helps you to set up and optimize your new Compaq rack to best fit the needs of your environment.

- Rack Builder Pro Configuration Utility CD kit

This information allows you to simulate potential Compaq rack configurations based on your input. The rack builder utility provides:

- Graphical preview of properly configured racks.
- Site planning data, power requirements, cooling mandates, and physical specifications.
- Ordering information, required components, part numbers, and appropriate quantities.

- Rack Series Products Audio-Visual (AV) CD kit

This information gives a visual overview of operations required to configure a Compaq rack with rack-mountable components. The video covers key configuration steps:

- Site planning
- Installing rack options
- Cabling
- Coupling multiple racks

Rack Warnings and Precautions

Before beginning installation procedures, make sure that you understand the following warnings and cautions:



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - The stabilizers are attached to the rack if it is a single rack installation.
 - The racks are coupled in multiple rack installations.
-



WARNING: To reduce the risk of personal injury or damage to the equipment, at least two people are needed to safely unload the rack from the pallet. An empty 42U rack weighs 253 lb (115 kg), is over seven ft (2.1 m) tall, and may become unstable when being moved on its casters. Do not stand in front of the rack as it rolls down the ramp from the pallet, but handle it from the sides.



WARNING: A rack may become unstable if more than one component is extended for any reason. To reduce the risk of personal injury, always ensure that the rack is adequately stabilized before extending a component outside the rack, and extend only one component at a time.



WARNING: Before beginning to work on the rack, be sure that the leveling jacks are extended to the floor, that the full weight of the rack rests on the level floor, and that either stabilizers are installed or that multiple racks are coupled together for stability.

Optimum Environment

When installing your MDR in a rack, certain standards of temperature and power requirements must be met.

Space Requirements

Consider the following spatial needs when deciding where to install your rack:

- Clearance in the front of the rack should be a minimum of 25 inches for adequate airflow.
- Clearance in the back of the rack should be a minimum of 30 inches to allow for servicing and for adequate airflow.

Power Requirements

The electrical current rating for the MDR is a maximum steady input of 1.3A rms at 120 VAC or 0.7A rms at 230 VAC.



WARNING: To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over your facility wiring and installation requirements.

- The power load needs to be balanced between available AC supply branch circuits.
- The overall system AC current load must not exceed 80 percent of the branch circuit AC current rating.
- If power strips are used, the load should not exceed 80 percent of the marked electrical current rating.

The installation of this equipment shall be in accordance with Local/Regional electrical regulations governing the installation of Information Technology Equipment by licensed electricians. This equipment is designed to operate in installations covered by the National Electric Code (ANSI/NFPA 70, 1993) and the code for Protection of Electronic Computer/Data Processing Equipment (NFPA-75, 1992).

For electrical power ratings on options, refer to the product's rating label or the user documentation supplied with that option.

Grounding

For proper operation and safety, this equipment must be properly grounded in accordance with NFPA 70-1993, Article 250. All power distribution devices, branch wiring, and receptacles must be "Listed" grounding type devices.

When using power strips for electrical distribution, make sure that ground integrity is maintained for each connection made. Plug each component into a reliably grounded outlet.

Temperature Requirements

To ensure continued safe and reliable operation of the equipment, locate the system in a well-ventilated, climate-controlled environment.

The operating temperature inside the rack will always be higher than the room temperature and is dependent on the configuration of the equipment in your rack.

The maximum internal rack temperature for your configuration should not exceed the values shown in the table below.

Table 2-1
Maximum Internal Rack Temperatures

Equipment	Maximum Temperature
Compaq Rack options	40°C/104°F
Other manufacturers' options	See other manufacturers' specifications



CAUTION: To reduce the risk of damage to the equipment when installing third-party options, make sure the manufacturer's maximum recommended ambient operating temperature of the optional equipment is not exceeded when installed in the rack.

Airflow Requirements

The MDR draws air in through the front and left-side fans and expels warm air out through the right-side fans. Therefore, the front door of the rack must be adequately ventilated to allow ambient air to enter the cabinet. Do not block the ventilation apertures.



CAUTION: If a third-party rack is used, the following minimum requirements should be observed to ensure adequate airflow and to prevent damage to the equipment:

- Front: The rack door should have 120 square inches of holes evenly distributed from top to bottom to permit adequate airflow.
 - Side: The clearance between the installed module and the side panels of the rack should be a minimum of 2.75 inches.
 - Rear: The clearance between the back of the rack and the wall should be a minimum of 30 inches.
-

Blanking Panels

If all of the vertical space in the rack is not filled by components, the gaps that are left will cause a change in airflow through the rack and across the components. These gaps need to be covered with blanking panels.

Unpacking the MDR

Unpack the MDR and locate the materials and documentation necessary to install it in a rack.

Materials Needed

To install the MDR in a rack, the following hardware is needed:

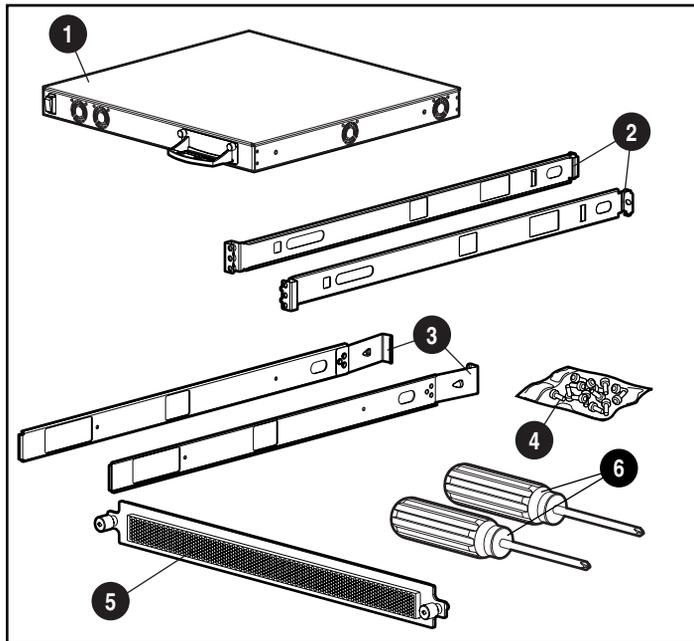


Figure 2-1. Rack mounting hardware

- ❶ MDR
- ❷ Left and right mounting rails
- ❸ Left and right slide rails
- ❹ Mounting screws
- ❺ Front cover panel
- ❻ #1 and #2 Phillips screwdrivers (not included with kit)

Installation Procedure

Before beginning the installation, be sure that a grounded electrical outlet is easily accessible and is located as close to the storage system as possible.

NOTE: For additional help placing the device in the correct location in a 19-inch rack, refer to the Rack Builder Pro Configuration Utility CD kit provided with the Compaq rack. This CD is also available from your local Compaq reseller or authorized service provider.

To install the MDR in a Compaq 19-inch rack:

1. Remove any blanking panels and other equipment from the chosen rack location.
2. At the rear of the rack cabinet, install one cage nut in the center slot on each side.

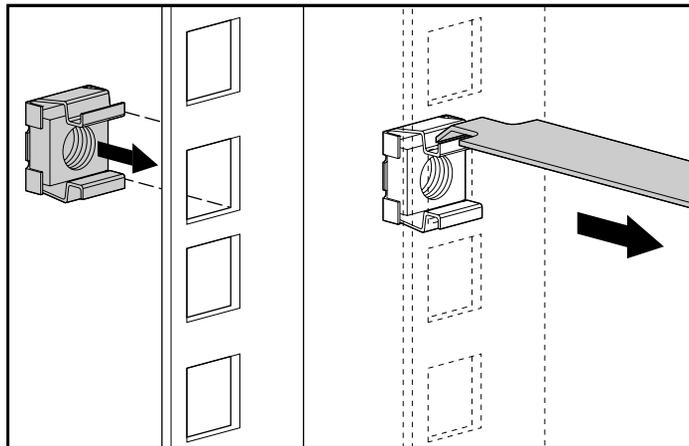


Figure 2-2. Installing the cage nuts

3. Locate the rear of each of the mounting brackets.

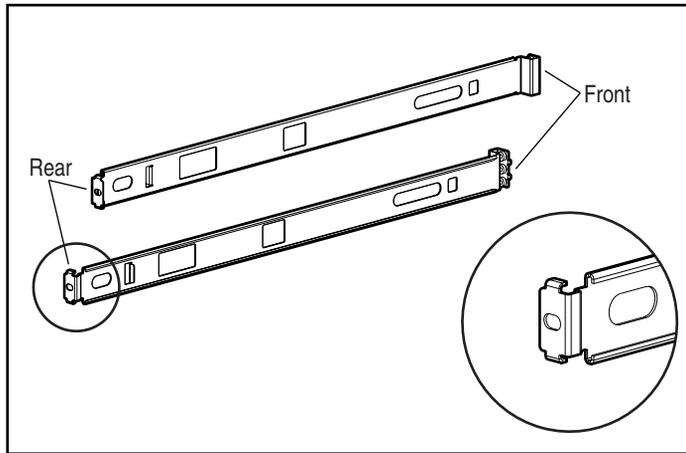


Figure 2-3. Identifying mounting bracket rear and front ends

NOTE: Do not tighten the mounting bracket screws completely until after the MDR is inserted in the rack. A small amount of play will help position the brackets to the exact width of the component being installed.

4. Secure the back of the mounting bracket with one M6 x 1.0-12L Phillips screw and tighten the center cage nut.

IMPORTANT: Make sure that the mounting bracket is level from front to back.

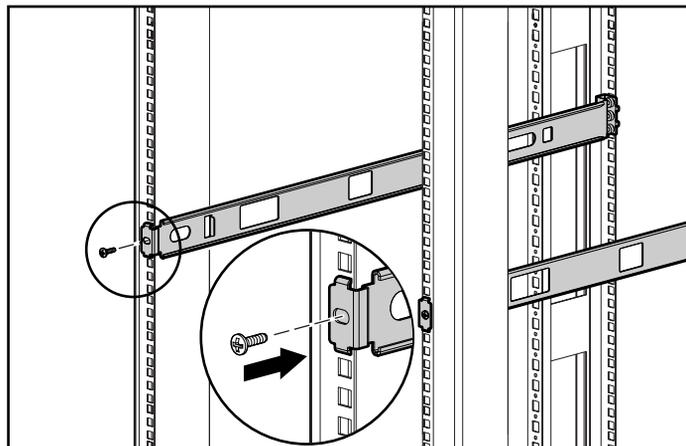


Figure 2-4. Attaching the brackets to the rear mounting rails

5. Attach the brackets to the front mounting rails, using two M6 x 1.0-12L screws on each side. Be sure to use only the top and bottom holes in each bracket. The middle hole will be used to attach the front cover panel after the unit is installed. Tighten the screws securely.



WARNING: To avoid injury or equipment damage, the mounting brackets must be level. If the brackets are not level, the Compaq MDR cannot be installed correctly.

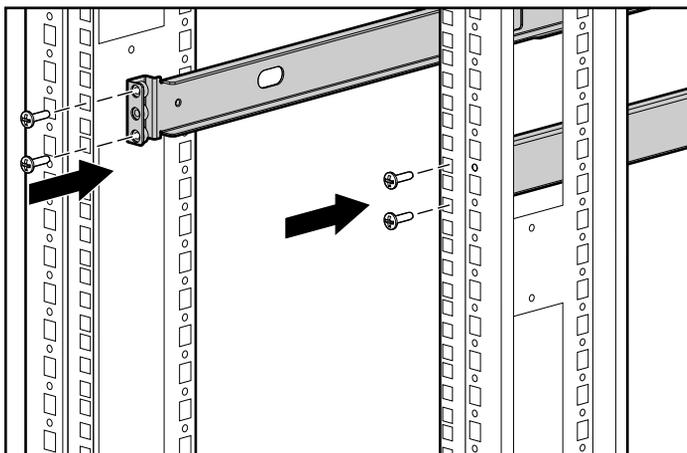


Figure 2-5. Attaching the brackets to the front mounting rails

6. Attach the slide rails to the MDR, using two 6-32 x 5/16" Phillips screws on each side. Make sure the front ends of the rails angle in toward the unit.

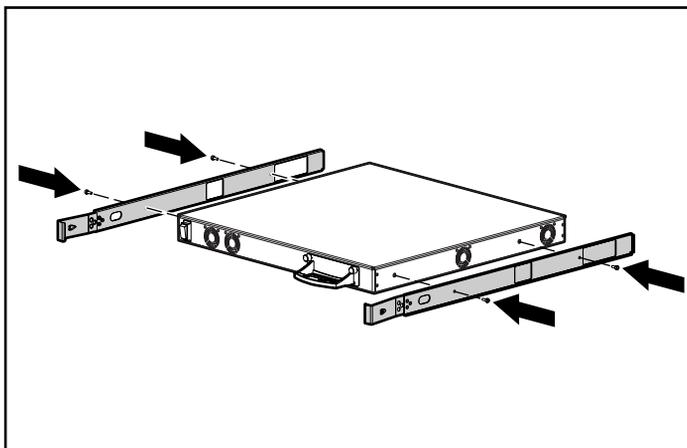


Figure 2-6. Attaching the slide rails

- Slide the unit into the rack from the front of the rack, inserting the three option module slot end in first. Slide the unit back into the rack until the rails snap into place. The unit will lock into place approximately 6 inches (15 cm) from the front of the rack.



CAUTION: Keep the unit parallel to the floor when sliding the unit rails into the rack mounting rails. Tilting the unit up or down can result in damage to the rails.

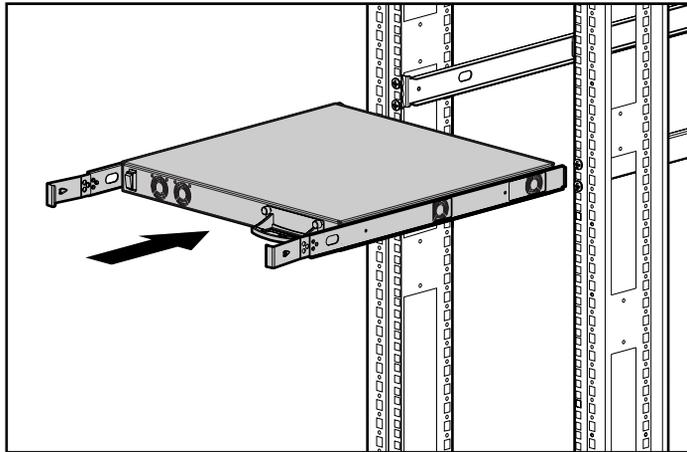


Figure 2-7. Installing the MDR in the rack

- Secure the front cover panel to the middle holes in the rack using the thumbscrews.

