

StorageWorks by Compaq

SAN Director 64 Installation Guide

Part Number: AA-RQZQB-TE

Second Edition (February 2002)

This guide provides procedures for setting up, configuring and managing the SAN Director 64.

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SAN Director 64 Installation Guide
Second Edition (February 2002)
Part Number: AA-RQZQB-TE

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About This Guide

This guide is part of a documentation set that supports the SAN Director 64. It is intended for use by trained service and installation representatives experienced with the Storage Area Network (SAN) technology and Fibre Channel technology.

This guide provides information on installing, configuring, managing, and verifying operation of the SAN Director 64. The SAN Director 64 switch connects storage devices, hosts, and servers in a SAN. The Director is easily managed and configured to optimize the performance of your SAN.

Related Documents

The Compaq StorageWorks documentation listed in [Table 1](#) provides additional information about the SAN Director 64.

Table 1: Related Documents

Document Title	Part Number
<i>StorageWorks by Compaq SAN Director 64 Installation Guide (this guide)</i>	AA-RQZQB-TE
<i>StorageWorks by Compaq SAN Director 64 Release Notes</i>	AA-RQZRB-TE
<i>SANworks by Compaq Director Connectivity Manager User Guide</i>	AA-RPL7B-TE
<i>SANworks by Compaq SAN Director 64 Product Manager User Guide</i>	AA-RPL9B-TE
<i>StorageWorks by Compaq SAN Director 64 Planning Guide</i>	AA-RPLAB-TE
<i>StorageWorks by Compaq SAN Director 64 CLI Reference Guide</i>	AA-RQ7AA-TE
<i>StorageWorks by Compaq SAN Director 64 SNMP Support Manual</i>	AA-RQ7BA-TE
<i>StorageWorks by Compaq SAN Director 64 Service Manual</i>	AA-RPL8B-TE
<i>Compaq 9000 Series Rack Products Reference Guide</i>	142553-002
<i>StorageWorks by Compaq SAN Director 64 Fibre Port Module Kit Installation Instructions</i>	AA-RQZNA-TE

Table 1: Related Documents (Continued)

Document Title	Part Number
<i>Compaq StorageWorks SAN Director 64 SDCM Hardware Kit Installation Instructions</i>	AA-RR26A-TE
<i>Compaq M-Series Rack Installation Instructions</i>	AA-RQZPA-TE

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 italic, initial capital letters except when case-sensitive.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in upper case. NOTE: UNIX commands are case sensitive and will not 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 enter information, type the information and then press the Enter key.

Symbols in Text

These symbols may be found in the text of this guide.



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

These icons may be located on equipment in areas where hazardous conditions may exist.



Any surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

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



Any RJ-45 receptacle marked with these symbols indicates a Network Interface Connection.

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



Any surface or area of the equipment marked with these symbols 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.



Power supplies or systems marked with these symbols indicate the equipment is supplied by multiple sources of power.

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



Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

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 together 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.
 - Heaviest components are installed at the bottom of the rack.
-

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.

NOTE: For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are listed on the Compaq Website. Access the Compaq Website by logging on to the Internet at <http://www.compaq.com>.

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

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

Compaq Website

The Compaq website has the latest information on this product as well as the latest drivers, <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

Overview

This chapter contains the following information.

- SAN Director 64 Features
- SAN Director 64 Hardware Components
- SAN Director 64 Optional Kits

SAN Director 64 Features

Features of the SAN Director 64 include:

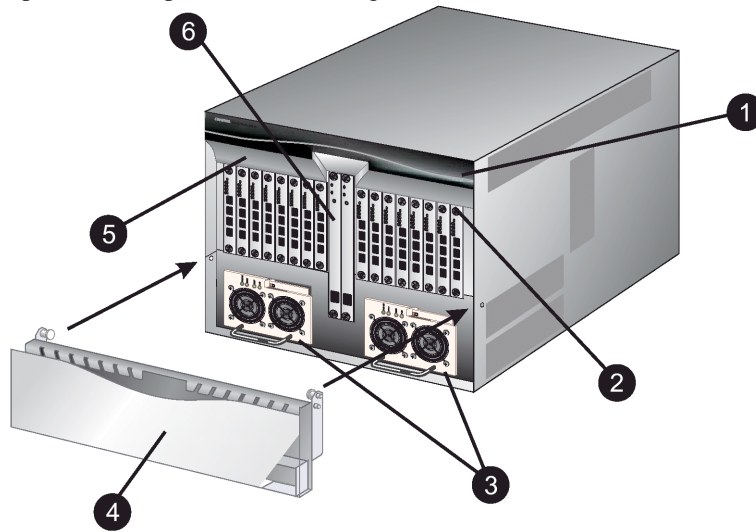
- Scalable from 32 to 64 User ports (with optional 64 Port Upgrade Kit)
- 100% dynamic non-blocking, cut through switching with congestion queuing
- Online error detection, error isolation, and error recovery
- Redundant hot-swap components
- Full duplex 100 MB/second per port performance
- Less than 2- μ s average switch latency
- 100-km distance support (60 buffers), with use of repeaters
- Small form factor, hot pluggable optical transceivers, auto configure G_ports
- Combination short-wave or long-wave laser transceivers
- Redundant power supplies and fan modules
- Online product repair for Field Replaceable Units (FRUs)
- Periodic health check and enhanced system monitoring
- Nondisruptive firmware load and update.

SAN Director 64 Hardware Components

The Director provides a modular design that enables quick removal and replacement of FRUs. The following sections define SAN Director 64 main components.

Front View

Figure 1-1 shows SAN Director 64 components accessible from the front of the Director. Component descriptions follow the figure.



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- | | |
|-------------------------------|-----------------------------|
| ❶ Power and system error LEDs | ❹ Cable management assembly |
| ❷ FPM cards | ❺ Front bezel |
| ❸ Power supplies | ❻ CTP cards |

Figure 1-1: Director components—front

CTP Card

The SAN Director 64 ships with two Control Processor (CTP) cards. The active CTP card initializes and configures the Director after power on, and contains the microprocessor and associated logic that coordinate Director operation. The second CTP card serves as a

backup. A CTP card provides an Initial Machine Load (IML) button on the faceplate. When the button is pressed and held for three seconds, the director reloads firmware and resets the CTP card without switching off power or affecting operational fiber-optic links.

Each CTP card also provides a 10/100 megabit per second (Mbps) RJ-45 twisted pair connector on the faceplate that attaches to an Ethernet Local Area Network (LAN).

Each CTP card provides System Services Processor (SSP) and Embedded Port (EP) subsystems. The SSP subsystem runs director applications, communicates with director ports, and controls the RS-232 maintenance port and 10/100 Mbps ethernet port. The EP subsystem provides Class F processing, and manages frame transmission to and from the Serial Crossbar Assembly (SBAR). In addition, CTP cards provide non-volatile memory for storing firmware.

Each card faceplate contains a green light emitting diode (LED) that lights if the card is operational and active, and an amber LED that lights if the card fails. The LED is not lit on the backup CTP.

Front Bezel

The bezel at the front of the SAN Director 64 includes two indicator LEDs. The green power LED lights when the director is powered on and operational. If the LED turns off, a facility power source, alternating current (AC) power cord, or director power distribution failure is indicated.

The amber system error LED lights when the director detects an event requiring immediate operator attention, such as a FRU failure. The LED remains illuminated as long as an event is active. The LED blinks if unit beaconing is enabled.

Cable Management Assembly

The cable management assembly positioned at the front of the director provides routing for Ethernet cables attached to CTP cards and fibre-optic cables attached to director ports. The assembly rotates up to provide front access to the redundant power supplies.

Power Supplies

The SAN Director 64 uses redundant, load-sharing power supplies which step down and rectify facility input power to provide 48-Volt Direct Current (VDC) power to Director FRUs. The power supplies also provide over-voltage and over-current protection. Either power supply can be replaced while the switch is powered on and operational. Each power supply has a separate backplane connection to allow for different AC power sources.

The power supplies are input rated at 85 to 264 volts alternating current (VAC). The faceplate of each power supply provides the following status LEDs.

- A green **PWR OK** LED lights if the power supply is operational and receiving AC power.
- An amber **FAULT** LED lights if the power supply fails.
- An amber **TEMP** LED lights if the power supply shuts down due to an over temperature condition.
- An amber **I LIM** LED lights if the power supply is overloaded and operating at the current limit (15.6 amperes).

Power supply requirements are listed in Appendix C, “Technical Specifications.”

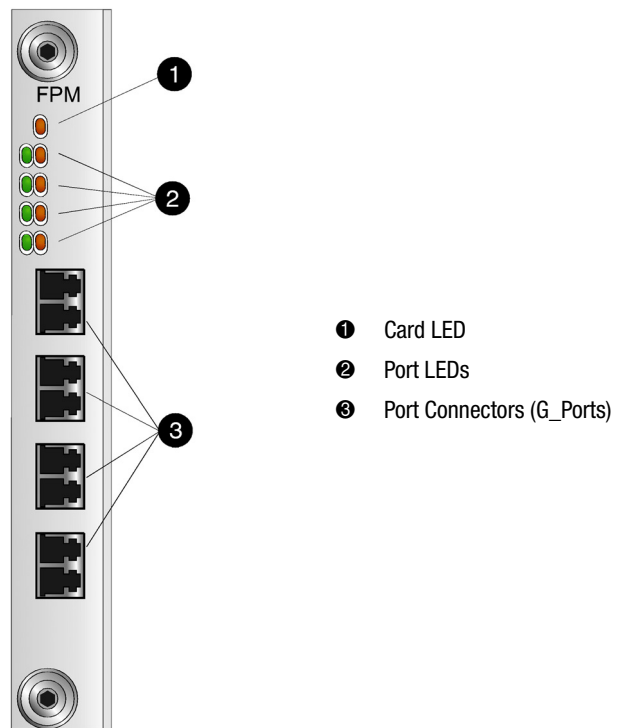
FPM Card

Each Fibre Port Module (FPM) card provides four full-duplex generic ports (G_Ports) that transmit or receive data at 1.0625 gigabits per second (Gbps). G_Port functionality depends on the type of cable attachment. FPM cards use Non-Open Fibre Control (NOFC) Class 1 laser transceivers that comply with Section 21 of the Code of Federal Regulations (CFR), Subpart (J) as of the date of manufacture.