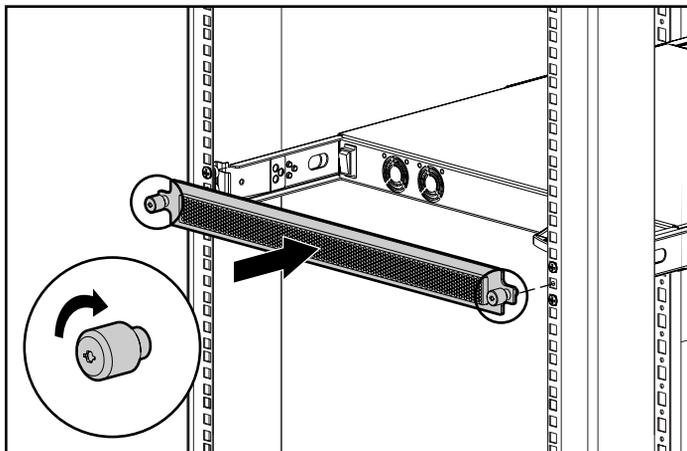


Figure 2-8. Securing the front cover panel

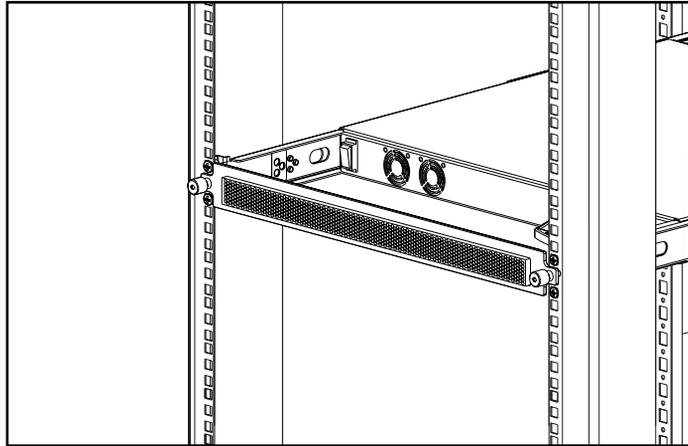


Figure 2-9. MDR installed in a rack

Installation is complete. Proceed to “Power cords.”

Installing the MDR on a Desktop

If the unit will not be installed in a rack the four rubber feet provided in the kit need to be attached. These feet stabilize the base of the unit and minimize damage to any surface on which the unit rests.



CAUTION: Do not stack more than one unit or it may damage your system.

Materials Needed

To install the MDR on a desktop, four adhesive rubber feet are needed.

Installation Procedure

To attach the rubber feet:

1. Turn the unit over and attach one foot to each corner of the unit.

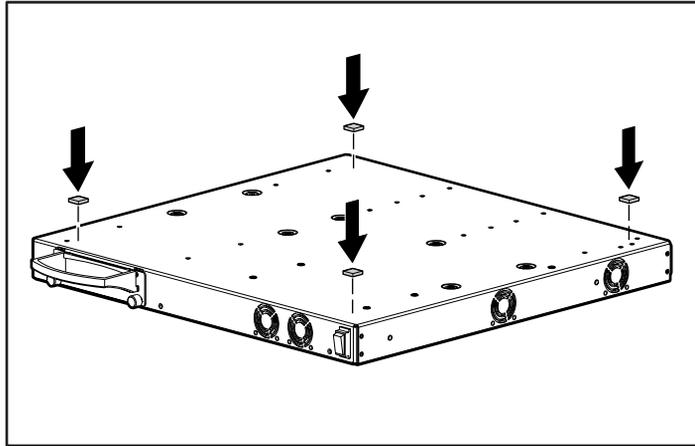


Figure 2-10. Attaching the adhesive rubber feet.

2. Turn the unit upright; place it on a flat, level surface.

IMPORTANT: Six inches of clearance is needed around the unit for adequate ventilation.

Installation is complete. Proceed to the next section.

Setting up the Modular Data Router (MDR)

The Compaq StorageWorks Modular Data Router (MDR) acts as a Fibre Channel-to-SCSI bridge that allows a host server to communicate with SCSI devices over a Fibre Channel link. Each SCSI connection on the business side of the MDR (the front panel, containing the option module slot) represents a SCSI bus.

IMPORTANT: SCSI Target 7 of each SCSI Bus is reserved for the MDR. Do not attempt to set one of your SCSI devices to this value. To install a tape library, you must set the SCSI Target IDs according to the manufacturer's requirements.

Each SCSI device attached to the MDR is represented by a unique set of values represented by the Bus, Target, and SCSI Logical Unit Number (LUN),

typically represented as B:T:L. The Bus number is the SCSI connection on the rear side of the MDR. The Target ID is a value assigned for that device according to the SCSI device manufacturer. SCSI Target ID 7 is reserved for use by the MDR. Typically, the SCSI LUN value is fixed at 0. However, some SCSI devices use this value as well. Check with your SCSI device vendor to verify this.

The following figure identifies the bus numbers for the SCSI connections on the rear side of your MDR. Please note the difference between the numbering scheme for dual-port SCSI modules and quad-port SCSI modules. If you mix modules, the numbering is assigned according to the module type (quad or dual) and its location. The center module position is assigned buses 5-8 and the right module position is assigned buses 9-12.

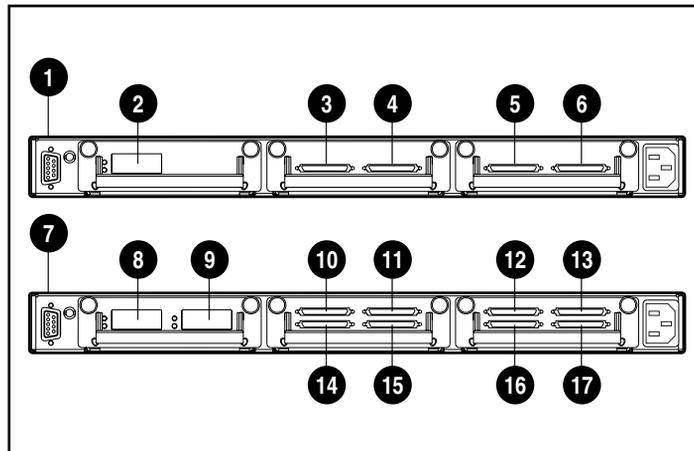


Figure 2-11. SCSI numbering system

- | | |
|--------------------|---------------|
| ❶ DB-9 Serial Port | ❷ SCSI Bus 5 |
| ❸ FC Port 1 | ❸ SCSI Bus 7 |
| ❹ SCSI Bus 6 | ❹ SCSI Bus 9 |
| ❺ SCSI Bus 5 | ❺ SCSI Bus 11 |
| ❻ SCSI Bus 10 | ❻ SCSI Bus 6 |
| ❼ SCSI Bus 9 | ❼ SCSI Bus 8 |
| ❽ DB-9 Serial Port | ❽ SCSI Bus 10 |
| ❾ FC Port 1 | ❾ SCSI Bus 12 |
| ❿ FC Port 2 | |

Special considerations should be taken when attaching SCSI tape libraries to the MDR. The number of targets will be 1 plus the number of tape drives since the Robot Arm (device that retrieves and mounts tapes) will occupy a SCSI Target ID. On large libraries, this may result in a tape drive inadvertently receiving a Target ID of 7, causing your library to behave in an erratic manner. Always verify your Target ID selections to guarantee proper operation.

The Fibre Channel Port must be connected to a Fibre Channel Arbitrated Loop (FC-AL) Hub, a Fibre Channel Fabric Switch, or Point-to-Point. To configure Fibre Channel Topography, please refer to your user documentation.

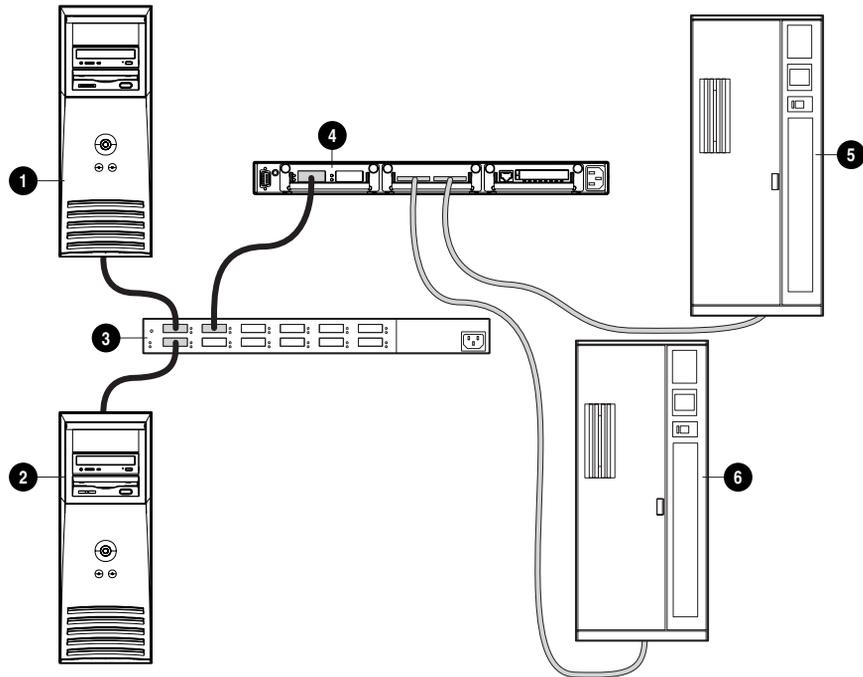


Figure 2-12. Example configuration

- | | | | |
|---|--------------------------|---|---------------------|
| ❶ | NT Server 1 | ❷ | Modular Data Router |
| ❸ | NT Server 2 | ❸ | SCSI Tape Library 2 |
| ❹ | Fibre Channel Switch/Hub | ❹ | SCSI Tape Library 1 |

In the preceding figure, an MDR is shown with two tape libraries attached to the SCSI buses. Additionally, the MDR and two servers are connected to a switch or hub. The hollow lines represent SCSI connections to the libraries while the solid lines represent Fibre Channel connections. Note that our target IDs for the devices within each of the libraries are identified according to the following table.

**Table 2-2
Target IDs**

Enclosure	Device	Bus	Target	LUN
Tape Library 1	Robot Arm	6	1	0
	Drive 1	6	2	0
	Drive 2	6	3	0
Tape Library 2	Robot Arm	5	4	0
	Drive 1	5	5	0
	Drive 2	5	6	0

Overview: SCSI versus Fibre Channel

In the Fibre Channel world, devices such as tapes and disk drives (known as targets in the SCSI world) are known as Fibre Channel Logical Unit Numbers (FC-LUN). A physical grouping of similar devices (such as the devices behind the MDR) are associated with a World Wide Name (WWN). There are two different WWNs: The World Wide Node Name (WWNN) and the World Wide Port Name (WWPN). The MDR enclosure has a WWNN associated with it. Each MDR Fibre Channel port has a WWPN associated with it. The MDR can support up to two Fibre Channel ports. To address a particular device, the WWPN and the FC-LUN must be specified. In order to describe a particular SCSI device, the SCSI Bus:Target:LUN (B:T:L) of the device must be specified.

As a side note, devices attached to the MDR are considered Fibre Channel targets since they receive commands, such as READ and WRITE, from host servers but do not initiate those commands. Host servers send commands. They are called Fibre Channel Initiators since they start the communication sequence.

NOTE: The SCSI LUN is different than an FC-LUN though the concept is the same. Typically, a SCSI LUN is simply 0. An FC-LUN, however, takes the place of a SCSI Target ID in the Fibre Channel world.

The WWPN is similar to an Ethernet Media Access Control (MAC) address. It is a unique “name” that represents the target, such as the MDR. FC-LUNs

represent physical or virtual devices attached to the target. There are potentially six SCSI devices that should appear as FC-LUNs behind the MDR's WWPN.

Since the MDR acts as a Fibre Channel-to-SCSI bridge, there must be a mechanism to relate a particular FC-LUN to a SCSI B:T:L. This is the role of the FCScsiMap. Initially there is only one of these maps, called the default map. All hosts that don't have a unique map assigned for them will use the default map to relate FC-LUNs to SCSI B:T:Ls. Host-specific maps will be covered later in the section "Selective Storage Presentation."

In our example configuration, the MDR discovers the devices in Bus/Target Order. First, an internal device is mapped (the SCC device at SCSI B:T:L 0:0:0, which will be described in the next section). Once this map is created, commands coming over the Fibre Channel are re-directed to the appropriate SCSI device using the newly created map.

SCSI Cables

Each MDR Dual SCSI module has two Very High-Density Cable Interconnect (VHDCI) connectors. A module may ship equipped with either Low-Voltage Differential/Single-ended (LVD/SE) or High-Voltage Differential (HVD) transceivers. Modules are identified with the appropriate icons (illustrated below) and care should be taken not to connect devices with a different transceiver type to the SCSI module.

NOTE: Prior to SCSI-2, standards defined only one type of differential SCSI signaling, now known as "High-Voltage Differential" to distinguish it from SCSI-2 "Low-Voltage Differential." High-voltage Differential SCSI is still commonly referred to as "Differential SCSI."

Table 2-3
SCSI Module Symbols

Symbol	Description
SCSI LVD/SE 	Low-Voltage Differential/Single-ended SCSI icon
SCSI DIFF 	High-Voltage Differential SCSI icon

Each VHDCI connector provides an independent SCSI bus and is internally terminated. The SCSI module reserves initiator ID 7 for use on each SCSI bus.

Fibre Channel Cable

The MDR Single Port Fibre Channel module is intended primarily for use with Shortwave GBICs and multi-mode Fibre Channel cables. While Longwave GBICs can be used, performance may not be optimal.

Multi-mode Fibre Channel cables are capable of supporting distances of 2 meters to 500 meters. These cables are for use with Shortwave GBICs only. Three multi-mode Fibre Channel cable option kits are available from Compaq. Each kit contains a multi-mode Fibre Channel cable with a connector attached to each end. The available kits are as follows:

- 2-meter multi-mode Fibre Channel Cable option kit (part number 234457-B21)
- 5-meter multi-mode Fibre Channel Cable option kit (part number 234457-B22)
- 15-meter multi-mode Fibre Channel Cable option kit (part number 234457-B23)

To customize your system with multi-mode Fibre Channel cable at distances of 15 meters to 500 meters, contact an independent Fibre Channel cable supplier.

If you are using an existing 62.5-micron cable, you must obtain a 62.5-micron jumper from an independent source. A 50-micron cable cannot be spliced with a 62.5-micron cable.



CAUTION: Make certain the Fibre Channel cables are installed and supported so that no excess weight is placed on the Fibre Channel connectors. This is necessary to prevent damage to the connector and cable and to prevent a cable bend radius less than 3 inches at the connector and along the cable length. Excess Fibre Channel cable should be coiled and tied out of the way, being careful not to coil the cable in a tight loop with a bend radius of less than 3 inches.

Laser Precautions



WARNING: To reduce the risk of injury from laser radiation or damage to the equipment, observe the following precautions:

- Allow only Compaq authorized service technicians to repair the equipment.
 - Do not open any panels, operate controls, make adjustments, or perform procedures to a laser device other than those specified herein.
 - Do not stare into laser beam when panels are open.
-

GBIC and Fibre Channel Cable Connector Cleaning Considerations

Optics, by nature, are susceptible to anything that hinders light transmission. Consequently, manufacturers of both GBIC Modules and Fibre Channel Cable Connectors provide dust covers to protect the optical areas and ensure optical signal integrity for initial system configuration. If the fiber optic interconnects are disengaged, the optical tips can be soiled by human touch, damaged from dropping, or simply collect dust debris when exposed to the open air for extended time periods. A contaminated optic tip may not be visible to the naked eye and could potentially cause degraded performance of your system.

To minimize the risk of optic contamination on your system, keep the following fibre optic handling guidelines in mind:

- **Dust Covers:** Dust Covers are provided with all optical components and should be kept in place when not used. Do not throw away the dust covers after initial installation. You may need them to protect optical interconnect areas if reconfiguration is required.
- **When to Clean:** The best rule of thumb for cleaning fiber optics is common sense. If you have handled fiber optic interconnects and think there may be contamination, clean it. If you need to use a fiber optic interconnect component that is found without the dust covers in place, clean it.
- **How to Clean:** First, wipe the optics with a lint-free tissue soaked in 100% Isopropyl alcohol. Next, wipe optics with a dry lint-free tissue and dry with compressed/canned air.

Ethernet RJ-45 Cable

This connector is provided for management through Simple Network Management Protocol (SNMP). By default, the MDR is configured to use an IP address of 10.1.2.3. To change this IP address or enable DHCP, use a terminal or terminal emulator connected to the DB-9 serial port. See Appendix C, “Boot Management Console for Windows NT HyperTerminal” for more information.

DB-9 Serial Cable

This connector is provided for advanced configuration and management.

The MDR is designed to function directly out of its shipping container with no special configuration required. However, you have the ability to configure and monitor various aspects of the MDR by connecting a terminal or terminal emulator to the serial port. See Appendix C, “Boot Management Console in Windows NT HyperTerminal” for more information on using this interface.

Power cords

The power cord set included with the MDR meets the requirements for use in the country where you purchased the it. If you need to use this MDR in another country, you should purchase a power cord that is approved for use in that country.

The power cord must be rated for the product and for the voltage and current marked on the product’s electrical ratings label. The voltage and current rating of the cord should be greater than the voltage and current rating marked on the product. In addition, the diameter of the wire must be a minimum of 1.00 mm² or 18AWG, and the length of the cord must be between 6 feet (1.8 m) and 12 feet (3.6 m). If you have questions about the type of power cord to use, contact your Compaq authorized service provider.

A power cord should be routed so that it is not likely to be walked on or pinched by items placed upon it or against it. Particular attention should be paid to the plug, electrical outlet, and the point where the cord exits from the product.

When installing the power cord, plug the AC power cord into the MDR, then into a grounded AC outlet.

Powering Up

After the MDR is installed and connected to a system, the system is ready to use. If further configuration is needed, see Appendix C, “Boot Management Console in Windows NT HyperTerminal” and Appendix D, “Application Management Console in Windows HyperTerminal.”

To power on the unit properly:

1. Power on all peripheral devices.
2. Wait at least ten seconds, then power on the MDR. The LEDs on the Management module will display a series of patterns while the unit initializes.

NOTE: The initialization may take over one minute depending upon the number of devices attached. The unit is ready for use when the Management module LEDs show a pattern of a single LED moving back and forth.

3. Power on the server(s).

Managing the Modular Data Router

Understanding the MDR's Configuration

The MDR is designed to operate within a Fibre Channel Arbitrated Loop as well as within a Fibre Channel Fabric. The unit's default configuration allows for Fibre Channel hosts to connect to SCSI targets.

The MDR's default configuration can be changed, including the method of connection and other features. An understanding of the basic characteristics of Fibre Channel and SCSI devices is recommended before configuring the MDR.

Fibre Channel Arbitrated Loop Configuration

On a Fibre Channel arbitrated loop, the MDR appears at a single Arbitrated Loop Physical Address (AL_PA). The MDR is configured to use soft addressing, which is described in the following section.

Soft Addressing

To acquire a soft address, the MDR will obtain the first available loop address starting from address 0. In this mode, the MDR automatically acquires an available address and participates on the loop, as long as there is at least one address available on the loop that is connected to the MDR. The MDR will request this address as its preferred address during any subsequent Fibre Channel loop initialization.

Fibre Channel Fabric Configuration

The MDR is identified to the Fibre Channel switch as a unique device by the preconfigured World Wide Name (WWN). This setting is factory-programmed and no further configuration is needed, although the WWN is able to receive user-defined settings through the interface.

Host Device Configuration

Fibre Channel devices will be mapped by the host system into the existing device mapping scheme used by that operating system when a Fibre Channel Host Bus Adapter (HBA) is used. The Fibre Channel HBA maps Fibre Channel AL_PAs to SCSI target addresses. The HBA will claim enough SCSI bus entries to allow for 125 Fibre Channel targets to map to SCSI Bus:Target entries by a fixed mapping of AL_PA to Bus:Target. Configured this way, the MDR becomes a Bus:Target identifier, with the attached SCSI devices showing as logical units (LUNs).

Although the available SCSI limit is 15 per bus, operating systems can extend this limit in cases where older applications might have expectations about valid SCSI IDs, and can not work with certain mappings. In particular, applications have had difficulties addressing target IDs greater than 15 (for example: 16 and up).

The MDR does not have a hard addressing mode that would allow selectable fixed assignment of AL_PA values. It is recommended that the number of devices connected to the arbitrated loop be less than 16. The user may limit the number of Fibre Channel Arbitrated Loop Hub ports in an arbitrated loop so the loop AL_PA values are assigned based on the connections to the hub.

Fibre Channel Host to SCSI Target Configuration

- The MDR's default configuration allows it to act as a target to a Fibre Channel Initiator and to pass FCP requests to SCSI target devices. In order to map SCSI targets to Fibre Channel Hosts, MDR supports two Fibre Channel to SCSI addressing methods:
 - Progressive Persistent Device Discovery Addressing – Mapping tables are saved in persistent memory and are loaded each time the MDR is power cycled. The MDR creates new entries in the address mapping tables for newly attached devices.
 - Indexed Addressing – Allows editing of an address mapping table.

SCSI Targets are selected by mapping the appropriate values into the FCP LUN field, and comparing a Fibre Channel LUN value to a SCSI Bus:Target:LUN value. The MDR acts as a single initiator on each SCSI bus, defaulting to ID 7. All commands passed through to a SCSI bus originate from this SCSI ID.

Progressive Persistent Device Discovery (PPD) Addressing

PPD address mapping is the default mode during the new SCSI device discovery process, which is initiated upon power up or remapping. During the MDR's discovery process on a SCSI bus, the Index table is filled with adjacent FCP LUNs referencing each subsequent SCSI device. The host system will then detect every attached device without voids, allowing full device discovery to the host.

The MDR can perform SCSI device discovery in two ways:

- Target ID priority – This mode fills the table according to ascending SCSI Target ID order. This is the MDR's default discovery mode.
- Bus Number priority – This mode fills the table in ascending SCSI Bus Number (SCSI port number) order.

The user can use the Application Management Console (AMC) “setFcLunPriority” command to choose which mode to use (see Appendix D in this guide, “Application Management Console in Windows HyperTerminal”).

Indexed Addressing

Indexed Addressing mode is recommended for environments where users want more flexibility in mapping Fibre Channel to SCSI addresses than provided by the default Progressive Persistent Device Discovery Addressing (PPD) Mode.

The user can edit the entries in the Fibre Channel to SCSI Mapping Table with indexed addressing using an in-band management tool. The user can then select a table entry by FCP LUN and specify the associated BUS:TARGET:LUN. The MDR saves all changes to the mapping table in persistent memory and loads them at the next power cycle.

Management Information Base (MIB)

A Management Information Base (MIB) is a repository of information about the current status of the entire network. The data that is stored within the MIB appears at the management workstation. The management console uses the Ethernet connection via Simple Network Management Protocol (SNMP) to send requests and receive MIB information from the MDR. This management application is used to set system variables and to get system information stored in the MIB.

Fibre Channel interface MIB information includes:

- Fibre Channel port statistics.
- Fibre Channel-to-SCSI mapping.
- Type and connectivity information for attached devices.
- Ethernet information.
- System information such as unit serial number.

StorageWorks Command Console (SWCC)

The Compaq StorageWorks MDR can be managed by StorageWorks Command Console (SWCC). SWCC displays the configuration and status of the MDR. The software can be configured to provide pager notification when a problem occurs with the MDR. SWCC can be installed from the SWCC CD-ROM, or from the following website:
www.compaq.com/products/storageworks/Storage-Management-Software/command_console.html

Restoring Factory Defaults

To access the Application Management Console (AMC), you will need to attach the null-modem cable that came with your MDR to the serial connection on the business side of your MDR and use a terminal program to access it. This procedure is described in Appendix D of the *Compaq StorageWorks Modular Data Router User Guide*, part number 133834.

The configuration example that follows assumes that your MDR is in its default state (as it came from the factory). If you are not sure that your MDR has ever been powered up before, use the AMC command `deleteConfig` to return it to its default state, as described in the following steps. These steps should be used to return the MDR to its default state before and after the examples that follow.

IMPORTANT: You must wait for the AMC> prompt at the end before turning off your MDR. See Appendix D to learn how to access the Application Management Console (AMC) using the null-modem cable provided in your accessory kit.

IMPORTANT: Following this example will change the behavior of your Modular Data Router.

1. At the AMC> prompt, type the following command: deleteConfig.

```
AMC>deleteConfig
Are You Sure you Want to Remove All System Configurations
and return to the Factory Default Settings? y

THIS WILL ERASE ALL MAPS AND CONFIGURATIONS AND RETURN
THIS UNIT TO THE FACTORY DEFAULTS.

ARE YOU SURE?
```

Figure 3-1. deleteConfig screen 1 of 2

2. When asked if you are sure you want to remove all system configurations and return to the Factory Default Settings, type “y” for yes.
3. You will be cautioned that this command will erase all maps and configurations to the factory defaults. At the question, “Are you sure?”, type “y” for yes. The following message will appear:

```
ARE YOU SURE? y
FACTORY DEFAULTS RESTORED.
YOU MUST REBOOT THE SYSTEM IN ORDER FOR THE CHANGES TO TAKE EFFECT.
AMC>
```

Figure 3-2. deleteConfig screen 2 of 2

4. Power off the MDR.

Default MDR Operation

To begin operating your MDR, first power-up your SCSI devices before turning on your MDR. Then, power up the MDR with the devices. During initialization, the MDR will discover each of the SCSI devices attached to your MDR and add them to the default map.

We can look at the default map by using the command `showFcSCSIMap` with no arguments. The dialog below shows a typical power-up sequence of the MDR followed by the issuing of this command. The commands you issue are shown:

```
COMPAQ Data Router

Performing Power-On Self Test ...

Serial Port Test ..... passed
Processor Test ..... passed
Processor Memory Test ..... passed
Boot ROM Checksum ..... passed
I2C NVRAM Checksum ..... passed
Local Bus To PCI Bus Bridge Test ..... passed

Power-On Self Test Completed.

Press any key to access the Boot Management Console.
Auto Booting
Booting default application image 0: Data Router
    1170
Attaching network interface fei0... done.
Attaching network interface lo0... done.

IP Address = 174.104.125.104:fffffc00:13c680:2
Flash ROM Initialization done.

Performing I/O Memory Test ...

Memory Test Using DMA Engine ..... passed

I/O Memory Test Completed.

Current system Date and Time is Wednesday December 20, 2000 10:07:22
Starting to initialize the SCSI ports...Done!
Starting to initialize the Fibre Channel ports...Done!
```

Figure 3-3. Default MDR operation screen

```

AMC>showFcSCSIMap

The Default Map is:
FC LUN  SCSI Bus  SCSI Target ID  SCSI LUN  Device Type
  0      0      0      0      0      0x0C
  1      5      4      0      0x08
  2      5      5      0      0x01
  3      5      6      0      0x01
  4      6      1      0      0x08
  5      6      2      0      0x01
  6      6      3      0      0x01

AMC>

```

Figure 3-4. showFcSCSIMap screen

FC LUN is the Fibre Channel logical unit number that is assigned to a particular SCSI device. This will be used by the host server to communicate with the assigned SCSI device, in addition to the MDR's World Wide Name. The SCSI Bus, SCSI Target ID, and SCSI LUN are combined to represent a particular SCSI device attached to the MDR. Each line in the map represents an association between a Fibre Channel LUN and a SCSI B:T:L.

The last column, Device Type, uses SCSI Device Type Codes to describe the type of device attached. The following table can be used to translate this column.

Table 3-1
Device Type

Device Type	Description
0x00	Direct Access Device (Disk)
0x01	Sequential Access Device (Tape)
0x08	Medium Changer (Library Robot)
0x0C	Storage Array Controller (SCC)

There are other device types; however, the devices listed in the preceding table are typically encountered when using the MDR. According to the map, there are 7 devices: the internal SCC device at FC LUN 0, Tape Library 2 at FC LUNs 1-3, and Tape Library 1 at FC LUNs 4-6.

The reason devices are listed in this order has to do with the fact that device discovery happens in Bus/Target order. Since the SCC device is at B:T:L 0:0:0, it has the lowest bus value of all and is mapped first. Tape Library 2 is attached to Bus 5, so it is mapped next (with its targets 4, 5, 6 mapped in order). That is why the library robot is typically assigned the lowest Target ID. Finally, Tape Library 1 is mapped since it is attached to bus 6.

Using the SCSI Command Controller (SCC)

In the past, operating systems queried for each device that a particular host could address. This was adequate for the SCSI world where there was a known maximum number of devices available on a bus. This limitation can not be assumed in Fibre Channel since there can be any number of storage devices that may be connected in different configurations, including Arbitrated Loop, Fabric environments, and more.

The SCC device is a virtual device that lives within the MDR. It functions as MDR's controller and represents the MDR's presence in the Fibre Channel world. All Fibre Channel devices must respond to FC LUN 0 inquiries. Without any devices attached, the MDR can fulfill this requirement.