Depending on device connections, G_Ports work as follows.

- If the G_Port is attached to a Fibre Channel device, the port functions as a fabric port (F_Port). An F_Port is the interface on a director that connects to a device N_Port.
- If the G_Port is attached to another director to form an Interswitch Link (ISL), the port functions as an expansion port (E_Port). A multi-switch fabric is formed through multiple directors and ISLs.

Figure 1-2 shows the faceplate of an FPM.



SHR-2274

Figure 1-2: FPM card LEDs and connectors

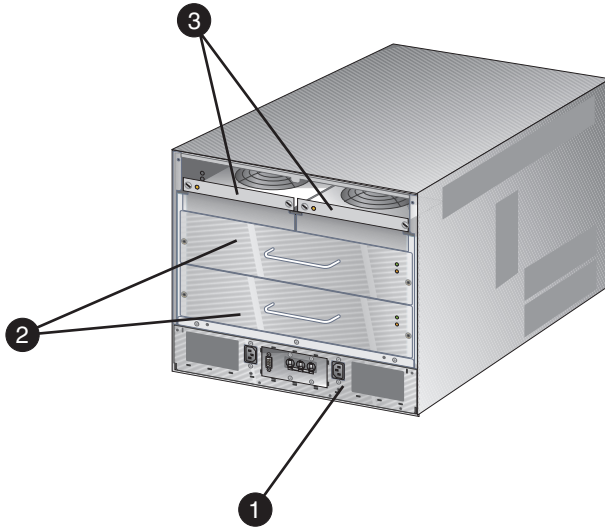
Single-mode or multimode fibre-optic cables attach to FPM cards through small form factor (SFF) pluggable optical transceivers. The fibre-optic transceivers provide duplex connectors, and can be detached from FPM cards (through a 10-pin interface) for easy replacement. Two fiber-optic transceiver types are available.

- Short-wave Laser—Short-wave laser transceivers provide connections for transferring data over short distances (2 to 500 meters) through 50- μ s (500 meters) or 62.5- μ s (200 meters) multimode fibre.
- Long-wave Laser—Long-wave laser transceivers provide connections for transferring data over long distances (up to 20 kilometers) through 9- μ s single-mode fiber.

NOTE: Compaq recommends 50- μ s fiber optic cable for any new installation requiring multimode fiber.

Rear View

Figure 1-3 shows the components accessible from the rear of the SAN Director 64.



SHR-2309

- ❶ Power module assembly
- ❷ SBAR assemblies
- ❸ Fan modules

Figure 1-3: Director components—rear

Fan Modules

Two fan modules, each containing three fans (six fans total), provide cooling for director FRUs, as well as providing redundancy for continued operation if a fan fails.

The fan module can be replaced while the director is powered on and operating, provided the module is replaced within ten minutes (after which software powers off the director). An amber LED for each fan module lights if one or more fans fail or rotate at insufficient velocity.

SBAR Assembly

The director ships with two SBAR assemblies. The active SBAR is responsible for Fibre Channel frame transmission from any director port to any other director port. Connections are established without software intervention. The assembly accepts a connection request from a port, determines if a connection can be established, and establishes the connection if the destination port is available. The assembly also stores busy, source connection, and error status for each director port.

The backup SBAR takes over operation if the active assembly fails, and provides the ability to maintain connectivity and data frame transmission without interruption. The transition to the backup assembly is transparent to attached devices.

Each SBAR assembly consists of a card and steel carriage that mounts flush on the backplane. The carriage provides protection for the back of the card, distributes cooling airflow, and assists in aligning the assembly during installation. The rear of the carriage contains a green LED that lights if the assembly is operational and active, and an amber LED that lights if the assembly fails. The amber LED blinks if FRU beaconing is enabled.

Power Module Assembly

The power module assembly is located at the bottom rear of the director. The module provides the following.

- Two single-phase AC power connectors. Each connector is input rated at 85 to 264 VAC.
- A power switch (circuit breaker) that controls AC power distribution to both power supplies. The breaker is set manually, or is automatically tripped by internal software if thermal sensors indicate the director has overheated.
- A 9-pin maintenance port that provides a connection for a local terminal or dial-in connection for a remote terminal.

SAN Director 64 Optional Kits

Contact your Compaq Sales Authorized Service Provider to purchase the following optional SAN Director 64 kits. See [Table 1-1](#).

Table 1-1: SAN Director 64 Optional Kits

Supporting Kit	Description
SANworks Director Connectivity Manager Kit, and SANworks Director Connectivity Software Kit, Part Number: DS-DMGG0-AA (these products ship together)	The SDCM Manager Kit consists of a laptop computer, preloaded with SDCM software. Also includes all the necessary hardware components (pre-assembled on an adjustable rack-mount shelf) required to run SDCM. The SDCM Software Kit includes the SDCM Server Restore/Boot CD, SDCM Management Applications CD, SDCM Software License Agreement, and Warranty.
Long-wave Port Module Kit, Part Number: DS-DMGGD-AC	Provides additional long-wave ports for the SAN Director 64.
Short-wave Port Module Kit, Part Number: DS-DMGGD-AD	Provides additional short-wave ports for the SAN Director 64.
Combination Long-wave/Short-wave Port Module Kit, Part Number: DS-DMGGD-AE	Provides three additional long-wave and one additional short-wave port for the SAN Director 64.
M-Series Rack Mount Kit, Part Number: DS-DMGGD-AF	Provides cabinet, mounting hardware and installation instructions.

NOTE: The 9000 Series Rack Mount Kit is included with the SAN Director 64, and does not need to be ordered separately.

Installing and Configuring the SAN Director 64

This chapter contains the following information.

- Lists installation requirements
- Provides a carton contents checklist
- Outlines how to install the SAN Director 64 in a Compaq 9000 Series, or comparable rack
- Describes how to configure the SAN Director 64
- Summarizes SAN Director Connectivity Manager (SDCM) Server set up and configuration.

Review Installation Requirements



WARNING: The SAN Director 64 weighs approximately 115 pounds. Use proper handling and lifting equipment to reduce the possibility of injury or product damage.

The Director is delivered stand-alone and ready to be mounted in a Compaq 19-inch equipment rack. Rack mount brackets and hardware are provided in the shipping container. Ethernet cabling, distance, and LAN addressing issues must be considered.

Review the following checklist before installing the switch.

- Prepare a site plan. Consult the *Compaq StorageWorks SAN Director 64 Planning Guide*, Part Number AA-RPLAB-TE.
- Verify that required technical personnel are available and scheduled for the installation.

- Obtain the required fibre-optic cables (multimode or single-mode). Verify cable length and required connectors.
- Obtain a Compaq 19-inch equipment rack.
- If applicable, obtain the necessary remote workstations or Simple Network Management Protocol (SNMP) workstations. Workstations are customer-supplied and connected through a corporate or dedicated LAN.
- Verify that the front panel air temperature does not exceed 40 °C (104 °F) during operation.
- Verify that there is space in the rack. The Director is 9U, or 15.75 inches high.
- Verify that the rack is stable.
- Verify that all other equipment installed in the rack is connected to a reliable ground connection; do not rely on connections to a branch circuit, such as a power strip.
- Compaq recommends securing the rack mechanically to prevent it from tipping over during a natural disaster, such as an earthquake.

Items Required for Installation

Locate the following items before beginning the install procedure.

- Lift device (recommended)
- SAN Director 64
- A Compaq 9000 Series Rack, Compaq M Series Rack, or any rack with the following specifications,
 - ❑ A minimum depth of 24.5 inches
 - ❑ 9 rack units (9U) high
 - ❑ 19 inches wide.
- Two power outlets (for redundancy)
- Torque driver with cross-tip bit (for setting 22 in-lbs of torque)
- Fibre-optic protective plug—For safety and port transceiver protection, fibre-optic protective plugs must be inserted in all Director ports without fibre-optic cables attached. The Director is shipped with protective plugs installed in all ports.
- Null modem cable—An asynchronous RS-232 null modem cable is required to configure Director network addresses and obtain event log information through the maintenance port. The cable has nine conductors and two DB-9 female connectors.

- Standard flat-tip and cross-tip Phillips screwdrivers—Required to remove, replace, adjust or tighten various FRUs, chassis, or cabinet components.
- Electrostatic discharge (ESD) grounding cable with attached wrist strap—Required when working in and around the Director card cage.
- Maintenance terminal (desktop or notebook computer)— Required to configure Director network addresses and acquire event log information through the maintenance port. Computer requirements include:
 - Microsoft Windows 98, Windows NT 4.0, Windows 2000, or Windows Millennium Edition operating system installed
 - RS-232 serial communication software (for example, ProComm Plus or HyperTerminal).

Select an Operating Location

Install the Director in a secure or limited-access area to ensure that cable connections are not compromised. Also, make sure to install the Director in an area with the ventilation and power requirements described next.

Cooling and Power Requirements

Two fan modules, each containing three fans (six fans total), provide cooling for the Director, as well as redundancy if a fan fails. The air intake for the director must satisfy an operating environment temperature requirement of 40°F to 104°F (4°C to 40°C).

Director power requirements are listed next.

- Input voltage: 100 to 120 or 200 to 240 VAC
- Input frequency: 50/60 Hz



CAUTION: Do not block SAN Director 64 air vents. The switch uses ambient air for cooling.

Unpack and Inspect the Director

Unpack and inspect the Director as follows.

1. Inspect the shipping container for damage caused during transit.
2. Unpack the shipping cartons.
3. Verify that the carton contains the items shown in [Figure 2-1](#) and [Table 2-1](#).

IMPORTANT: If any items are damaged or missing, please contact Compaq or a Compaq Authorized Reseller.



SHR-2263b

Figure 2-1: Carton contents

Table 2-1: Shipping Carton Contents

Number	Item
1	One SAN Director 64 Product CD containing firmware, license, documentation
2	<i>SAN Director 64 Installation Guide, SAN Director 64 Release Notes</i>
3	Two Power Distribution Unit (PDU) power cords
4	Two standard AC power cords
5	Four multimode, short-wave loopback plugs
6	One torque driver with integrated 5/32" bit
7	One 10-foot null modem cable
8	<p>Compaq 9000 Series Rack Mount Kit containing:</p> <p>Two front mounting brackets</p> <p>Two rear mounting plates</p> <p>Two rear angle brackets</p>
9	Two shelf brackets
10	<p>Pouch containing Compaq 9000 Series Rack Mount hardware:</p> <p>Eight 10-32 x 0.375 in. Phillips panhead screws—Installs two shelf brackets to rails.</p> <p>Six 10-32 x 0.375 in. Phillips panhead screws—Installs two front mounting brackets to rails.</p> <p>Four 10-32 X 0.25 in. Phillips countersunk screws—Installs front brackets to switch.</p> <p>Ten 10-32 cage nuts—Secures front and rear shelf brackets.</p> <p>Four 0-32 x 0.375 in. Phillips panhead screws—Installs rear bracket sections.</p> <p>Four 10-32 X 0.25 in. Phillips countersunk screws—Installs rear mounting plates to chassis.</p> <p>Four 10-32 X 0.375 in. Phillips panhead screws—Installs two rear angle brackets.</p> <p>Eight square alignment washers</p>
11	One cable management assembly
12	Compaq SAN Director 64

Install the Director in a 9000 Series Rack

NOTE: The SAN Director 64 ships with the complete set of rack mount hardware required for installation in the Compaq 9000 Series Rack. If you plan to install the director in the optional Compaq M-Series Rack, Part Number DS-DMGGD-AF, consult the *Compaq M Series Rack Mount Kit Installation Guide*, Part Number AA-RQZPA-TE.

Obtain the following tools.

- A #2 Phillips screwdriver
- Torque screwdriver.

Tips for Installing More than One Switch

Review the following tips.

- Install the first director in the lowest position of the rack, allocated for switches.
- If installing more than one switch, Compaq recommends installing an optional PDU in the bottom of the rack. Compaq ships two PDU power cords with the SAN Director 64.
- Install additional switches in position directly above one another.
- Make sure to connect power cables as you install each individual switch.

Transfer the Director to the Lift Device

Use these steps to position the SAN Director 64 next to the rack.



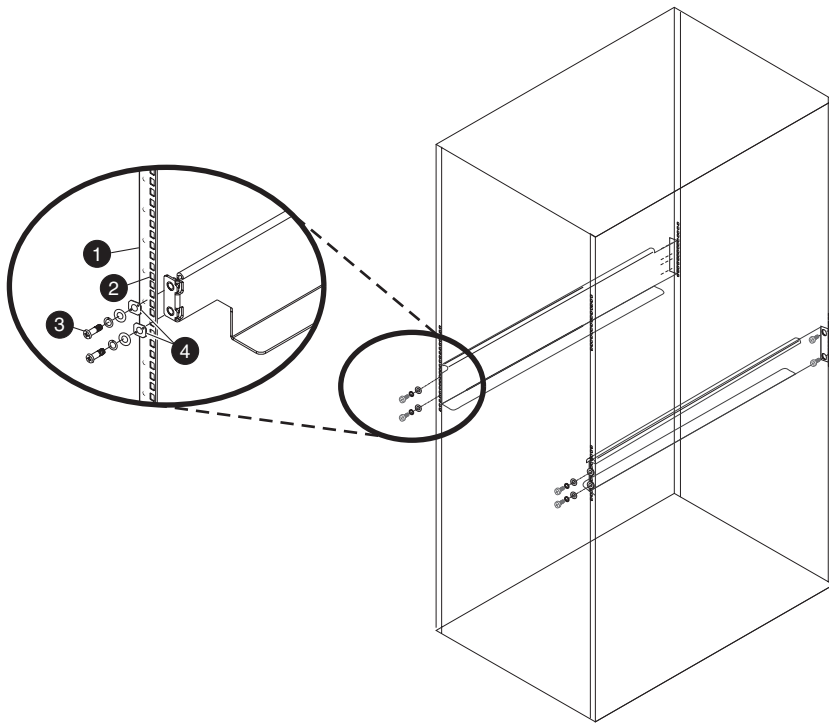
WARNING: Two people will need to work together to transfer the Director to the lift. Make sure the wheels of the lift cannot roll as you transfer the Director to the lift. Move the Director slowly and carefully onto the lift to prevent back and hand injury. Dropping the Director could injure personnel or damage the equipment.

1. Position the lift device next to the Director.
2. Using a pallet jack, raise the pallet on which the Director is mounted to the same height as the top surface of the lift device.
3. Slide the Director across from the pallet to the lift device.
4. Determine the appropriate rack-mount position. Remember that the Director is 15.75 inches or 9 U high.

Install the Shelf Brackets in the 9000 Series Rack

Use these steps to install the two shelf brackets in the rack.

1. Determine the appropriate placement for the switch inside the rack. It is important to consider the number of switches you intend to install. See “Tips for Installing More than One Switch,” listed previously in this chapter.
2. Locate the small, round marker hole on the rails that coincides with the location selected in step 1. Each marker hole delineates the beginning of one rail unit, or U.
3. Locate the square opening in the rail that corresponds with the appropriate marker hole. See [Figure 2-2](#).



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- | | |
|--------------------------|---|
| ❶ Marker hole | ❸ Screws with captive lock and flat washers |
| ❷ Square opening in rail | ❹ Square alignment washers |

Figure 2-2: Securing shelf brackets

NOTE: Consider leaving the bottom and top U positions open to permit easy accessibility to the cables entering and exiting the cabinet.

4. Position the higher, shelf bracket threaded hole in this square opening. See [Figure 2-2](#).
5. Orient the shelf bracket in the rails.
6. Place the square washer provided on the front of the rail so that the two bumps on the washer sit in opposite corners in the rail's square hole.
7. Insert the panhead Phillips screw, and partially tighten to temporarily stabilize the bracket.
8. Make sure the shelf bracket is level, and align the rear of the shelf bracket with the appropriate position on the rear rail See [Figure 2-2](#).
9. Repeat steps 4 through 7 for the rear end of the shelf bracket.
10. Repeat steps 1 through 9 for the second shelf bracket.
11. Completely tighten all screws attaching shelf brackets to the rack's rails.
12. Using a torque driver, torque the screws to 22 in.- lbs.

Prepare the Switch for Install

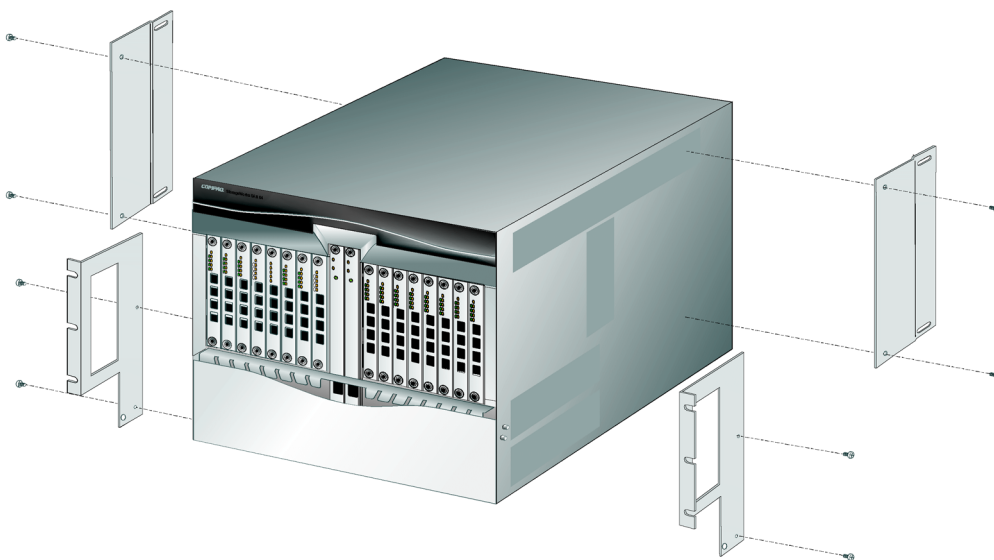
The following section describes how to install the mounting hardware that attaches the switch to the rails. This hardware includes:

- Two front mounting brackets
- Two rear mounting plates
- Ten cage nuts
- Eight screws

Secure the Mounting Hardware

Use these steps to secure the mounting hardware to the switch.

1. Locate the two front mounting brackets in the shipping carton.
2. Secure the front mounting brackets on either side of the switch as shown in [Figure 2-3](#). For each front mounting bracket, use two flathead countersunk Phillips screws (10/32 x 0.25-inch) provided.



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Figure 2-3: Securing the two mounting brackets

3. Using a torque driver, torque the screws to 22 in.- lbs.
4. Locate the two rear mounting plates in the shipping carton.
5. Secure the two rear mounting plates to each side of the switch as shown in [Figure 2-3](#). For each plate, use two flathead countersunk Phillips screws (10/32 x 0.25-inch) provided.
6. Using a torque driver, torque the screws to 22 in.- lbs.

Insert the Cage Nuts

Read the following sections for instructions on inserting front and rear cage nuts in the rack.

Insert the Front Cage Nuts in the Rack

Use these steps to insert the six supplied cage nuts in the rack's front rails.

1. Select one of the front rails. Count up 11 square openings from the top screw of the shelf bracket, and insert the first of three cage nuts.
2. Count up 5 square openings from the cage nut you just installed, and insert the next cage nut.
3. Count up four square openings for the third cage nut.
4. To install cage nuts in the corresponding front rail, repeat step 1 through step 3.