More importantly, the SCC device provides a means for the host server operating system to determine the number of FC LUNs supported by the MDR. Without the SCC device present at FC LUN 0, host server operating systems would have to inquire each FC LUN to determine if something was attached.

Device discovery through LUN scanning is impractical when there are a large number of devices involved. This was the primary reason for implementing an internal SCC device at FC LUN 0. It is important, however, that the SCC device can be "turned off" in order to keep from interfering with operating systems that cannot handle the extended functionality. The MDR provides two methods for doing this: using the `setScMode off` command and by changing the default map. The following command sequence removes the SCC devices from FC LUN 0 and recreates the default map.

```

AMC>setSccMode off
This will Force the FC-SCSI Map to be Recreated.
Are You Sure? (Y or N) y
Map Recreated!
SCC Mode is Off

AMC>showFcSCSIMap
The Default Map is:
FC LUN  SCSI Bus  SCSI Target ID  SCSI LUN  Device Type
  0      5      4      4      0      0x08
  1      5      5      5      0      0x01
  2      5      6      6      0      0x01
  3      6      1      1      0      0x08
  4      6      2      2      0      0x01
  5      6      3      3      0      0x01

AMC>

```

Figure 3-5. setSccMode off screen

Note that the FC LUNs have shifted upwards; FC LUN 0 now references the robot arm of Tape Library 2. However, the SCC device still exists, even though it is not mapped anymore. Using the command `showSCSIDevices` it is possible to take a look at all the SCSI devices attached to the MDR.

```

AMC>showSCSIDevices
Device#  SCSI Bus#  SCSI Target ID  SCSI LUN  Port#  Slot#  Type
  0      0      0      0      0      0      0x0C
  1      5      4      4      0      5      2      0x08
  2      5      5      5      0      5      2      0x01
  3      5      6      6      0      5      2      0x01
  4      6      1      1      0      6      2      0x08
  5      6      2      2      0      6      2      0x01
  6      6      3      3      0      6      2      0x01

```

Figure 3-6. showSCSIDevices screen

Issuing the `setScMode on` command, forces a remapping of the devices and adds the SCC device back at FC LUN 0. The `setScMode` command controls the mapping behavior of the SCC device during device discovery whether that's power-on or during remapping. To add the SCC device back, use the following command sequence:

```
AMC>setScMode on
This will Force the FC-SCSI Map to be Recreated.
Are You Sure? (Y or N) y
Map Recreated!
SCC Mode is On
AMC>showFcSCSIMap
The Default Map is:
FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type
0        0          0                0          0x0C
1        5          4                0          0x08
2        5          5                0          0x01
3        5          6                0          0x01
4        6          1                0          0x08
5        6          2                0          0x01
6        6          3                0          0x01

AMC>
```

Figure 3-7. `setScMode on` screen

Changing the Default Map

Another way to change a map is by using the `setFcSCSIMap` command. For example, if you want Tape Library 1 to appear before Tape Library 2, you can create the map rather than accepting MDR's ordering, by implementing the following command sequence:

```
AMC>clearFcSCSIMap
The default map is to be cleared. Are you sure? (Y/N) y
Map Entries in the default map are deleted.

AMC>setFcSCSIMap

*** Editing the Default Map:
set new entry (Y), delete entry (D), show map (S), stop (N)? y
Map Entry to be edited (Bus:TargetID:Lun): 0:0:0
Fibre Channel LUN to be associated with the above entry:0
Entry with FC LUN 0, SCSI Bus 0, Target ID 0, SCSI LUN 0 was saved!
Map Entry to be edited (Bus:TargetID:Lun): 6:1:0
Fibre Channel LUN to be associated with the above entry:1
Entry with FC LUN 1, SCSI Bus 6, Target ID 1, SCSI LUN 0 was saved!
Map Entry to be edited (Bus:TargetID:Lun): 6:2:0
Fibre Channel LUN to be associated with the above entry:2
Entry with FC LUN 2, SCSI Bus 6, Target ID 2, SCSI LUN 0 was saved!
Map Entry to be edited (Bus:TargetID:Lun): 6:3:0
Fibre Channel LUN to be associated with the above entry:3
Entry with FC LUN 3, SCSI Bus 6, Target ID 3, SCSI LUN 0 was saved!
Map Entry to be edited (Bus:TargetID:Lun): 5:4:0
Fibre Channel LUN to be associated with the above entry:4
Entry with FC LUN 4, SCSI Bus 5, Target ID 4, SCSI LUN 0 was saved!
Map Entry to be edited (Bus:TargetID:Lun): 5:5:0
Fibre Channel LUN to be associated with the above entry:5
Entry with FC LUN 5, SCSI Bus 5, Target ID 5, SCSI LUN 0 was saved!
Map Entry to be edited (Bus:TargetID:Lun): 5:6:0
Fibre Channel LUN to be associated with the above entry:6
Entry with FC LUN 6, SCSI Bus 5, Target ID 6, SCSI LUN 0 was saved!
Map Entry to be edited (Bus:TargetID:Lun): <ENTER>

set new entry (Y), delete entry (D), show map (S), stop (N)? s

FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type
    0         0         0             0         0x0C
    1         6         1             0         0x08
    2         6         2             0         0x01
    3         6         3             0         0x01
    4         5         4             0         0x08
    5         5         5             0         0x01
    6         5         6             0         0x01
set new entry (Y), delete entry (D), show map (S), stop (N)? n
AMC>
```

Figure 3-8. Changing the default map screen

You can also use this same procedure to remove the SCC device. Do not enter the SCC device at B:T:L 0:0:0 and shift the assigned FC LUN up for each SCSI device.

Multiple Paths

The MDR is capable of having two Fibre Channel Ports. The extra port increases the bandwidth available for sending and receiving commands to the SCSI devices attached to the MDR. The goal of optimizing bandwidth through the MDR is to balance the data flow between the Fibre Channel ports so that the tape devices attached to the MDR do not starve while waiting to get data.

The addition of this second port could be confusing to hosts communicating with the MDR. At this point, each port has a unique World Wide Port Name yet share a common World Wide Node Name. Some operating systems can use this information to determine that there are multiple paths to the MDR, but most can not make this determination. Regardless, all hosts will receive the same default map whether they communicate with the MDR through Fibre Channel port 1 or Fibre Channel port 2. If the host operating system cannot distinguish the multiple paths, the devices will appear twice on the host's device list. This is known as *device ghosting*, a situation that can lead to errors.

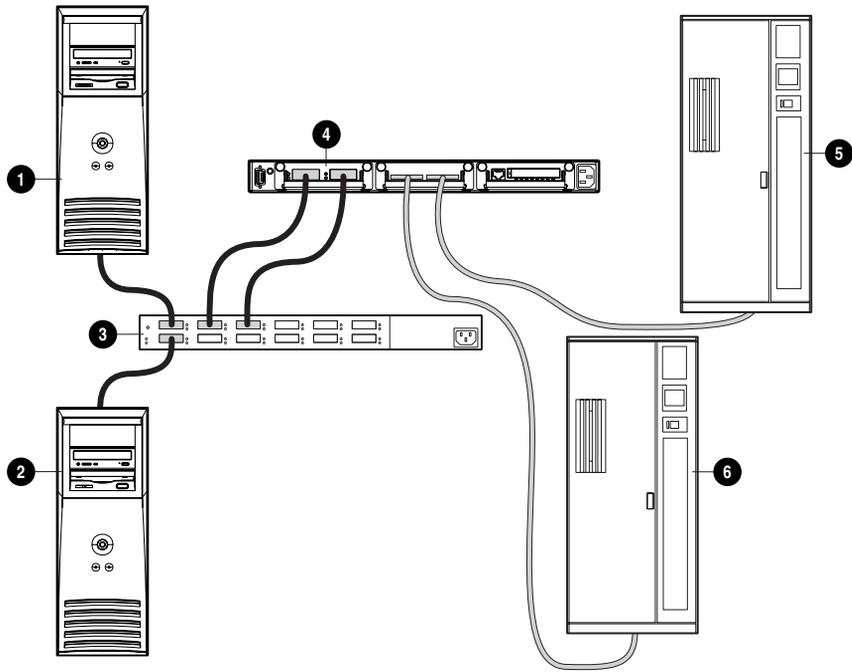


Figure 3-9. Device ghosting

- | | | | |
|---|--------------------------|---|---------------------|
| ❶ | NT Server 1 | ❷ | Modular Data Router |
| ❸ | NT Server 2 | ❸ | SCSI Tape Library 2 |
| ❹ | Fibre Channel Switch/Hub | ❹ | SCSI Tape Library 1 |

The preceding figure shows NT Server 1 sending an inquiry to FC LUN 1 through Port 1. The default map looks up the association and routes the command to Tape Library 1 and returns the result back to the server through Port 1. However, if NT Server 1 does the same inquiry through Port 2, we will be communicating with the same device (Tape Library 1) since the default map will be used to look up the device.

Selective Storage Presentation

Only the default map is defined at this point, and all host servers have access to the SCSI devices shown in that map. By providing a unique map for each host, you can limit what each host has access to. However, having a map for each host doesn't solve the whole problem. It is necessary to define which devices are available for the host depending upon the port the request is made. In this way, device ghosting can be eliminated.

Host-defined maps require two pieces of information: the Host server World Wide Port Name and the MDR port that receives the command. World Wide Names require an eight-byte value, which is often difficult to type. To make it easier to work with World Wide Names, the MDR uses aliases to identify them. The added benefit of aliases is that, if the Fibre Channel Host Bus Adapter needs to be replaced, you can simply point the alias at the new WWN rather than having to recreate the associated maps. The following figure shows this relationship.

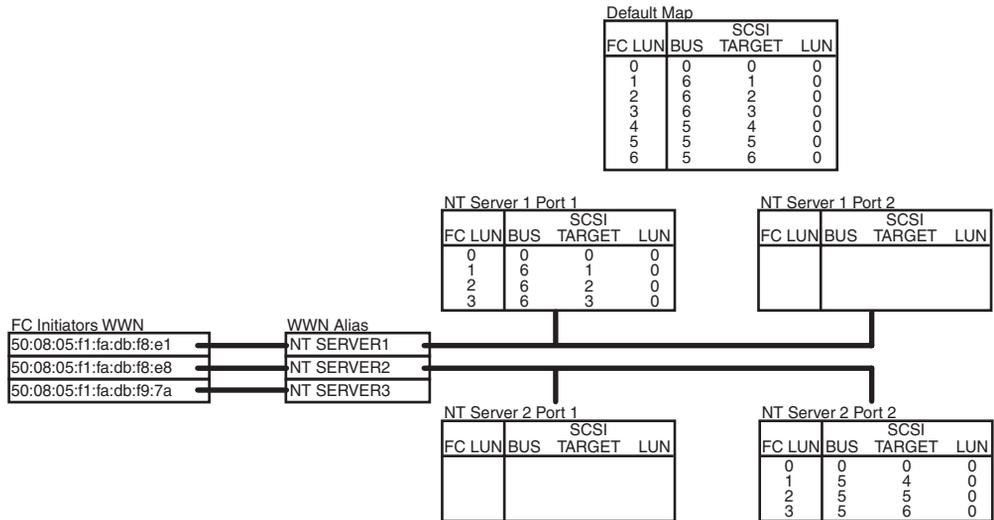


Figure 3-10. Creating maps for a host

The preceding figure shows the map creation strategy that will be demonstrated. For instance, NT Server 1 can access only Tape Library 1 through FC Port 1. Another host (NT Server 2) can only access Tape Library 2 through Port 2. Finally, a third server (NT Server 3) has access to all devices regardless of which port the command comes in on.

To begin, you can obtain a list of hosts that are on the Fibre Channel. The AMC command showHosts displays a list of the Fibre Channel hosts that have logged into the MDR. However, it may be difficult to identify which WWN belongs to which host. One way to identify host WWNs is to bring the servers up one at a time and issue the showHosts command after each server is fully operational.

Next, you can use the AMC command setAlias to associate the World Wide Port Name with the appropriate alias. Finally, maps can be created using the AMC command setFcScsiMap for each alias at each port.

In this exercise, the default map will be left as it was defined earlier under the section “Changing the Default Map.” Input the following command sequence:

```
AMC>showHosts
Port Number : 1
World Wide Name -
Node Name : 50:05:08:03:00:10:04:80
Port Name : 50:05:08:03:00:10:04:81
Source ID : 0x000004
Status : Enabled
Operation Mode : Fibre Channel Target

Host World Wide Name -
Host Node Name : 50:08:05:F1:FA:DB:F8:E1
Host Port Name : 50:08:05:F1:FA:DB:F8:E1
AliasName : <not defined>
Is Currently Logged In : Yes
Source ID = 0x000001
Operation Mode = Fibre Channel Initiator

Host World Wide Name -
Host Node Name : 50:08:05:F1:FA:DB:F8:E8
Host Port Name : 50:08:05:F1:FA:DB:F8:E8
AliasName : <not defined>
Is Currently Logged In : Yes
Source ID = 0x000002
Operation Mode = Fibre Channel Initiator

Host World Wide Name -
Host Node Name : 50:08:05:F1:FA:DB:F9:7A
Host Port Name : 50:08:05:F1:FA:DB:F9:7A
AliasName : <not defined>
Is Currently Logged In : Yes
Source ID = 0x000003
Operation Mode = Fibre Channel Initiator

Port Number : 2
World Wide Name -
Node Name : 50:05:08:03:00:10:04:80
Port Name : 50:05:08:03:00:10:04:82
Source ID : 0x000005
Status : Enabled
Operation Mode : Fibre Channel Target
```

Figure 3-11. showHosts screen 1 of 4

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```
Host World Wide Name -
  Host Node Name : 50:08:05:F1:FA:DB:F8:E1
  Host Port Name : 50:08:05:F1:FA:DB:F8:E1
  AliasName : <not defined>
  Is Currently Logged In : Yes
  Source ID = 0x000006
  Operation Mode = Fibre Channel Initiator
```

```
Host World Wide Name -
  Host Node Name : 50:08:05:F1:FA:DB:F8:E8
  Host Port Name : 50:08:05:F1:FA:DB:F8:E8
  AliasName : <not defined>
  Is Currently Logged In : Yes
  Source ID = 0x000007
  Operation Mode = Fibre Channel Initiator
```

```
Host World Wide Name -
  Host Node Name : 50:08:05:F1:FA:DB:F9:7A
  Host Port Name : 50:08:05:F1:FA:DB:F9:7A
  AliasName : <not defined>
  Is Currently Logged In : Yes
  Source ID = 0x000008
  Operation Mode = Fibre Channel Initiator
```