Insert the Rear Cage Nuts in the Rack

Use these steps to insert the four supplied cage nuts in the rack's rear rails.

1. Select one of the rear rails, and count up six square openings from the top screw of the rear shelf bracket. Insert the first of two cage nuts.
2. Count up sixteen square openings from the cage nut you just installed, and insert the next cage nut.
3. To install cage nuts in the rack's corresponding rear rail, repeat step 1 through step 2.

Finalize the Rack Mounting Procedure

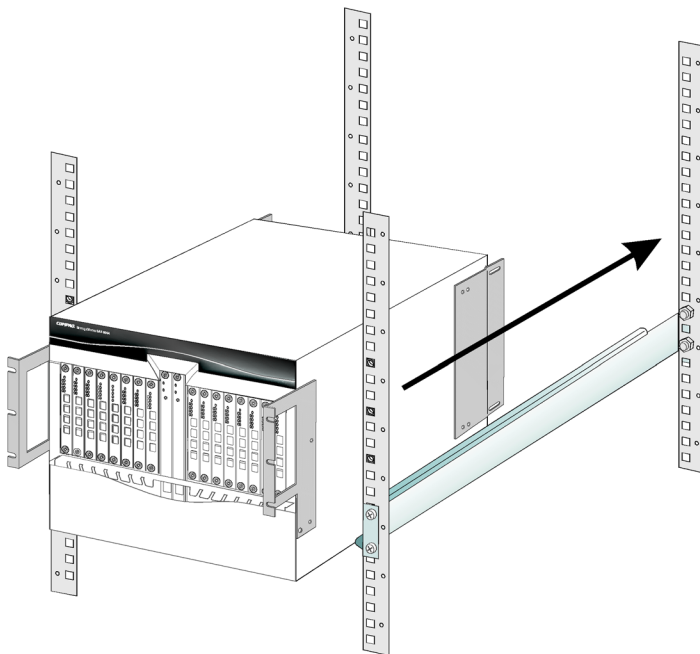
Read the following sections to complete the installation procedure.

After completing the steps outlined in the previous section, prepare to orient the switch in the rack, as follows. The procedure requires two technicians.



CAUTION: The Director weighs approximately 115 lbs. Do not attempt to lift or carry the Director with fewer than two people. Failure to observe this CAUTION may result in injury to personnel or damage to the Director.

1. Carefully lift the switch into the front of the cabinet and onto the shelf brackets. Slide the switch forward into the rack until the edge of the rear mounting plates are approximately 1-inch from the rack's rails. See [Figure 2-4](#).



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Figure 2-4: Aligning the switch in the rack

2. Align one rear angle bracket with the cage nuts installed earlier, see “Inserting Cage Nuts.” See [Figure 2-5](#).

NOTE: Make sure that the angle bracket is in contact with the outside surface of the mounting plate.

3. Loosely attach the rear angle bracket to the rack rail with the two panhead Phillips screws provided. See [Figure 2-5](#).

- Repeat steps 2 and 3 for the corresponding rear angle bracket. See [Figure 2-5](#).

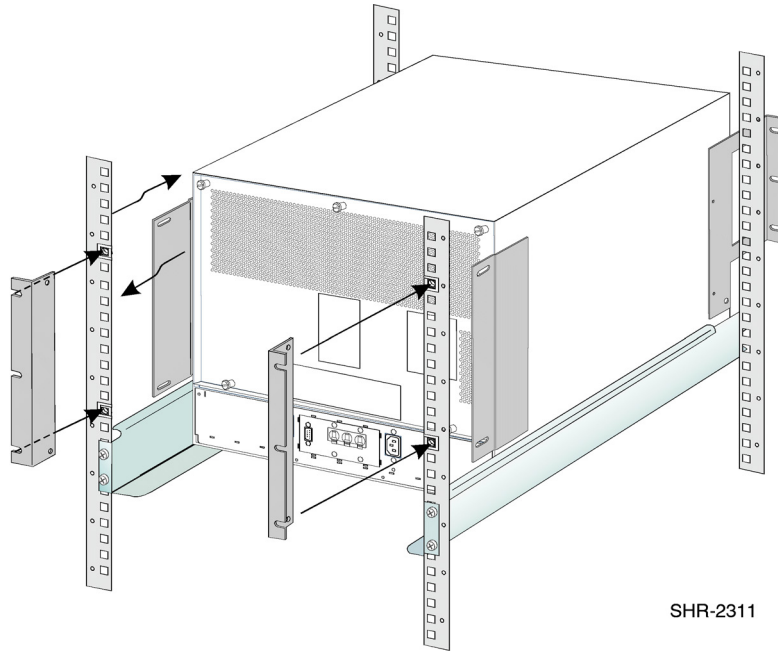
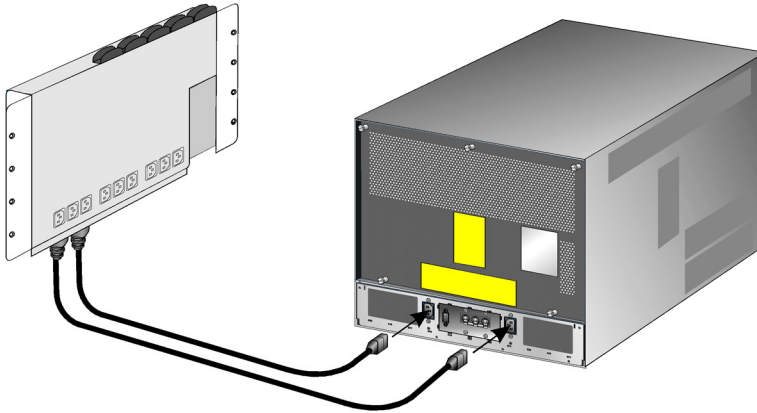


Figure 2-5: Securing the rear angle brackets

- The two rear angle brackets now touch the outside surfaces of the rear mounting plates. Slide the switch all the way into the rack to where the front mounting bracket meets the rack rails.
- If you are certain that the hardware lines up properly, secure the hardware as follows.
 - Secure each rear mounting plate to the rear angle bracket with the two screws provided.
 - Move to the front of the switch, and secure each front mounting bracket with the three screws provided.
- Using a torque driver, torque the screws to 22 in. - lbs.

8. Connect the remaining ends of the PDU power cords to separate PDUs (if installed) as shown in [Figure 2-6](#). Otherwise, connect the two standard AC power cords.

NOTE: Compaq recommends installing an optional PDU in the rack. Compaq ships two PDU power cords with the SAN Director 64.



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Figure 2-6: AC power connections



WARNING: Compaq power cords are provided for each Director power supply. To prevent electric shock, use only the supplied power cords. Also, verify that the facility power receptacle is the correct type, supplies the required voltage, and is properly grounded.

9. Connect the equipment rack power cords to separate (for redundancy) facility power sources, providing single-phase, 120 to 240 VAC current.

Power-On Self Test

Use the following steps to run a Power-On Self Test (POST).

1. Power on the PDUs (if used).
2. At the bottom rear of the Director, set the power switch (circuit breaker) to the Up position. The Director powers on. The following occurs during POST.
 - Amber LEDs on both CTP cards and all FPM cards illuminate momentarily.
 - The green LED on each CTP card (active and backup) lights as the card is tested and FPM cards are tested.

- ❑ Green LEDs associated with Fibre Channel ports sequentially illuminate as the ports are tested.
- 3. After successful POST completion, the green power LED on the front bezel, green LED on the active CTP card, and green PWR OK LEDs on both power supplies remain illuminated.
- 4. If a POST error or other malfunction occurs, refer to the “Maintenance Analysis Procedures” section in the *Compaq StorageWorks SAN Director 64 Service Manual*.

Configure Director Network Information

Read the following sections for information on how to configure the director’s network addressing scheme.

Default Settings

The Director is delivered with the following default network addresses.

- MAC address—The Media Access Control (MAC) address is programmed into FLASH memory on the CTP card at the time of manufacture. The address is in xx.xx.xx.xx.xx.xx format, where xx is a hexadecimal pair.
- IP address—The factory preset, default Internet Protocol (IP) address is 10.1.1.10.

If the Reset Configuration option is selected from SDCM, the Director resets to the default address of 10.1.1.10.

NOTE: If multiple Directors are installed on the same LAN, each Director (and server) must use a unique IP address. One Director can use the factory-set address, but the addresses of the remaining Directors require change.

- Subnet mask—The subnet mask is 255.0.0.0. If the Director is installed on a complex public LAN with one or more routers, the address may require change.
- Gateway address—The gateway address is 0.0.0.0. If the Director is installed on a dedicated LAN with no connection through a router, the address does not require change. If the Director is installed on a public LAN (corporate intranet), the gateway address must be changed to the address of the corporate intranet’s local router.

Verify the type of LAN installation with the customer’s network administrator. If one Director is installed on a dedicated LAN, network addresses must be verified but do not require change.