```
AMC>setAlias 50:08:05:F1:FA:DB:F8:E1 NT_SERVER1
The alias of port 50:08:05:f1:fa:db:f8:e1 is set to nt_server1.
```

```
AMC>setAlias 50:08:05:F1:FA:DB:F8:E8 NT_SERVER2
The alias of port 50:08:05:f1:fa:db:f8:e8 is set to nt_server2.
```

```
AMC>setAlias 50:08:05:F1:FA:DB:F9:7A NT_SERVER3
The alias of port 50:08:05:f1:fa:db:f9:7a is set to nt_server3.
```

```
AMC>showFcSCSIMap
```

```
The Default Map is:
```

FC LUN	SCSI Bus	SCSI Target ID	SCSI LUN	Device Type
0	0	0	0	0x0C
1	6	1	0	0x08
2	6	2	0	0x01
3	6	3	0	0x01
4	5	4	0	0x08
5	5	5	0	0x01
6	5	6	0	0x01

Figure 3-12. showHosts screen 2 of 4

```

AMC>createMap NT_SERVER1 1
A host map is created for host nt_server1 at port 1.
AMC>createMap NT_SERVER1 2
A host map is created for host nt_server1 at port 2.
AMC>createMap NT_SERVER2 1
A host map is created for host nt_server2 at port 1.
AMC>createMap NT_SERVER2 2
A host map is created for host nt_server2 at port 2.
AMC>clearFcSCSIMap NT_SERVER1 2
All the map entries are deleted from the host map.
AMC>clearFcSCSIMap NT_SERVER2 1
All the map entries are deleted from the host map.
AMC>setFcSCSIMap nt_server1 1
set new entry (Y), delete entry (D), show map (S), stop (N)? d
Fibre Channel LUN to be Deleted: 4
Entry with FC LUN 4, SCSI Bus 5, Target ID 4, SCSI LUN 0 was removed!
Fibre Channel LUN to be Deleted: 5
Entry with FC LUN 5, SCSI Bus 5, Target ID 5, SCSI LUN 0 was removed!
Fibre Channel LUN to be Deleted: 6
Entry with FC LUN 5, SCSI Bus 5, Target ID 6, SCSI LUN 0 was removed!
Fibre Channel LUN to be Deleted: <ENTER>
set new entry (Y), delete entry (D), show map (S), stop (N)? s
FC LUN  SCSI Bus  SCSI Target ID  SCSI LUN  Device Type
  0         0         0         0         0x0C
  1         6         1         0         0x08
  2         6         2         0         0x01
  3         6         3         0         0x01
set new entry (Y), delete entry (D), show map (S), stop (N)? n
AMC>createMap NT_SERVER1 1
A host map is created for host nt_server1 at port 1.
AMC>createMap NT_SERVER1 2
A host map is created for host nt_server1 at port 2.
AMC>createMap NT_SERVER2 1
A host map is created for host nt_server2 at port 1.
AMC>createMap NT_SERVER2 2
A host map is created for host nt_server2 at port 2.
AMC>clearFcSCSIMap NT_SERVER1 2
All the map entries are deleted from the host map.
AMC>clearFcSCSIMap NT_SERVER2 1
All the map entries are deleted from the host map.
AMC>setFcSCSIMap nt_server1 1
set new entry (Y), delete entry (D), show map (S), stop (N)? d
Fibre Channel LUN to be Deleted: 4
Entry with FC LUN 4, SCSI Bus 5, Target ID 4, SCSI LUN 0 was removed!
Fibre Channel LUN to be Deleted: 5
Entry with FC LUN 5, SCSI Bus 5, Target ID 5, SCSI LUN 0 was removed!
Fibre Channel LUN to be Deleted: 6
Entry with FC LUN 5, SCSI Bus 5, Target ID 6, SCSI LUN 0 was removed!
Fibre Channel LUN to be Deleted: <ENTER>
set new entry (Y), delete entry (D), show map (S), stop (N)? s

```

Figure 3-13. showHosts screen 3 of 4

```

FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type
  0         0         0         0         0         0x0C
  1         6         1         0         0         0x08
  2         6         2         0         0         0x01
  3         6         3         0         0         0x01
set new entry (Y), delete entry (D), show map (S), stop (N)? n
AMC>showFcSCSIMap -all

```

The Default Map is:

```

FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type
  0         0         0         0         0         0x0C
  1         6         1         0         0         0x08
  2         6         2         0         0         0x01
  3         6         3         0         0         0x01
  4         5         4         0         0         0x08
  5         5         5         0         0         0x01
  6         5         6         0         0         0x01

```

The Host Map for Host nt_server1 at Port 1:

```

FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type
  0         0         0         0         0         0x0C
  1         6         1         0         0         0x08
  2         6         2         0         0         0x01
  3         6         3         0         0         0x01

```

The Host Map for Host nt_server1 at Port 2:

```

FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type

```

The Host Map for Host nt_server2 at Port 1:

```

FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type

```

The Host Map for Host nt_server1 at Port 1:

```

FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type
  0         0         0         0         0         0x0C
  1         5         4         0         0         0x08
  2         5         5         0         0         0x01
  3         5         6         0         0         0x01

```

AMC>

Figure 3-14. showHosts screen 4 of 4

You'll notice that the maps for NT Server 1 were updated differently than the maps for NT Server 2. When setting the map for NT Server1, we relied on the fact that when you create maps using the createMap AMC command, you get a copy of the default map. The LUNs that weren't necessary were deleted (LUNs 4, 5, and 6). For NT Server 2, the map was cleared using the AMC command clearFcScsiMap and the map was created from scratch specifying the SCSI B:T:Ls and the FC LUNs.

At this point, there will be no interference from NT Server 1 using Fibre Channel Port 2 or from NT Server 2 using Fibre Channel Port 1. However, other servers, such as NT Server 3 will access the default map, regardless of

the port the command comes in on. The following section offers detailed information about this process.

Open Versus Closed Default Map Model

If a map has not been defined for a particular host that is communicating through a specific Fibre Channel port, the default map will be used. Therefore, it is important that the default map contain only those devices that you want those servers to have access to. In this situation, NT Server 3 would have access to all the SCSI devices defined in the default map.

If you want to deny access to NT Server 3 and all other unknown servers, you can simply clear the default map by issuing the AMC command `clearFcScsiMap`. Subsequently, these servers would be denied access. A problem arises, however, when the MDR is power-cycled.

By default, the MDR default map's update policy is Open. When new SCSI devices are discovered during the power-up initialization of the MDR, the new devices are added to the end of the default map. Therefore, all the devices are added again to the default map. The following exercise details the process of clearing the default map, recycling the power on the MDR, and (after POST), analyzing the default map. Enter the following command sequence:

```
AMC>clearFcSCSIMap
The default map is to be cleared. Are you sure? (Y/N) y
Map Entries in the default map are deleted.

AMC>showFCSCSIMap
The Default Map is:
FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type
-----
AMC> <<RECYCLE THE MDR POWER>>
```

Figure 3-15. `clearFcSCSIMap` screen

```
AMC>showFCSCSIMap
The Default Map is:
FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type
-----
0         0         0                 0          0x0c
1         5         4                 0          0x08
2         5         5                 0          0x01
3         5         6                 0          0x01
4         6         1                 0          0x08
5         6         2                 0          0x01
6         6         3                 0          0x01

AMC>
```

Figure 3-16. `showFcSCSIMap` screen

The default map was re-created in Bus/Target order. Library 2 was added before Library 1, even though it was changed earlier. Since recycling the power will cause the map to be recreated every time, you need to take this a step further by “closing” the map update model.

By setting MDR’s map update policy to Closed, subsequent power-cycles of the MDR will not add new devices to the default map. The MDR will still discover the devices and add them to its list of available devices. You can use the AMC command `showScsiDevices` to view the SCSI devices discovered during initialization. The AMC command `setMapUpdateModel` is used to control the map update policy.

The following exercise details the process to block access to all other servers besides NT Server 1 and NT Server 2. Input the following command sequence:

```
AMC>setMapUpdateModel closed
The Default Map is Update model is set to CLOSED model.

AMC>clearFcSCSIMap
The default map is to be cleared. Are you sure? (Y.N) y
Map Entries in the default map are deleted.
```

Figure 3-17. setMapUpdateModel closed screen

```
AMC>showFcSCSIMap
The Default Map is:
FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type

AMC> <<RECYCLE THE MDR POWER>>

AMC>showFcSCSIMap

The Default Map is:
FC LUN   SCSI Bus   SCSI Target ID   SCSI LUN   Device Type

AMC>
```

Figure 3-18. showFcSCSIMap screen

Notice that when the power on the MDR is recycled, the map no longer gets updated. We've demonstrated the default behavior of the MDR, SCC, and SSP. Let's return your MDR back to its factory condition.

```
AMC>deleteConfig
Are You Sure you Want to Remove All System Configurations
and return to the Factory Default Settings? y

THIS WILL ERASE ALL MAPS AND CONFIGURATIONS AND RETURN
THIS UNIT TO THE FACTORY DEFAULTS.

ARE YOU SURE? y

FACTORY DEFAULTS RESTORED.
YOU MUST REBOOT THE SYSTEM IN ORDER FOR THE CHANGES TO TAKE EFFECT.

AMC>
```

Figure 3-19. deleteConfig screen

Chapter 4

Troubleshooting

The MDR is designed to function directly out of its shipping container with no special configuration required. However, if you have problems accessing SCSI tape devices connected to the MDR from your fibre channel network you can use the steps in this chapter to help locate the problem.

NOTE: The MDR does not contain any user serviceable parts. If you determine that there is a hardware problem with the MDR contact a Compaq authorized service provider.

Step 1: Verify AC Power

The MDR has an LED on the rear panel that illuminates when it is connected to an AC power source and the power switch has been turned on. If this LED does not illuminate verify that the MDR has been plugged into an active AC power source. Also, verify that all peripheral devices are connected to AC power.

Step 2: Power-on Self-test

Immediately after the MDR is turned on, it performs a power-on self-test (POST) to verify its internal hardware is working properly. When POST starts all the LEDs on the Management Module will illuminate and then go through a series of indicator patterns as various portions of the internal hardware are tested. This process should last approximately 90 seconds. Once POST is complete, the Management Module LEDs will display a single LED moving back and forth. If the MDR displays this pattern, it has completed POST properly; proceed to the section “Inspect Fibre Channel Cables.”

If the LED’s illumination pattern does not change for more than 90 seconds there may be a hardware failure in the MDR. If this happens, first power off the MDR and then reseal all of the option modules, making certain to tighten the modules in with their thumbscrews. If POST stops with a static LED pattern again, connect a terminal or terminal emulator to the MDR’s DB-9 serial port to monitor POST progress and error messages. See Appendix C, “Boot Management Console in Windows NT HyperTerminal,” for more information on connecting a terminal to the DB-9 serial port.

Step 3: Inspect Fibre Channel Cables

Inspect all fibre cables between the MDR and all attached fibre channel devices. The connectors should latch into position with an audible “click.” Verify that the cables are not damaged or bent with a radius of less than 3 inches. Also, check the GBIC modules in the Fibre Channel module to ensure they are properly inserted.

There are two LEDs on the MDR Fibre Channel module. Normally, these indicate the condition of transmitted and received signals. When a cable attached to an operating loop or fabric is plugged into the GBIC in the module, both LEDs should illuminate. If they do not, the likely causes are a bad GBIC or Fibre Channel cable. If a pattern of alternating periods of rapid flashes followed by a short period of non-illumination is displayed there may be an internal problem in the Fibre Channel module.

Step 4: Inspect SCSI Cables

Inspect the SCSI cabling between the MDR and all attached SCSI devices. Check for loose, dirty, broken, or bent cabling and connectors. Note that the VHDCI SCSI connectors used on the MDR can not support the weight of the attached SCSI cables. The cables must be resting on the SCSI module's plastic handle.

The MDR SCSI modules are marked with icons indicating whether they contain Low-Voltage Differential/Single-Ended (LVD/SE) or High-Voltage Differential (HVD) transceivers. Verify that the target SCSI device(s) have the same type of transceivers. The MDR will not be able to communicate with the SCSI devices if the transceiver types do not match.

Each SCSI module has one LED indicator for each SCSI bus. The LED is an indicator of activity on the SCSI bus. Depending on the level of SCSI activity the LED may be off (indicating no SCSI activity) or it may appear to be solidly illuminated during high rates of SCSI activity. If the LED appears on all the time but there is no apparent I/O activity happening, the SCSI bus may be "hung." This could be an indication of a faulty SCSI module in the MDR or an indication of a faulty component outside of the MDR such as a SCSI cable or tape drive.

Step 5: Serial Port Information

The DB-9 serial port provides an advanced configuration and management interface. This serial port reports POST progress and system error messages, as well as providing command line interfaces for boot management and application management. Appendix C "Boot Management Console in Windows NT HyperTerminal" and Appendix D "Application Management Console in Windows HyperTerminal" provide detailed information on these command line interface.

In particular, the Application Management Console (AMC) command "show SCSI Devices" can be used to show what SCSI devices the MDR was able to detect during system initialization.

Regulatory Compliance Notices

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, your Modular Data Router is assigned a Compaq Series Number. The Compaq Series number for this product is: Series EO1500. The Modular Data Router Series Number can be found on the product label, along with the required approval markings and information. When requesting certification information for this product always refer to this Series Number. This series number should not be confused with the marketing name or model number for your Modular Data Router.

Federal Communications Commission Notice

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

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Compaq Computer Corporation may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian Notice (Avis Canadien)

Class A Equipment

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

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

European Union Notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (in brackets are the equivalent international standards):

- EN55022 (CISPR 22) - Electromagnetic Interference
- EN50082-1 (IEC801-2, IEC801-3, IEC801-4) - Electromagnetic Immunity
- EN60950 (IEC950) - Product Safety

Japanese Notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

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Taiwanese Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Laser Compliance

The GBIC Module contains a laser diode of either gallium aluminum arsenide (GaALAs) emitting in the wavelength range of 770-860 nm, or indium gallium arsenide phosphide (InGaAsP) emitting in the wavelength range of 1270-1355 nm. All Compaq systems equipped with a laser device comply with safety standards, including International Electrotechnical Commission (IEC) 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. The product does not emit hazardous laser radiation.



WARNING: Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- Do not try to open the unit enclosure. There are no user-serviceable components inside.
 - Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
 - Allow only Compaq Authorized Service technicians to repair the unit.
-

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States. This device is classified as a Class 1 laser product as defined by IEC 825.



This indicates that the product is classified as a CLASS 1 LASER PRODUCT.

Appendix **B**

Electrostatic Discharge

To prevent damage to the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Make sure you are always properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm \pm 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an Compaq authorized reseller install the part.

NOTE: For more information on static electricity, or for assistance with product installation, contact your Compaq authorized reseller.

Boot Management Console in Windows NT HyperTerminal

Boot Management Console (BMC)

The Boot Management Console (BMC) is a command line interface to the DB-9 serial port that allows you to change the system's parameters: baud rate, Dynamic Host Configuration Protocol (DHCP) setting, default boot image ID, node IP address, and node name. The BMC also allows you to delete and add firmware images, list saved firmware images, and boot a firmware image other than the default firmware image.

Powering Up With a Terminal

NOTE: This process uses a computer running on Windows NT 4.0. However, the Modular Data Router (MDR) can communicate with any operating system that utilizes a terminal emulator. If your computer uses another operating system, be sure that the baud rate, data bits, stop bits, parity, and terminal emulation are set for the selected serial port as specified in this procedure.

To turn on the MDR and attach a terminal or terminal emulator, perform the following steps.

1. Connect a server to the MDR by attaching a DB-9 serial NULL MODEM cable to the DB-9 serial port on the rear panel of the MDR.
2. Power ON the server (if it is not already on).

3. Access the terminal emulator on the server. In Windows NT 4.0, select Start→Programs→Accessories→HyperTerminal.
4. Set up the properties for the terminal connection. In Windows NT 4.0, do the following:
 - a. Double-click the Hypertrm icon.
 - b. Enter a name for the connection in the New Connection dialog box and select an icon to represent the MDR for future use, then click OK. The Connect To dialog box appears.
 - c. From the Connect using: pull-down menu, select the communications port assigned to the serial port (for example, COM1, COM2), then click OK.
 - d. In the properties dialog box that appears, enter the following port settings, then select OK.

Table C-1
Default Serial Port Settings

Type	Setting
Bits per second (baud rate)	57600
Data bits	8
Parity	None
Stop bits	1
Flow control	None

- e. Select File→Properties to show the connection properties dialog box. Select the Settings tab. From the Emulation pull-down menu, select VT100, then click OK.
5. Power ON all peripheral device(s).
6. Wait at least ten seconds, then power ON the MDR. The MDR will display a series of Power-on Self-Test (POST) messages in HyperTerminal. After POST the following message is displayed with a five second countdown:

Press any key to access the Boot Management Console.

Press any key to access the BMC. The following prompt message appears:

Starting the Boot Management Console.
Type "help" to list available commands.
BMC>

If a key is not pressed, the system will proceed to boot the default firmware image and initialize the unit. The initialization may take over one minute depending upon the number of devices attached. The unit is ready for use when the HyperTerminal session displays the Application Management Console prompt,

```
AMC>
```

See Appendix D, “Application Management Console in Windows HyperTerminal,” for more information on the AMC.

Using the BMC

The BMC provides a command line interface to inspect or change system parameters, as well as update the MDR firmware image.

To view a list of available commands enter `help` at the prompt:

```
BMC> help
```

The following table lists and defines the BMC commands:

Table C-2	
Boot Management Console Commands	
Command	Definition
<code>boot</code>	Boots the default image.
<code>bootImage {ImageID}</code>	Boots image {ImageID}. {ImageID} must be a valid number.
<code>downloadImage</code>	Prepares the BMC to receive an Xmodem file transfer from the host.
<code>deleteImage {ImageID}</code>	Deletes image {ImageID}. {ImageID} must be a valid number.
<code>help</code>	Displays commands with their descriptions.
<code>setBaud {rate}</code>	Sets baud rate. {rate} must be one of the following: 1200, 2400, 4800, 9600, 19200, 38400, 57600.

continued

Table C-2
Boot Management Console Commands *continued*

Command	Definition
setBootImage {ImageID}	Sets the image {ImageID} as the default boot image. {ImageID} must be a valid number.
setDefault	Restores factory NVRAM settings (9600 baud, IP address set to 10.1.2.3, DHCP disabled, no node name).
setDHCP on off	Enables (on) or disables (off) DHCP. Enabling DHCP will prevent the MDR from being managed by network management utilities that require fixed IP addresses.
setIPAddress {IPAddress}	Sets IP address. {IPAddress} must be in a decimal format: {N.N.N.N} where N is a number in the range of 0-255.
setNodeName {NodeName}	Sets the node name. {NodeName} must be 19 characters or less.
setSubnetMask {SubnetMask}	sets subnet mask to {SubnetMask}. {SubnetMask} must be in dotted decimal format, {N.N.N.N}.
showBootParameters	Displays node name, DHCP setting, node IP address, baud rate, and information about the default boot image.
showImageList	Lists information on saved images.
showVersion	Shows current firmware version number.

NOTE: Conventions: {X} - a value of X must be entered; X | Y - either X or Y must be entered. These commands are not case sensitive.

BMC Command Examples

The following are examples of what you will see when you have entered the particular BMC command:

BMC> showBootParameters

```
Node Name      : StorageBridge
DHCP           : enabled
IP Address     : (assigned by DHCP server)
Subnet Mask    : (assigned by DHCP server)
Baud Rate      : 9600
Default Image  : 0
                StorageApplication
                1.0A3
```

BMC> showImageList

ImageID	Name/Version/Build Date	Size(Bytes)
0	StorageApplication 1.0A3 Tue Oct 29 18:31:26 1999	896,000
1	StorageApplication 1.0B1 Wed Oct 30 10:31:20 1999	768,000

Available space (Bytes) : 384,000

Note: * indicates default boot image.

BMC> setBaud 57600

The serial port baud rate is switching from 9600 to 57600.
Please adjust your terminal to the new baud rate.

BMC> setDHCP off

DHCP is disabled.

BMC> setIPAddress 192.100.99.98

IP address is 192.100.99.98.

BMC> setNodeName StorageBridge

Node name is StorageBridge.

BMC> setBootImage 1

Image 1 is the default boot image.

BMC> boot

Booting default application image 1: Storage Application
1.0B1

BMC> bootImage 0

Booting image 0 : Storage Application1.0A3

Updating the Firmware Using the BMC

The BMC can be used to download an updated firmware image for the MDR. To do this:

1. At the BMC prompt, enter the following command:

```
BMC>downloadImage
```

The BMC will display the following message:

```
Please begin Xmodem file transfer now.
```

2. In Windows NT HyperTerminal, choose Transfer/Send File from the menu bar.
3. Enter the file path and file name of the image or select the Browse button to find the file.

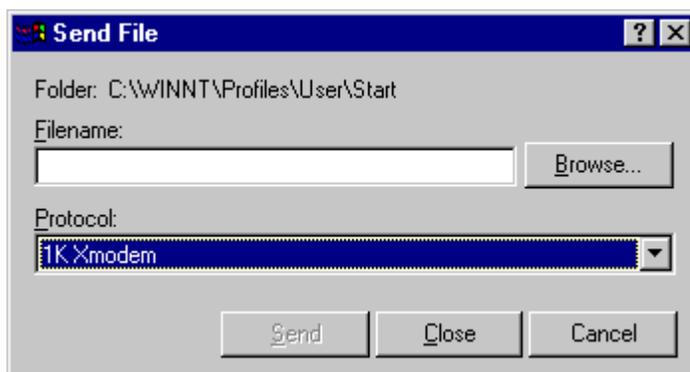


Figure C-1. Send File screen in HyperTerminal

4. Choose either Xmodem or 1KXmodem from the Protocol drop down menu.

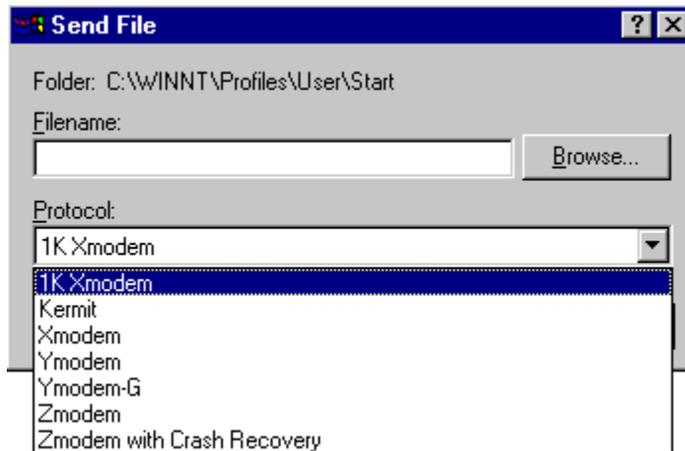


Figure C-2. Choosing the protocol

5. Click the Send button. HyperTerminal will show the status of the file transfer.
6. When the transfer is complete, the BMC will show the following message:

```
Xmodem File transfer Status: Success
Downloaded image :      StorageApplication
                    1.0A3
                    525,000
Saved as image 0
```

NOTE: Saving the image can take several seconds depending upon the size of the image.

IMPORTANT: Do not power down the MDR while the image is being saved. Interrupting the image save will leave the firmware in an unknown state. You may not be able to boot the MDR if this happens. You will be notified when the image has been saved.

Application Management Console in Windows HyperTerminal

The Application Management Console (AMC) has a set of online commands to configure and manage the Modular Data Router (MDR). The AMC can be accessed once the Boot Management Console has completed.

Accessing the AMC

When the BMC completes the countdown and no key has been pressed, the default firmware image automatically boots. When it completes, the following prompt appears:

```
AMC>
```

The online help can now be accessed. To display a list of help commands, enter a question mark, or h, or help at the prompt:

```
AMC> ?
```

```
AMC> h
```

```
AMC> help
```

To display a list of the commands' definitions, enter any of the help commands and a hyphen with lowercase d at the prompt:

```
AMC> help -d
```

The following table lists and defines all the commands.

Table D-1
Application Management Console Commands

Command	Definition
?	Provides help information for the diagnostic commands.
clearFcSCSIMap	Clears Fibre Channel to SCSI Bus/TargetID/LUN map.
createMap	Creates a Map for an Initiator Alias.
deleteAlias	Deletes an Alias for an Initiator.
deleteMapAdmin	Removes an Alias from the Map Administrator List.
getAlias	Displays the Alias for an Initiator.
getMapAdmins	Displays the Map Administrator List.
getMapUpdateModel	Displays the Update Model of the Default Map.
getWWN	Gets the World Wide Name for an Initiator Alias.
grantMapAdmin	Adds an Alias to the Map Administrator List.
help	Provides help information for the diagnostic commands.
ipconfig	Displays the network configurations (formerly called the showNet command).
remapFcSCSI	Re-maps Fibre Channel to SCSI Bus/TargetID/LUN.
resetMemEccErr	Resets the processor memory ECC error bits.
resetPciErr	Resets the PCI bus errors.
resetSec	Resets the clock seconds to zero.
setAlias	Creates an Alias for an Initiator.
setConsoleHeight	Sets the height of the display console.
setDate	Sets the clock calendar date.
setDaylightSavings	Enables/disables Daylight Savings time.
setFcLunPriority	Sets new Fibre Channel LUN assignment priority mode.
setFcScsiMap	Sets the Fibre Channel - to - SCSI Map for an Alias.

continued

Table D-1
Application Management Console Commands *continued*

Command	Definition
setMapUpdateModel	Sets the Update Model of the Default Map.
setTime	Sets the clock calendar time.
showDaylightSavings	Indicates status of Daylight Savings Time option.
showFcLunPriority	Shows Fibre Channel LUN assignment priority mode.
ShowFcScsiMap	Displays the Fibre Channel - to - SCSI Map for an Alias.
showKeys	Shows the shortcut keys for command line editing.
showMemECCerr	Displays the memory ECC error registers.
showPciErr	Displays the PCI bus error registers.
showPorts	Displays module cards and ports information.
showSCSIDevices	Shows attached SCSI device information.
showSerialNum	Shows the unit serial number.
showTemp	Shows temperature sensor information.
showTime	Shows current date and time.
showVersion	Shows current firmware version number.

Shortcut Keys

To display a list of shortcut keys, enter showKeys at the prompt:

```
A> showKeys
```

The following table lists and defines the shortcut keys.

Table D-2
Shortcut Keys

Command	Definition
<CTRL> + a or F1	Moves the cursor to the start of the line.
<CTRL> + e or F2	Moves the cursor to the end of the line.
F3	Toggles between destructive insert mode and non-destructive insert mode.
<CTRL> + d or F4	Deletes one character.
<CTRL> + b or left arrow key	Moves the cursor left one character.
<CTRL> + f or right arrow key	Moves the cursor right one character.
<CTRL> + n or down arrow key	Retrieves the next line in the command history.
<CTRL> + p or up arrow key	Retrieves the previous line in the command history.
<Esc> + <Esc>	Appends characters to the word under the cursor to complete the command name of an existing command. Characters are appended up to the point that they would match more than one existing command names or until they complete the command name.

NOTE: The command history holds up to the last 50 commands entered.

Application Management Console (AMC) Command Reference

?

see help

clearFcSCSIMap

Clear Fibre Channel to SCSI Bus/TargetID/LUN map. If the alias and port number are not specified, the default map is assumed.

Syntax:

```
clearFcSCSIMap [Alias] [PortNumber]
```

(deletes all the map entries in the specified host map)

Arguments:

Alias - name given to initiator/host

Port - the Fibre Channel port number from which the initiator/host logs into the MDR

NOTE: This is NOT the SCSI Port Number.

Example:

```
AMC>clearFcSCSIMap nt_server1 1  
All the map entries are deleted from the host map.
```

```
AMC>clearFcSCSIMap  
The default map is to be cleared. Are you sure? (Y/N) y  
Map Entries in the default map are deleted.
```

Figure D-1. clearFcSCSIMap screen

copyMap

Create/Update a host map with a specified source host map.

Syntax:

```
copyMap [SourceAlias] [SourcePort] [DestAlias] [DestPort]
```

```
copyMap [SourceAlias] [SourcePort] Default
```

Arguments:

SourceAlias - name given to the source initiator/host

SourcePort - the port number of the port from which the source initiator/host logs into MDR

DestAlias - name given to the destination initiator/host

DestPort - the port number of the port from which the destination initiator/host logs into MDR

Default - The default map

Example:

```
AMC>copyMap nt_server1 1 nt_server2 1  
A host map is created for Host nt_server2 at Port 1.
```

```
AMC>copyMap nt_server1 1 default  
Are you sure to update the existing map? (Y/N) y  
The Default Map is updated successfully.
```

Figure D-2. copyMap screen

createMap

Create a host map for a host alias. The resulting map will be a copy of the default map since it is used as a template.

Syntax:

```
createMap [Alias] [Port]
```

Arguments:

Alias - name given to initiator/host

Port - the Fibre Channel port number from which the initiator/host logs into the MDR

NOTE: This is NOT the SCSI Port Number.

Example:

```
AMC>showFcSCSIMap
```

The Default Map is:

FC LUN	SCSI Bus	SCSI Target ID	SCSI LUN	Device Type
0	0	0	0	0x0c
1	5	2	0	0x01
2	5	3	0	0x01
3	9	2	0	0x01
4	9	3	0	0x01
5	10	1	0	0x08
6	10	2	0	0x01
7	10	4	0	0x01

```
AMC>createMap nt_server1 1
```

A host map is created for host nt_server1 at port 1.