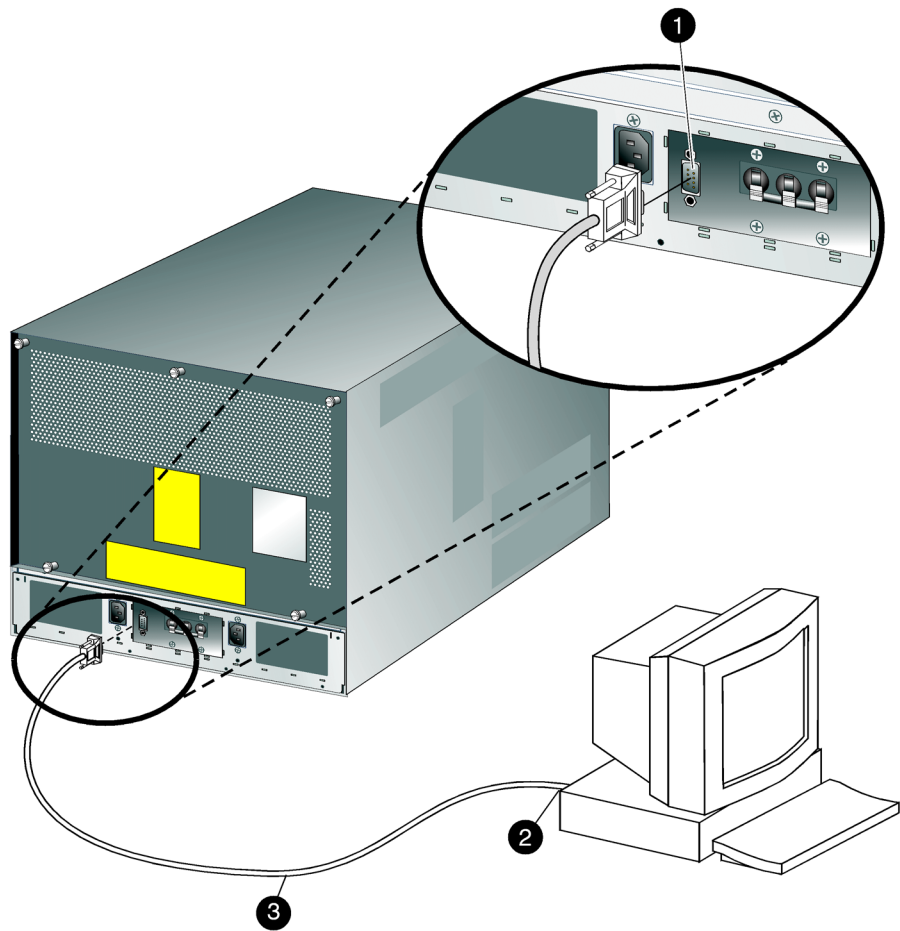
Changing the Director's IP Address

If multiple Directors are installed, or a public LAN segment is used, network addresses must be changed to conform to the customer's LAN addressing scheme. The following items are required to perform this task.

- A local workstation (desktop or notebook computer) with:
 - Microsoft Windows 98, Windows 2000, Windows Millennium Edition, or Windows NT 4.0 operating system.
 - RS-232 serial communication software (for example, ProComm Plus or HyperTerminal)
- An asynchronous RS-232 null modem cable (supplied with the SAN Director 64).

Use the following steps to verify or change (if required) a Director's IP address, subnet mask, or gateway address.

1. Remove the protective cap from the 9-pin maintenance port at the rear of the Director (a flat-tip screwdriver may be required). Connect the 9-pin end of the RS-232 modem cable to the port. See [Figure 2-7](#).



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- ① Maintenance port
- ② RS-232 port
- ③ Null Modem cable

Figure 2-7: Connecting the null modem cable between the Director and a workstation

2. Connect the other cable end to a 9-pin communication port (COM1 or COM2) at the rear of the local workstation.
3. Power on the workstation and establish a connection to the director using Windows HyperTerminal.

4. Configure the Port Settings parameters as follows:
 - Bits per second: 57600
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: Hardware.
5. Click OK. The HyperTerminal window displays.
6. At the > prompt, type the user-level password (the default is password) and press the Enter key. The password is case sensitive. The HyperTerminal window displays with an SSP0> prompt at the top of the window.
7. At the SSP0> prompt, type `ipconfig` and press the Enter key. The HyperTerminal window displays with configuration information listed as follows, see [Figure 2-8](#):
 - MAC Address
 - IP Address (default is 10.1.1.10)
 - Subnet Mask (default is 255.0.0.0)
 - Gateway Address (default is 0.0.0.0)

Only the IP Address, Subnet Mask, and Gateway Address fields are configurable.

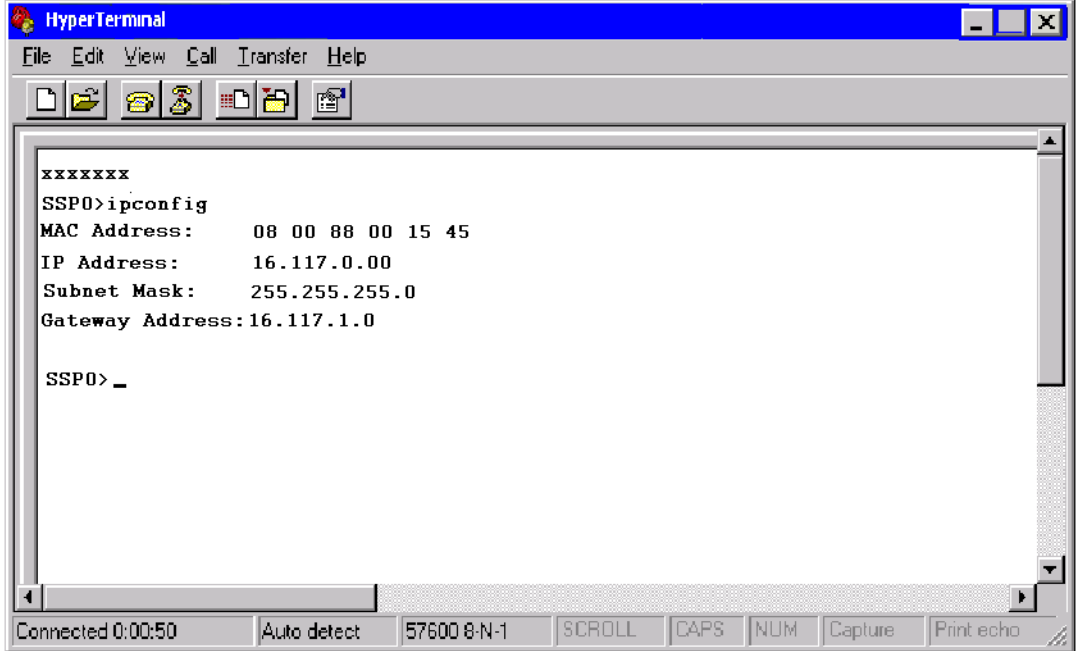


Figure 2-8: HyperTerminal configuration window

8. To change Director network addresses, type the following at the SSP0> prompt and press the Enter key.

```
ipconfig xxx.xxx.xxx.xxx.yyy.yyy.yyy.yyy.zzz.zzz.zzz.zzz
```

The IP address format is xxx.xxx.xxx.xxx. The subnet mask format is yyy.yyy.yyy.yyy. The gateway address format is zzz.zzz.zzz.zzz. The octets xxx, yyy, and zzz are decimals from 0 through 255. If a network address is to remain unchanged, type the current address in the respective field.

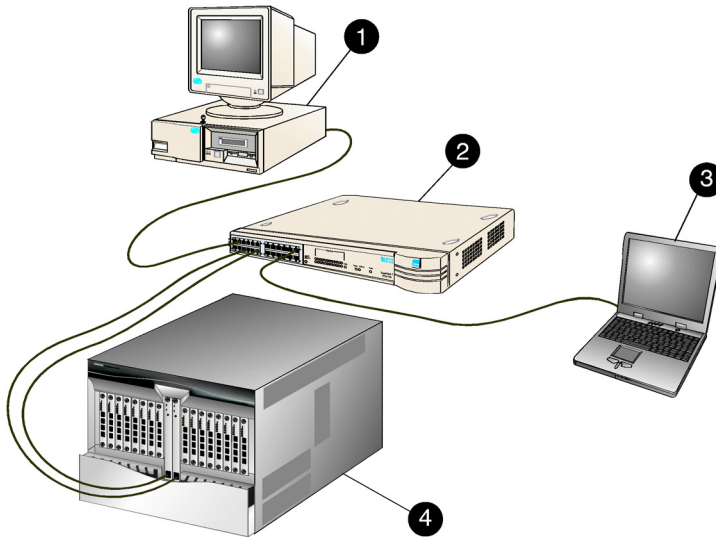
When the new network addresses are configured at the Director, the message “Request completed OK” displays at the bottom of the HyperTerminal window.

9. Select Exit from the File pull-down menu.

LAN-Connect the Director

Use these steps to connect the rack-mounted Director to the Ethernet LAN segment.

1. Connect one end of an Ethernet cable to the RJ-45 connector on each CTP card. See [Figure 2-9](#).



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- | | |
|--|-------------------|
| ❶ Remote workstation | ❸ SDCM Server |
| ❷ Ethernet hub or switch (customer supplied) | ❹ SAN Director 64 |

Figure 2-9: LAN-connect the Director

2. Connect the remaining end of each Ethernet cable to the LAN as directed by the customer's network administrator.

NOTE: If an SDCM Server is not available, use the Embedded Web Server (EWS) interface. Attach the Ethernet LAN segment to an Internet connection and refer to Chapter 3, "Using EWS to Configure the Director."

SDCM Server Hardware Kit Overview

To run SDCM software, you must obtain and install the SDCM Server Hardware Kit. The SDCM Server Hardware Kit consists of a laptop computer, pre-loaded with SDCM software. In addition, the kit includes all the necessary hardware components required to manage the SAN Director 64 via SDCM. These components ship pre-assembled on an adjustable rack-mount shelf, except for the laptop computer. Refer to the “Install the SDCM Server Hardware Kit in a Rack” section for complete installation instructions.

SDCM Software Kit Components

The SDCM Software Kit ships with the SDCM Server Hardware Kit, and includes the following items.

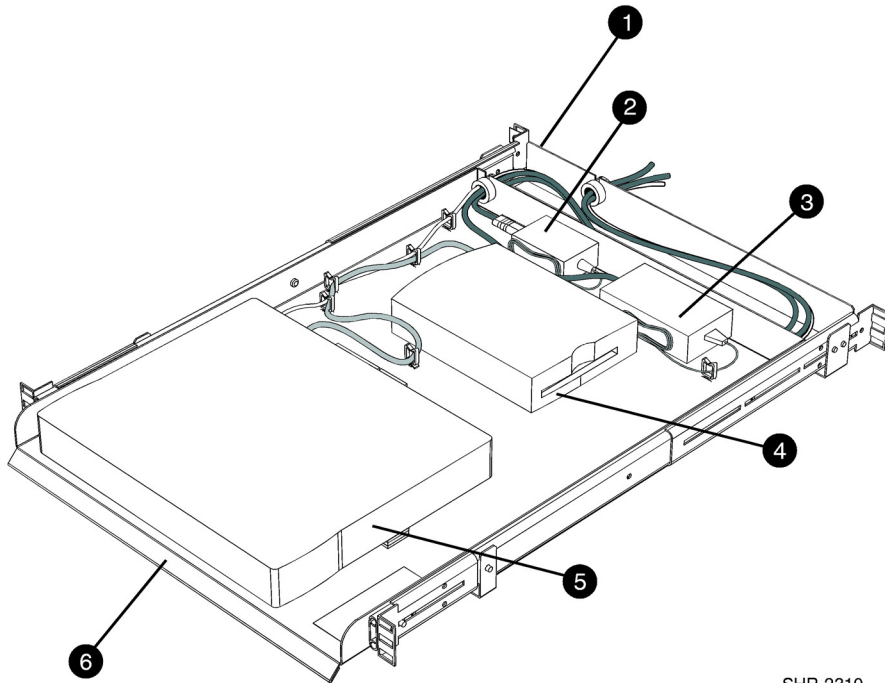
- SDCM Server Restore/Boot CD
- SDCM Management Applications CD
- SDCM Software License Agreement
- Warranty
- Software Release Notice

SDCM Server Hardware Kit Components

The following components comprise the SDCM Server Hardware Kit. See [Figure 2-10](#).

NOTE: The SDCM Server Hardware Kit uses velcro to secure the laptop and Zip drive in the shelf. To ensure that components do not shift, do not remove the velcro.

- Laptop with preloaded SDCM software
- Laptop AC adapter and adapter power cord
- Zip drive with data cable, AC adapter and power cord
- Two power cords
- Two power adapter cables
- Management server slide out shelf (universal), with mounting hardware
- Two 100-MB blank Zip disks
- Zip disk software pack



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- | | | | | | |
|---------------|------------------------|---------------------|-------------|---------------|-----------------|
| ❶ Bottom Tray | ❷ Zip Drive AC Adapter | ❸ Laptop AC Adapter | ❹ Zip Drive | ❺ SDCM Server | ❻ Sliding Shelf |
|---------------|------------------------|---------------------|-------------|---------------|-----------------|

Figure 2-10: SDCM Server Hardware Kit components

Install the SDCM Server Hardware Kit in a Rack

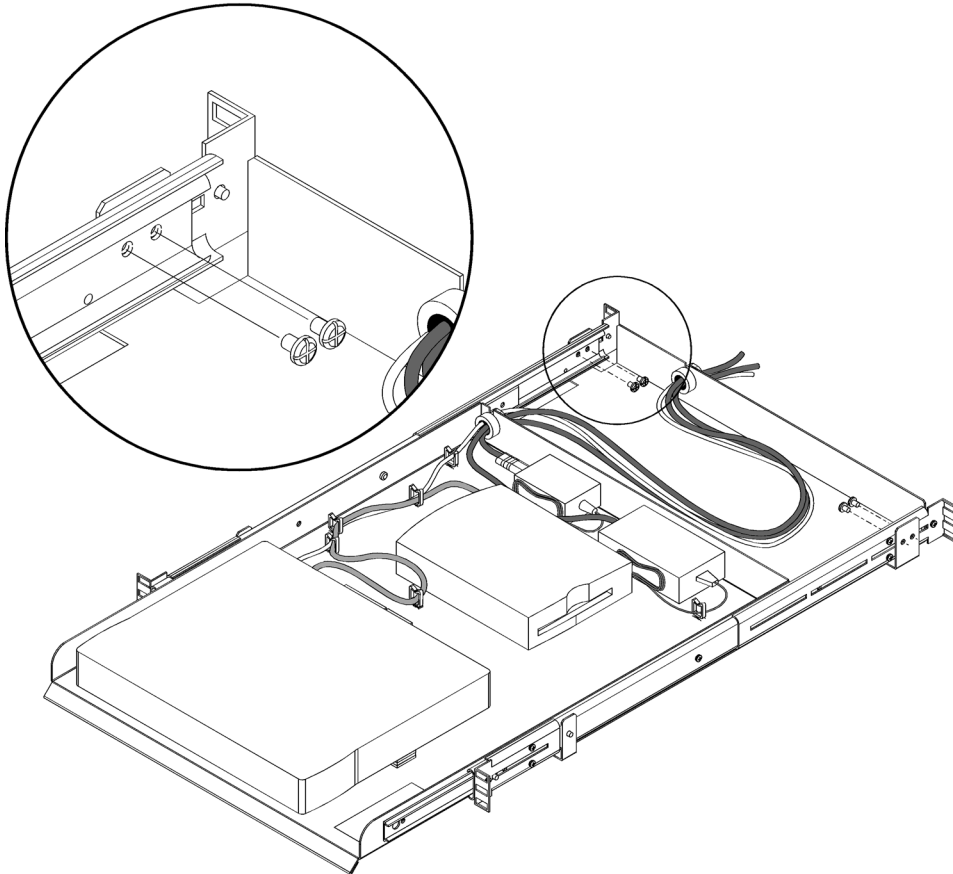
Complete the following steps to install the SDCM Server Hardware Kit into a Compaq 9000 Series, or comparable rack.

NOTE: The SDCM Server Hardware Kit installs in most racks, using the supplied adjustable rail extension. For example, the kit accommodates both the Compaq 9000 Series and Compaq M Series racks.

1. Select an appropriate location to install the kit in the rack. The SDCM Server Hardware Kit requires approximately 2.25 in. or 1.3U of space in the rack. Install the kit one hole higher than the standard 1U location.

NOTE: If installing three or more switches, Compaq recommends installing the SDCM Server and shelf in the middle of the rack.

2. Insert the eight cage nuts provided as follows. Four cage nuts install at the front of the rack; four cage nuts install at the rear of the rack.
 - a. On the front of the rack, locate the appropriate screw holes, based on the rack position determined in step 1.
 - b. Insert a cage nut in the topmost screw hole, one hole above the start of one rack Unit.
 - c. Repeat steps 2a and 2b for each of three cage nuts.
 - d. On the rear of the rack, insert the four cage nuts that correspond with the cage nuts you installed in the front of the rack.
3. Prior to positioning the SDCM Server and shelf in the rack, remove the rail extensions as follows. See [Figure 2-11](#).
 - a. Slide the shelf forward, exposing the four screws that secure the rail extensions.
 - b. Remove the two screws from each rail extension. Put aside in a safe place as you will need these screws to reinstall the rail extensions (see step 5).



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Figure 2-11: Removing the rail extensions

- c. Slide out the rail extensions.
4. Install the kit as follows. See [Figure 2-12](#).

NOTE: To properly orient the SDCM Server Hardware Kit in the rack, installation requires two technicians. Position one technician at the front of the rack, and one technician at the rear of the rack.

- a. To avoid tipping the shelf kit, hold the server shelf kit firmly, placing one hand at the front of the sliding shelf and one hand at the rear of the tray.
- b. Lift the server shelf kit, and position at the front of the rack.
- c. Align the kit with the cage nuts installed earlier (see step 2).

- d. From the front of the rack, move the server shelf kit forward into the rack.

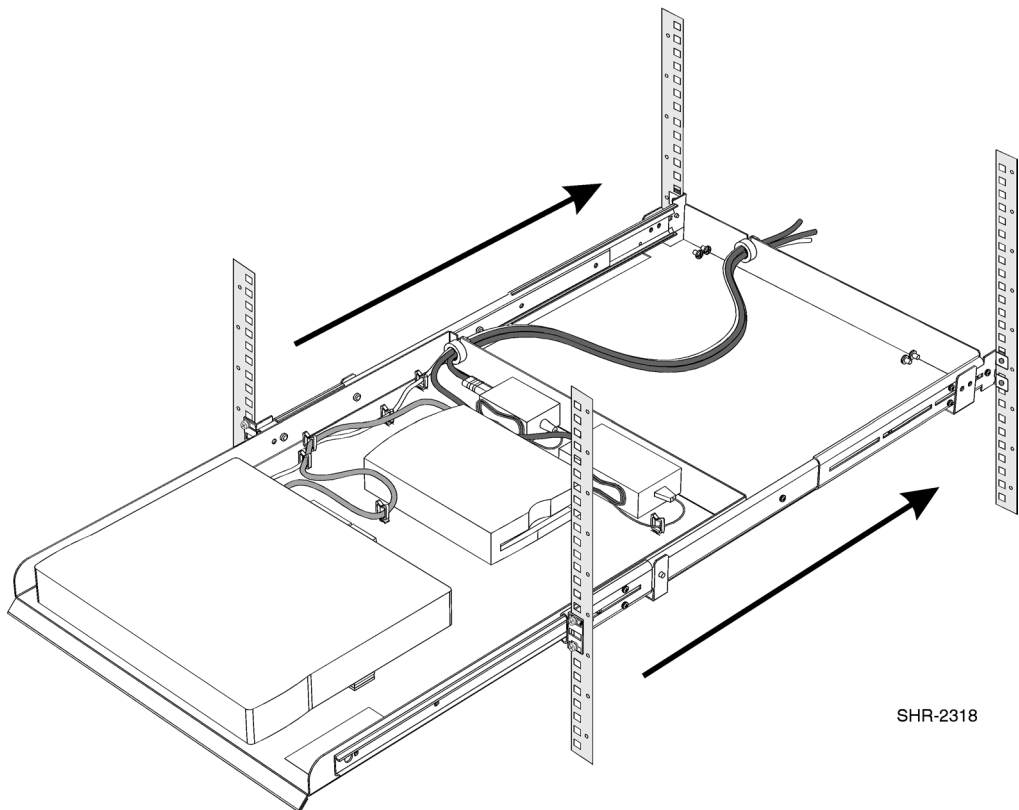


Figure 2-12: Positioning the server shelf kit in the rack

- e. Loosely attach the server shelf kit to the front of the rack using the four screws provided.
5. Reinstall the two rail extensions as follows. See [Figure 2-11](#).
- Slide the top tray forward.
 - Insert one rail extension (to where it was previously installed) between the bottom tray bracket and the slide rail. The slide rail attaches to the bottom shelf.
 - Adjust the the rail extension to the appropriate length, depending on the depth of the rack.