```
AMC>showFcSCSIMap nt_server1
```

The Host Map for Host nt_server1 at Port 1:

FC LUN	SCSI Bus	SCSI Target ID	SCSI LUN	Device Type
0	5	0	0	0x00
1	10	1	0	0x01

Figure D-3. createMap screen

deleteAlias

Delete the alias for the initiator/host. Also, any host maps created for the alias will be deleted. See setAlias for more details.

Syntax:

```
deleteAlias [alias name]
```

Arguments:

alias name - name given to initiator/host

Example:

```
AMC>deletealias nt_server1
DeleteAlias will
  (1) delete the alias,
  (2) set the host to use the default map,
  (3) revoke the host map admin right if it has the admin right.
Proceed (Y/N)? y
Host nt_server1 has been deleted successfully.
```

Figure D-4. deleteAlias screen

deleteConfig

Return System to its Factory Default State. This command will destroy any host maps including the default map. SCC mode will be set to ON and the Map Update Model will be set to OPEN. The changes do not take effect until the MDR is re-started. See getSCCmode and getMapUpdateModel for information on those modes of operation.

Syntax:

```
deleteConfig
```

Arguments: none

Example:

```
AMC>deleteConfig
Are You Sure you Want to Remove All System Configurations
and return to the Factory Default Settings? y

THIS WILL ERASE ALL MAPS AND CONFIGURATIONS AND RETURN
THIS UNIT TO THE FACTORY DEFAULTS.

ARE YOU SURE? y

FACTORY DEFAULTS RESTORED.
YOU MUST REBOOT THE SYSTEM IN ORDER FOR THE CHANGES TO TAKE EFFECT.
```

Figure D-5. deleteConfig screen

deleteMap

Delete the host map for a specific host alias at an FC Port.

Syntax:

```
deleteMap [alias name] [Port]
```

Arguments:

alias name - name given to initiator/host

portNumber - the Fibre Channel port number from which the initiator/host logs into the MDR

Example:

```
AMC>deleteMap nt_server1 1
The host map for Host nt_server1 at Port 1 is to be deleted and
Host nt_server1 will then use the default map for FC to SCSI mapping.
Do you want to proceed? (Y/N) y
```

```
The host map for Host nt_server1 at Port 1 is deleted successfully.
```

Figure D-6. deleteMap screen

getAlias

Display the alias for the initiator/host World Wide Name (WWN) if one is defined. If a WWN is not specified, display all known WWN / alias pairs.

Syntax:

```
getAlias [world wide port name]
```

Arguments:

world wide port name

HBA port world wide port name

Example:

```
AMC>getAlias 50:05:08:B3:00:00:00:31
Alias for port 50:05:08:b3:00:00:00:31 is nt_server1.
```

```
AMC>getAlias
Host World Wide Name      Host Alias
50:05:08:B3:00:00:00:32   nt_server2
50:05:08:B3:00:00:00:31   nt_server1
```

Figure D-7. getAlias screen

getMapUpdateModel

Display the update model of the default map. The Map Update Model controls the update of the default map during Power-On Self Test (POST) of the MDR. When new SCSI devices are discovered during POST, a setting of OPEN causes those new devices to be added to the default map. A setting of CLOSED blocks this behavior. Although new devices may be discovered during POST, a CLOSED setting will keep them from being added to the default map.

Syntax:

```
getMapUpdateModel
```

Arguments: none

Example:

```
AMC>getMapUpdateModel  
The Default Map Update Model is Open model.  
The Default Map will be updated during power cycle.
```

```
AMC>
```

Figure D-8. getMapUpdateModel screen

getWWN

Get the World Wide Port Name for an initiator (host) alias if one is defined. If an alias name is not specified, display all known WWN / alias pairs.

Syntax:

```
getWWN [alias name]
```

Arguments:

alias name
name given to initiator/host

Example:

```
AMC>getWWN nt_server1  
The world wide port name of alias 'nt_server1' is  
'50:05:08:B3:00:00:00:31'.
```

```
AMC>getWWN  
Host World Wide Name      Host Alias  
50:05:08:B3:00:00:00:32   nt_server2  
50:05:08:B3:00:00:00:31   nt_server1
```

Figure D-9. getWWN screen

h

see **help**

help

Provide help information for the application management console commands.

Syntax:

```
help [-d]  
help [CommandName]
```

Arguments:

-d
list of commands with short explanations

CommandName
display help information for that command

Example:

```
AMC>help showFcSCSIMap  
Show Fibre Channel LUN to SCSI Bus/TargetID/LUN map.  
  
showFcSCSIMap displays the default map.  
showFcSCSIMap [Alias] displays the host map.  
showFcSCSIMap -all to display all the maps.
```

Figure D-10. help screen

ipconfig

Show System name and IP information.

Syntax:

```
ipconfig
```

Arguments: none

Example:

```
AMC>ipconfig
Host Name . . . . . : vxTarget

Interface Name . . . . : fei0
IP Address . . . . . : 10.1.2.3
Physical Address . . . : 00:80:5F:7F:0F:90
Subnet Mask . . . . . : 255.255.255.0
Connecting Speed . . . : 0 MBPS
DHCP Enabled . . . . . : No

AMC>
```

Figure D-11. ipconfig screen

pCCardDelete

Delete file on PC Card. See pcCardDir for more information.

Syntax:

```
PCCardDelete [File Name]
```

Arguments:

File Name

The name of the file to delete

Example:

```
AMC>pCCardDelete V1151_~2.DLD
File /ata0/v1151_~2.dld has been deleted.
```

Figure D-12. pCCardDelete screen

pCCardDir

List files in current directory on PC Card. The MDR supports a single SanDisk Brand PCMCIA ATA PC Card in the lower slot of the PCMCIA Module in the Management Module of the MDR. This PC Card may be used to upgrade the firmware and add new features on the MDR. The PC Card is NOT hot-pluggable. The file-naming format supported is ISO-9660 8.3 format. Longer file names will be truncated when converted to this format.

Syntax:

PCCardDir

Arguments: none

Example:

```
AMC>pCCardDir
  size      date          time          name
  -----
  790644    DEC-22-2000    07:05:36    V1151_~2.DLD
  816416    DEC-22-2000    07:46:42    V1160.DLD
```

Figure D-13. pCCardDir screen

pCCardRename

Rename file on PC Card to new name. See pCCardDir for more information.

Syntax:

pCCardRename [Old File Name] [New File Name]

Arguments:

Old File Name
The original file name

New File Name
The new file name

Example:

```
AMC>pCCardRename V1160.DLD temp.dld
File /ata0/v1160.dld has been renamed to /ata0/temp.dld.
```

Figure D-14. pCCardRename screen

pCCardShowFile

Display a Hexadecimal Dump of a file on the PC Card.

NOTE: There is no way to stop the listing once started.

Syntax:

pCCardShowFile

Arguments: none

Example:

```
AMC>pCCardShowFile temp.dld
File = /ata0/temp.dld
 21 43 50 51 4E 4C 53 46 4D 54 21 00 00 00 00 00 :!CPQNLSFMT!.....
 00 00 04 00 00 0C 71 20 01 C0 00 00 01 C0 00 00 :.....q .....
 44 61 74 61 20 52 6F 75 74 65 72 00 00 00 00 00 :Data Router....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 :.....
 31 31 36 30 00 00 00 00 00 00 00 00 00 00 00 00 :1160.....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 :.....
 46 72 69 20 44 65 63 20 32 32 20 30 37 3A 34 36 :Fri Dec 22 07:46
 3A 33 33 20 32 30 30 30 00 00 00 00 00 00 00 00 :.33 2000.....
```

Figure D-15. pCCardShowFile screen

pCCardShowFileAttrib

Display the file attributes of the file on PC Card.

Syntax:

pCCardShowFileAttrib [File Name]

Arguments:

File Name

File to display the file attributes for

Example:

```
AMC>pCCardShowFileAttrib 1160.dld
FILE NAME = /ata0/1160.dld
SIZE (in bytes) = 816416
LAST MODIFIED = DEC-22-2000 07:46:42
```

Figure D-16. pCCardShowFileAttrib screen

pCCardUpgradeFW

Upgrade the Modular Data Router firmware from the PC Card. You must reboot the MDR in order for the new version to take effect.

Syntax:

```
pCCardUpgradeFW [FILENAME]
```

Arguments:

FILENAME

firmware filename on PC Card

Example:

```
AMC>pCCardUpgradeFW 1160.dld
Upgrade Firmware using 1160.dld
Are You Sure? (Y or N) y
Image file opened, reading data into a buffer.
Now writing image to the flash ROM.
This may take some time... Please wait...
Firmware upgrade is complete.
YOU MUST REBOOT THE SYSTEM IN ORDER FOR THE NEW VERSION TO TAKE EFFECT.
```

Figure D-17. pCCardUpgradeFW screen

remapFcSCSI

Re-map Fibre Channel to SCSI Bus/TargetID/LUN. If the alias and port number are not specified, the default map is assumed. See getAlias and createMap for more information.

Syntax:

```
remapFcSCSI [Alias] [PortNumber]
```

Arguments:

Alias - The Host Alias. Aliases are associated with an FC Initiator's (Host's) World Wide Port Name

PortNumber - The MDR Fibre Channel Port associated with the map

Example:

```
AMC>remapFcSCSI
The default map is to be recreated. Are you sure? (Y/N) y
The Default Map is recreated!
FC LUN      SCSI Bus    SCSI Target ID    SCSI LUN    Device Type
0           0           0                 0           0x0C
1           5           2                 0           0x01
2           5           3                 0           0x01
3           9           2                 0           0x01
4           9           3                 0           0x01
5           10          1                 0           0x08
6           10          2                 0           0x01
7           10          3                 0           0x01
AMC>
```

Figure D-18. remapFcSCSI screen

resetMemEccErr

Reset Processor Memory ECC Error bits. ECC is short for Error-Correcting Code memory, a type of memory that includes special circuitry for testing the accuracy of data as it passes in and out of memory.

Syntax:

```
resetMemEccErr
```

Arguments: none

Example:

```
AMC>resetMemEccErr  
Processor Memory ECC Error flag reset successfully.  
AMC>
```

Figure D-19. resetMemEccErr screen

resetPciErr

Reset PCI bus errors.

Syntax:

```
resetPciErr
```

Arguments: none

Example:

```
AMC>resetPciErr  
PCI buses reset successfully  
AMC>
```

Figure D-20. resetPciErr screen

resetSec

Reset clock seconds to zero.

Syntax:

```
resetSec
```

Arguments: none

Example:

```
AMC>resetSec
Seconds reset successfully
Current system time is 11:58: 1.
AMC>
```

Figure D-21. resetSec screen

setAlias

Create the alias for the initiator/host. See getAlias for more details.

Syntax:

```
setAlias {world wide port name} {alias name}
```

Arguments:

world wide port name
world wide port name of initiator/host

alias name
name given to initiator/host

Example:

```
AMC>setAlias 50:05:08:B3:00:00:00:31 nt_server1
The alias of port 50:05:08:B3:00:00:00:31 is set to nt_server1.
AMC>
```

Figure D-22. setAlias screen

setConsoleHeight

Set height of the display console. This value is not saved between power-cycles.

Syntax:

```
setConsoleHeight [Console Height]
```

Arguments:

Console Height
new height of the console

Example:

```
AMC>setConsoleHeight 40  
Height of the console is set to 40  
  
AMC>_
```

Figure D-23. setConsoleHeight screen

setDate

Set clock calendar day and date.

Syntax:

```
setDate
```

Arguments: none

Example:

```
AMC>setDate  
New Date (MM/DD/YYYY):1/25/2001  
  
System date is changed to Thursday January 25, 2001  
  
AMC>_
```

Figure D-24. setDate screen

setDaylightSavings

Enable/Disable Daylight Savings Time.

Syntax:

```
setDaylightSavings [on | off]
```

Arguments:

ON

Turn Daylight Savings on

OFF

Turn Daylight Savings off

Example:

```
AMC>setDaylightSavings on  
Daylight Savings Time has been enabled.
```

```
AMC>_
```

Figure D-25. setDaylightSavings on screen

setFcLunPriority

Set new Fibre Channel LUN assignment priority mode. This sets the order in which SCSI devices are discovered during power-up initialization of the default Fibre Channel-to-SCSI Map. Bus/Target describes that each SCSI bus on the business-side of the MDR is scanned in numerical order along with their associated targets. Target/Bus Order Scans the Targets first; then each bus. Bus/Target (-b) is the default mode. See remapFcScsi for more information.

Syntax:

```
setFcLunPriority [{-b} or {-t}]
```

Arguments:

-b
SCSI Bus/Target Priority

-t
SCSI Target/Bus Priority

Example:

```
AMC>setFcLunPriority -b
New Fibre Channel LUN Assignment has been changed to SCSI Bus Number Priority
AMC>_
```

Figure D-26. setFcLunPriority screen

setFcSCSIMap

Change or add entries in FC-to-SCSI Map. If the alias and port number are not supplied, the default map is assumed.

Syntax:

```
setFcSCSIMap [Alias] [PortNumber]
```

Arguments:

Alias - name given to initiator/host

Port - the Fibre Channel port number from which the initiator/host logs into the MDR.

NOTE: This is NOT the SCSI Port Number.

Example:

AMC>setFcSCSIMap

```
*** Editing the Default Map:
set new entry (Y), delete entry (D), show map (S), stop (N)? s

FC LUN          SCSI Bus      SCSI Target ID   SCSI LUN      Device Type
0                0              0                 0              0x0c
1                5              2                 0              0x01
2                5              3                 0              0x01
3                9              2                 0              0x01
4                9              3                 0              0x01
5                10             1                 0              0x08
6                10             2                 0              0x01
7                10             3                 0              0x01

set new entry (Y), delete entry (D), show map (S), stop (N)? d
Fibre Channel LUN to be Deleted: 1
Entry with FC LUN 1, SCSI Bus 10, Target ID 1, SCSI LUN 0 was removed!
Fibre Channel LUN to be Deleted:
set new entry (Y), delete entry (D), show map (S), stop (N)? y
Map Entry to be edited (Bus:TargetID:Lun): 10:1:0
Fibre Channel LUN to be associated with the above entry:2
Entry with FC LUN 2, SCSI Bus 10, Target ID 1, SCSI LUN 0 was saved!
Map Entry to be edited (Bus:TargetID:Lun):

set new entry (Y), delete entry (D), show map (S), stop (N)? s

FC LUN          SCSI Bus      SCSI Target ID   SCSI LUN      Device Type
0                0              0                 0              0x0c
2                10             1                 0              0x08
3                9              2                 0              0x01
4                9              3                 0              0x01
6                10             2                 0              0x01
7                10             3                 0              0x01

set new entry (Y), delete entry (D), show map (S), stop (N)? n

AMC>_
```

Figure D-27. setFcSCSIMap screen

setMapUpdateModel

Set the update model of the default map. See getMapUpdateModel for more information.

Syntax:

```
setMapUpdateModel [open|closed]
```

Arguments:

open

Open model (Default map updated at power up)

closed

Closed model (Default map NOT updated at power up)

Example:

```
AMC>setMapUpdateModel open  
The Default Map Update model is set to OPEN model.
```

```
AMC>_
```

Figure D-28. setMapUpdateModel screen

setScMode

Set SCSI Command Controller (SCC) Mode. Changing the SCC mode will force remapping of the default map. See getScMode and showFcScsiMap for additional information.

Syntax:

```
setScMode [on|off]
```

Arguments:

on

Turn SCC Mode On

off

Turn SCC Mode Off

Example:

```
AMC>setSccMode on
This will Force the FC-SCSI Map to be Recreated.
Are You Sure? (Y or N) Y
Map Recreated!
SCC Mode is On

AMC>_
```

Figure D-29. setSccMode screen

setTime

Set system time.

Syntax:

```
setTime
```

Arguments: none

Example:

```
AMC>setTime
New Time (HH:MM:SS) : 12:30:00
Current system time is changed to 12:30:00.