NOTE: For example, the Compaq 9000 Series rack requires a longer rail extension. The Compaq M-Series rack requires a shorter rail extension.

- d. Loosely secure the rail extension to the inner segment of the shelf rails.
 - e. Repeat steps 5a through 5d for the corresponding rail extension.
NOTE: Before tightening the screws for each rail extension, it is important to secure the shelf rails to the front and rear of the rack with the four screws provided. When the shelf is secure, continue with step f.
 - f. Secure the rail extensions to the rear of the rack with the four screws provided.
 - g. Slide the shelf to the back of the rack.
6. Connect cables as follows.
 - a. Connect the two power cords to an equipment rack power strip.
 - b. Attach the Ethernet cable to a device with an Ethernet port.
 7. Remove the laptop from its packaging.
 8. Locate the velcro pads on the server shelf and then remove the paper backing to expose the adhesive.
 9. Position the laptop as shown in [Figure 2-10](#). Press the bottom of the laptop onto the adhesive on the velcro pads.
 10. Connect the data cable between the laptop server's parallel port and the Zip drive.
 11. Connect the Ethernet cable to the PCMCIA Ethernet card located on the right side of the laptop computer.
 12. Plug in the power supply adapter cable.

Connect the SDCM Server to the LAN

To optimize system security, Compaq recommends that the SDCM server and the StorageWorks Director 64 reside in a secure physical network domain. For more information on local security guidelines, contact your network administrator.

Use these steps to connect the SDCM server to the customer-supplied Ethernet LAN segment.

1. Connect one end of the Ethernet patch cable (supplied with the SDCM Server Hardware Kit) to the RJ-45 port on the side of the laptop. See [Figure 2-9](#).
2. Connect the remaining end of the Ethernet cable to the LAN as directed by the site's network administrator. See [Figure 2-9](#).

NOTE: The motherboard LAN connection is currently not supported.

Configure the SDCM Server Addressing Information

Verify the type of LAN installation with the customer's network administrator. If the SDCM Server is installed on a dedicated LAN, network information does not require change.

If the SDCM Server is installed on a public LAN segment, the following transmission control protocol/ internet protocol (TCP/IP) network information must conform to the customer's LAN addressing scheme.

- IP address
 - Subnet mask
1. At the Windows NT desktop, click the Start button. Select Settings | Control Panel. The Control Panel window displays.
 2. At the Control Panel window, double-click the Network icon. The Network dialog box displays. The Computer Name field displays SDCMSERVER. Record this computer name for reference. See [Figure 2-13](#).

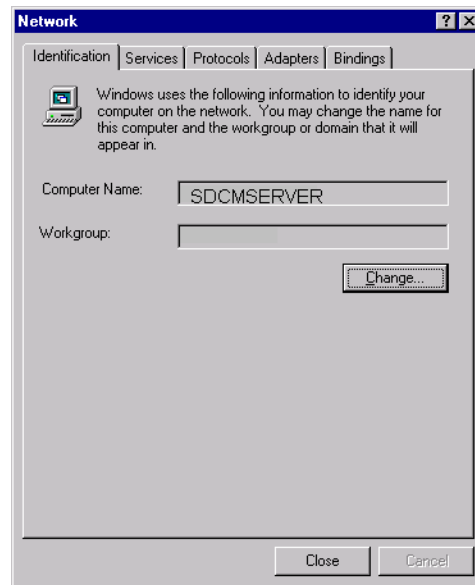


Figure 2-13: Computer name

3. If the SDCM Server is installed on a dedicated LAN only, go to step 10. If the SDCM Server is installed on a public LAN and the computer name requires change, click the Change button. Figure 2-14 shows the Identification Changes dialog box.

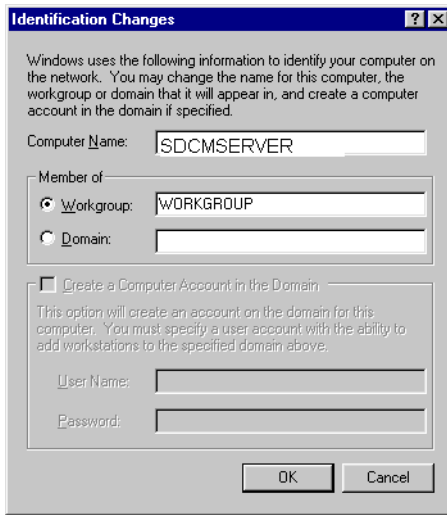


Figure 2-14: Identification changes dialog box

4. At the Identification Changes dialog box, highlight SDCMSERVER in the Computer Name field and delete the name. Type a new computer name and click OK to return to the Network dialog box. Record the updated computer name for reference.

5. Click the Protocols tab. The Network dialog box displays with the Protocols tab selected. See [Figure 2-15](#).

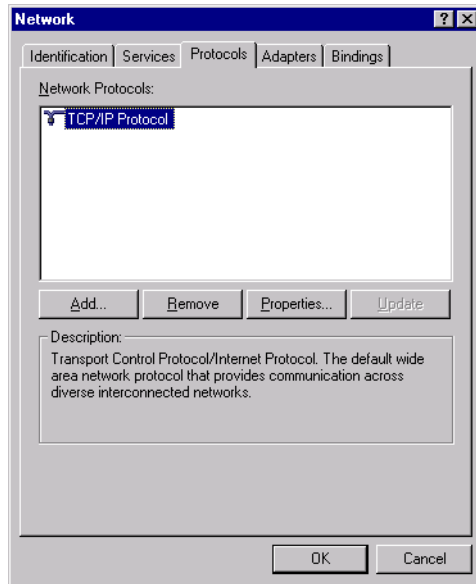


Figure 2-15: Protocols tab

6. Select the TCP/IP Protocol entry from the list box and click the Properties button. The Microsoft TCP/IP Properties dialog box displays with the IP Address tab selected. See [Figure 2-16](#).

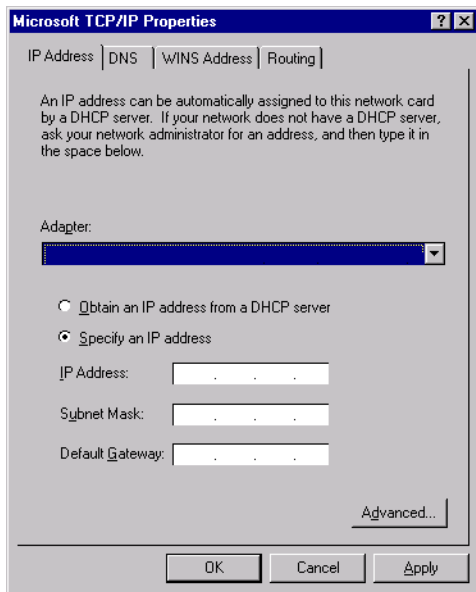


Figure 2-16: TCP/IP properties dialog box

7. At the Adapter list box, select the name of the Network Interface Card (NIC) installed in your server.
8. Click the Specify an IP address item. Enter the IP address, subnet mask, and gateway address obtained from the customer's network administrator, then click the Apply button. Record the changed network addresses for reference. It is required to restore the SDCM Server hard drive.

9. At the Microsoft TCP/IP Properties dialog box, click the DNS tab See [Figure 2-17](#).

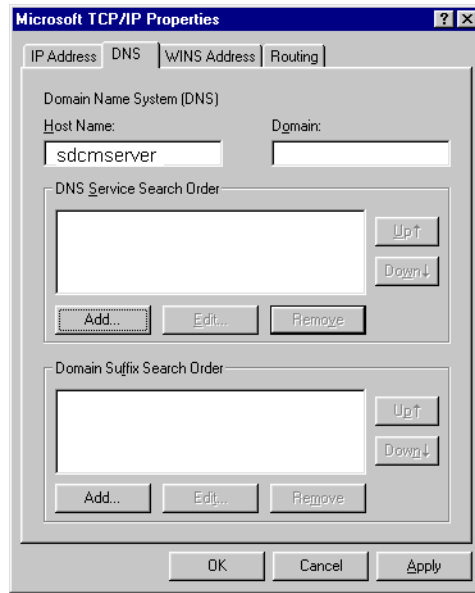


Figure 2-17: DNS tab

10. Check that the host name shows SDCMSERVER, (default). At the Domain field, type a domain name as specified by the customer's system administrator.
11. If the SDCM Server is installed on a dedicated LAN, go to step 13. If the SDCM Server is installed on a public LAN, add the DNS Server IP address (specified by the customer's system administrator) to the DNS Service Search Order field as follows:

- a. Click the Add button under the DNS Service Search Order list box. The TCP/IP DNS Server dialog box displays. See Figure 2-18.