AMC>_
```

Figure D-30. setTime screen

showDaylightSavings

Indicate status of Daylight Savings Time option.

Syntax:

```
showDaylightSavings
```

Arguments: none

Example:

```
AMC>setDaylightSavings
Daylight Savings is enabled.

AMC>_
```

Figure D-31. showDaylightSavings screen

showFcLunPriority

Show Fibre Channel LUN assignment priority mode. See setFcLunPriority for more information.

Syntax:

```
showFcLunPriority
```

Arguments: none**Example:**

```
AMC>showFcLunPriority
Fibre Channel LUN assignment mode is SCSI Bus number priority

AMC>_
```

Figure D-32. showFcLunPriority screen

showFcSCSIMap

Show Fibre Channel LUN to SCSI Bus/TargetID/LUN map. If the Alias is not specified the default map will be displayed. Hosts that do not have a map assigned for them will use the default map. See setFcSCSIMap for more information.

Syntax:

```
showFcSCSIMap [Alias]
showFcSCSIMap -all
```

Arguments:

Alias - Display the maps associated with this alias. If the alias is not specified the default map will be assumed.

-all - Display all known maps including the default map.

Example:

```

AMC>showFcSCSIMap
The Default Map is:
FC LUN          SCSI Bus      SCSI Target ID      SCSI LUN      Device Type
0                0                0                    0              0x0C
1                5                2                    0              0x01
2                5                3                    0              0x01
3                9                2                    0              0x01
4                9                3                    0              0x01
5                10               1                    0              0x08
6                10               2                    0              0x01
7                10               3                    0              0x01
AMC>showFcSCSIMap nt_server1 1

The Host Map for Host nt_server1 at Port 1:
FC LUN          SCSI Bus      SCSI Target ID      SCSI LUN      Device Type
0                0                0                    0              0x0C
1                5                0                    0              0x00
AMC>showFcSCSIMap -all

The Default Map is:
FC LUN          SCSI Bus      SCSI Target ID      SCSI LUN      Device Type
0                0                0                    0              0x0C
1                5                0                    0              0x00
2                10               1                    0              0x01
The Host Map for Host nt_server1 at Port 1:
FC LUN          SCSI Bus      SCSI Target ID      SCSI LUN      Device Type
0                0                0                    0              0x0C
1                5                0                    0              0x00

```

Figure D-33. showFcSCSIMap screen

showHosts

Display the hosts logged into each of MDR's FC Ports.

Syntax:

```
showHosts
```

Arguments: none

Example:

```

AMC>showHosts
Port Number      : 1
World Wide Name -
Node Name        : 50:05:08:B3:00:00:00:32
Port Name        : 50:05:08:B3:00:00:00:32
Source ID        : 0x000002
Status           : Enabled
Operation Mode   : Fibre Channel Target

Host World Wide Name -
Host Node Name  : F1:05:08:50:89:89:DB:FA
Host Port Name  : F1:05:01:50:89:89:DB:FA
AliasName       : <not defined>
Is Currently Logged In : Yes
Source ID       = 0x000001
Operation Mode = Fibre Channel Initiator

```

Figure D-34. showHosts screen

showIOMem

Show memory consumption of IO memory.

Syntax:

```
showIOMem
```

Arguments: none

Example:

```

AMC>showIOMem
Overall IO memory = 0x0000000004000000
Used IO memory    = 0x0000000001000000
Available IO memory = 0x0000000003000000

AMC>

```

Figure D-35. showIOMem screen

showKeys

Show shortcut keys for command line editing.

Syntax:

```
showKeys
```

Arguments: none

Example:

```
AMC>showKeys
Shortcut keys for command line editing:

<CTRL> + a, or F1
      : Moves the cursor to the start of the line.
<CTRL> + e, or F2
      : Moves the cursor to the end of the line.
      F3
      : Toggles between destructive insert mode
      and non-destructive insert mode.

<CTRL> + d, or F4
      : Deletes one character.
<CTRL> + b, or LEFT arrow Key
      : Moves the cursor left 1 character.
<CTRL> + f, or RIGHT arrow Key
      : Moves the cursor right 1 character.
<CTRL> + n, or DOWN arrow key
      : Fetches previous line in your command history.
<CTRL> + p, or UP arrow key
      : Fetches next line in your command history.
<Esc> + <ESC>
      : Appends characters to the word under the cursor
      to complete the command name of an existing
      command. Characters are appended up to
      the point that they would match more than one
      existing command name or until they complete
      the command name.
```

Figure D-36. showKeys screen

showMemECCerr

Display memory ECC Error registers.

Syntax:

```
showMemECCerr
```

Arguments: none

Example:

```
AMC>showMemECCerr
Processor Memory Error Correction Code:
No Error!
Content of Processor Memory ECC Configuration register = 0x40181800
Content of Processor Memory ECC Error Status register = 0x00000000

I/O Memory at PCI bus 1 Error Correction Code:
No Error.
Content of ECC Error Status register = 0x00000000
Content of ECC Error Address register = 0x00000000
Content of ECC Error Count register = 0x00000000
```

Figure D-37. showMemECCerr screen

showPciErr

Display PCI bus Error registers.

Syntax:

```
showPciErr
```

Arguments: none

Example:

```
AMC>showPciErr
Primary PCI Bus:
No errors.
Content of Primary PCI Bus PCI Status register = 0x0200
Content of Primary PCI Bus Error Status register = 0x00

PCI Bus 1:
No Error.
Content of PCI Status Register = 0x00000230
```

Figure D-38. showPciErr screen

showPorts

Display module cards and ports information.

Syntax:

showPorts

Arguments: none

Example:

```
AMC>showPorts
Module 0, Module Type - Fibre Channel Module, Slot 1:
Port Index  Port Number  Port Type  World Wide Name  ALPA
      0           1      Fibre Channel  50:05:08:B3:00:00:00:32:  0x000002
                                     50:05:08:B3:00:00:00:32

Module 1, Module Type - SCSI Module, Slot 2:
Port Index  Port Number  Port Type  World Wide Name  ALPA
      0           5      SCSI Port  Not Applicable
      1           6      SCSI Port  Not Applicable

Module 2, Module Type - SCSI Module, Slot 3:
Port Index  Port Number  Port Type  World Wide Name  ALPA
      0           9      SCSI Port  Not Applicable
      1          10      SCSI Port  Not Applicable
      2          11      SCSI Port  Not Applicable
      3          12      SCSI Port  Not Applicable

Module 3, Module Type - Management Module, Slot 4:
No Ports on this module
```

Figure D-39. showPorts screen

showSCSIDevices

Show attached SCSI devices information. The SCC device (Type 0x0C) at B:T:L 0:0:0 is an internal MDR device.

Syntax:

```
showSCSIDevices
```

Arguments: none

Example:

```
AMC>showSCSIDevices
Device#   SCSI Bus#   SCSI Target ID   SCSI LUN   Port#   Slot#   Type
0         0           0                 0          0       0       0x0C
1         5           0                 0          5       2       0x00
2         10          1                 0          10      3       0x01

AMC>
```

Figure D-40. showSCSIDevices screen

showSccMode

Show SCSI Command Controller (SCC) Mode Setting.

Syntax:

```
showSccMode
```

Arguments: none

Example:

```
AMC>showSccMode
SCC Mode is On

AMC>
```

Figure D-41. showSccMode screen

showSerialNum

Display unit serial number.

Syntax:

```
showSerialNum
```

Arguments: none

Example:

```
AMC>showSerialNum  
Unit Serial Number = 4A01DRM1A44E  
AMC>
```

Figure D-42. showSerialNum screen

showTemp

Show temperature sensor information. Valid Temperature sensors are 0, 1, or 2. If a temperature sensor number is not specified, all will be shown.

Syntax:

```
showTemp [temperature sensor number]
```

Arguments:

temperature sensor number

a temperature sensor number

Example:

```
AMC>showTemp
Location near Memory:
Current temperature is 27C, 80F
Temperature warning limit is 60C, 140F
System reset over-temperature limit is 65C, 149F

Location near Processor:
Current temperature is 39C, 102F
Temperature warning limit is 60C, 140F
System reset over-temperature limit is 65C, 149F

Location near DataMover:
Current temperature is 42C, 107F
Temperature warning limit is 60C, 140F
System reset over-temperature limit is 65C, 149F

AMC>
```

Figure D-43. showTemp screen

showTime

Show current date and time.

Syntax:

```
showTime
```

Arguments: none

Example:

```
AMC>showTime

Current system Date and Time is Thursday January 25, 2001 12:39:23

AMC>
```

Figure D-44. showTime screen

showVersion

Show current firmware version number.

Syntax:

```
showVersion
```

Arguments: none

Example:

```
AMC>showVersion  
COMPAQ DATA ROUTER Firmware Version 1170  
  
AMC>
```

Figure D-45. showVersion screen

Management Module Removal and Reinstallation

This appendix describes removing and reinstalling the management module for a four-module configuration.

Removing the Management Module

1. Power down the MDR.
2. Remove all cables that are attached to the management module.
3. Remove the management module by turning the thumbscrews ❶ and pulling out the module by the handle ❷.

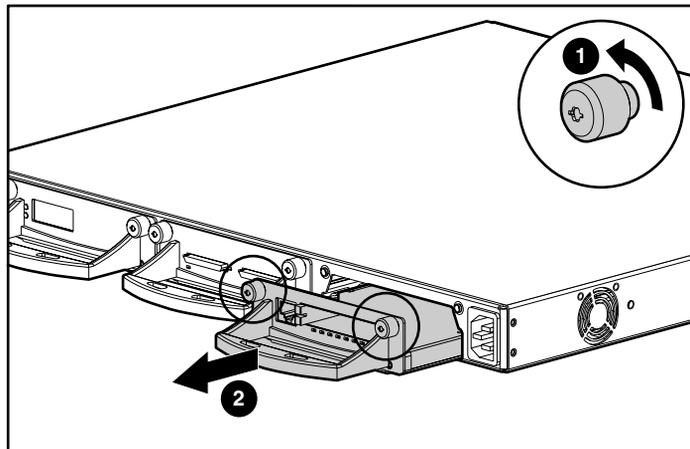


Figure E-1. Removing the management module

Reinstalling the Management Module

NOTE: If the MDR is installed in a Compaq rack, remove the front cover panel.

1. Remove the faceplate from the front panel's module slot by turning the thumbscrews and gently pulling on the handle.
2. Insert the management module into the slot by gently pushing on the handle ❶ until the module "clicks" into place.

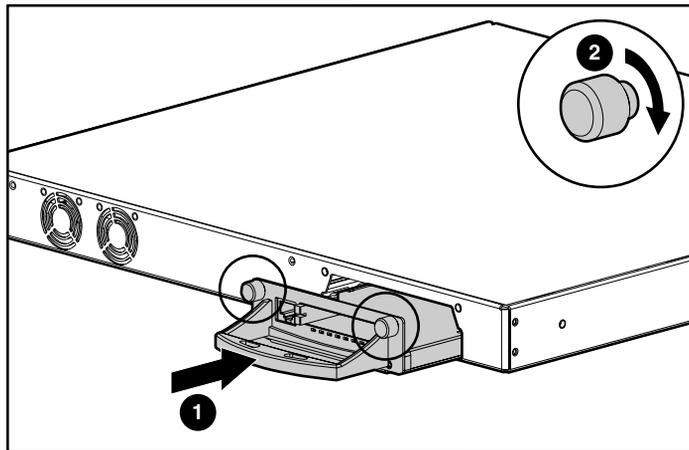


Figure E-2. Inserting the Management module

3. Turn the thumbscrews ❷ to secure the module into place.
4. Attach the Ethernet cable to the port.

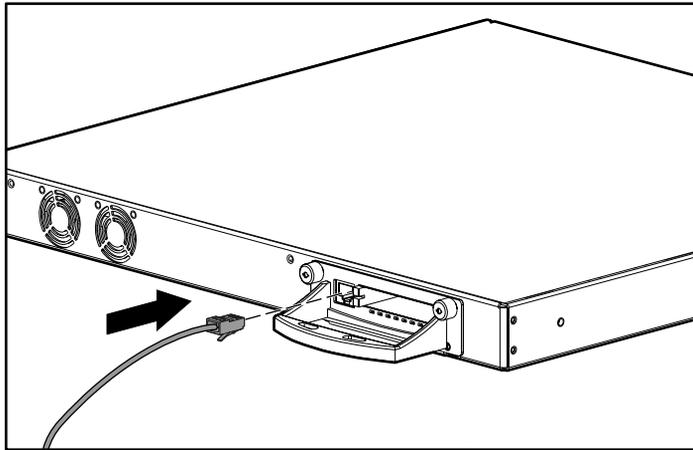


Figure E-3. Attaching the Ethernet cable

Installation of the management module is complete. Before powering up the MDR, make sure to install another module in the open rear module slot. Refer to the Installation Instructions that came with the optional module.

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