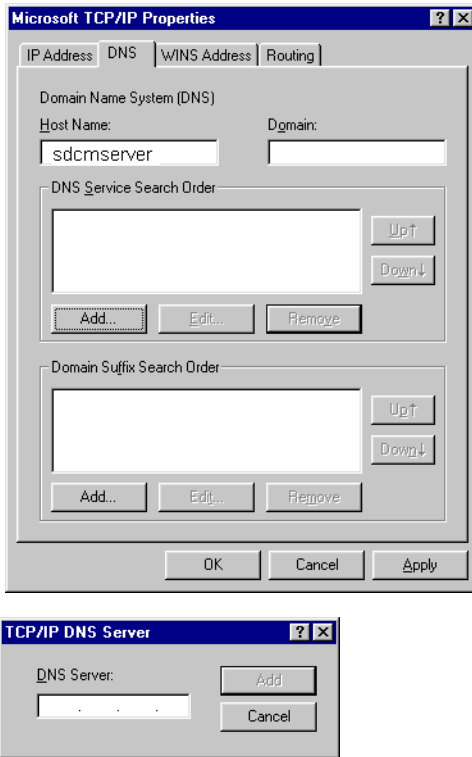


Figure 2-18: TCP/IP DNS server dialog box

- b. Type the DNS server IP address (obtained from the customer's system administrator) and click Add to save the data and close the dialog box.
12. Verify that the entered IP address displays in the DNS Service Search Order list box.
 - a. If the address is incorrect, select the address and click Edit under the DNS Service Search Order list box. In the TCP/IP DNS server dialog box, correct the address and click OK.
 - b. Click Apply. Record the IP address for reference if the SDCM Server hard drive fails and must be restored.
13. Click OK to close the Microsoft TCP/IP Properties dialog box, then click OK to close the Network dialog box.
14. Click the close [X] at the upper right corner of the Control Panel window to close the window and return to the Windows NT desktop.

15. Reboot the SDCM Server to implement the changes.
16. After the operating system starts, the Begin Logon dialog box displays. Press **Ctrl-Alt-Del**. The Logon Information dialog box displays.
17. Type the default Windows NT user name and password and click OK. The Windows NT desktop opens and the SDCM Server Login dialog box displays.

Set SDCM Server Date and Time

The SDCM Manager's audit and event logs are time-stamped with the date and time from the SDCM Server. Use these steps to set the date and time on the SDCM Server.

1. At the Windows NT desktop, click the Start button, then select Settings > Control Panel. Double-click the Date/Time icon. The Date/Time Properties dialog box displays, see [Figure 2-19](#).

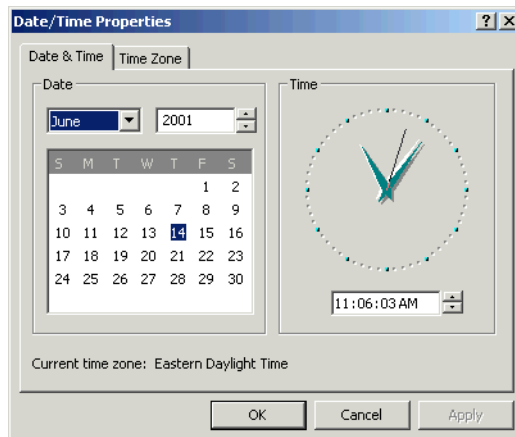


Figure 2-19: Date/Time properties

NOTE: The Time Zone field must be set before the Date & Time field.

2. At the Date/Time Properties dialog box, click the Time Zone tab. The dialog box displays with the Time Zone page open. See [Figure 2-20](#).

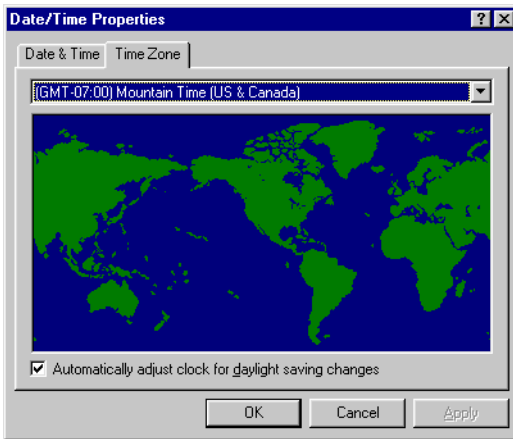


Figure 2-20: Time zone page

3. Use these steps to change the time zone.
 - a. Select the appropriate time zone from the drop-down list at the top of the dialog box.
 - b. If instructed by the customer's system administrator, select the Automatically adjust clock for daylight saving changes checkbox.
 - c. Click Apply. Record time zone and daylight savings information for reference.
4. At the Date/Time Properties dialog box, click the Date & Time tab. The dialog box displays with the Date & Time page open.
5. Use these steps to change the date and time.
 - a. Select the month from the drop-down list under Date.
 - b. Click the up or down arrow adjacent to the year field and select the desired year.
 - c. Click the day on the calendar to select the desired date.
 - d. Click in the time field and enter the desired time, then click the up or down arrow and select AM or PM.
 - e. Click Apply.
6. Click OK to close the Date/Time Properties dialog box.
7. Click the close [X] button at the upper right corner of the Control Panel window to close the window and return to the Windows NT desktop.

Assign SDCM User Names and Passwords

Follow these steps to assign SDCM user names and passwords.

NOTE: Prior to setting SDCM user names and passwords, verify that the appropriate Windows NT user accounts have been set up for the SDCM Server.

1. At the Windows NT desktop, the SDCM Manager Login dialog box displays. See [Figure 2-21](#).

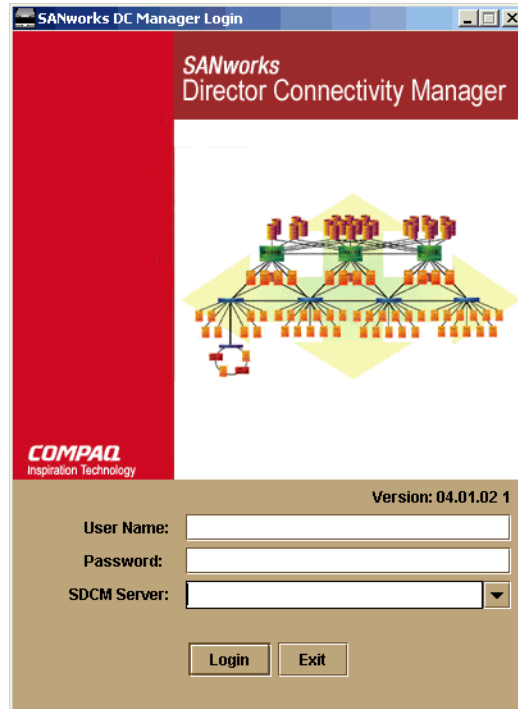


Figure 2-21: SDCM Manager login

2. Type the default user name and password and select an SDCM Server from the SDCM Server drop-down list.

NOTE: The default user name is Administrator and the default password is password. The user name and password are case-sensitive.

3. Click the Login button. The Product View displays. See [Figure 2-22](#).



Figure 2-22: Product View

4. Click the Configure icon at the navigation control panel and select Users from the pop-up menu. The Configure Users dialog box displays. See [Figure 2-23](#).

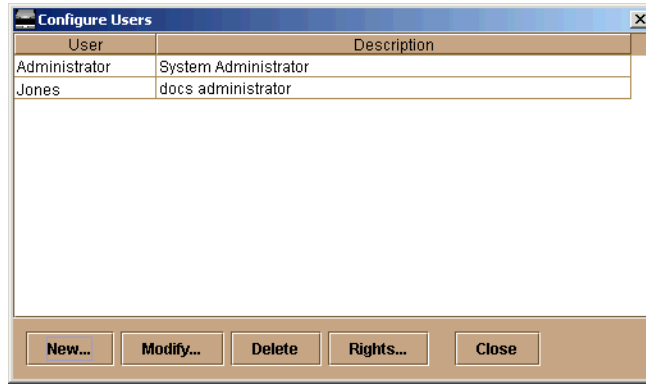


Figure 2-23: Configure Users dialog box

5. Click New. The New User dialog box displays. See [Figure 2-24](#).

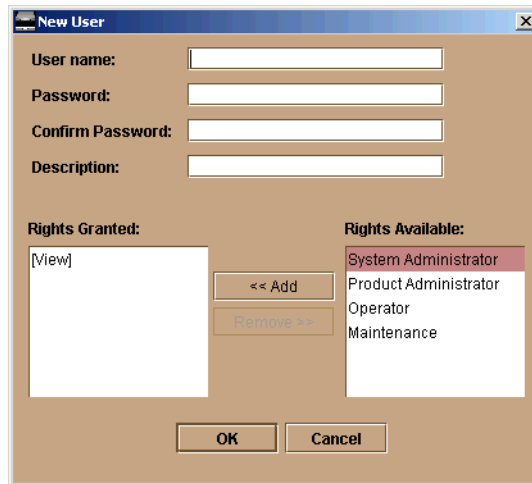


Figure 2-24: New User dialog box

6. Enter the following information, as directed by the customer.
 - a. User name—Click in this field and type a new user name up to 16 alphanumeric characters in length. Control characters and spaces are not valid. The user name is case-sensitive.

- b. Password—Click in this field and type a password up to 16 alphanumeric characters in length. Control characters and spaces are not valid. The password is case-sensitive.
 - c. Confirm Password—To confirm that the password is entered correctly, click in this field and enter the password exactly as in the Password field. If an incorrect keystroke is entered, use the **Backspace** key to delete individual letters or select (highlight) the entire entry and use the **Delete** key.
 - d. Description—*Optional*. Type a user description, such as location, department, function, or other information. Enter a description of 64 or fewer characters. Control characters and spaces are not valid.
 - e. Rights Granted/Rights Available—Lists all rights categories granted to a user. For a new user, only View displays in the Rights Granted field. The Rights Available field lists all rights categories not granted to a user.
7. To grant rights, select a category in the Rights Available field and click Add.
 8. To remove rights, select a category in the Rights Granted field, then click Remove. Since the View option is granted to all users, it cannot be removed from the Rights Granted field.

NOTE: For a description of rights categories available for users, refer to Chapter 5 of the *Compaq SANworks Director Connectivity Manager User Guide*.
 9. Click OK to accept the information.
 10. Repeat step 4 through step 6 as required to assign multiple user names and passwords.
 11. When finished, click Close.

Enabling SDCM to Manage the Director

To manage a new Director, it must be recognized by the SDCM application. Follow these steps to enable SDCM to recognize a new Director.

1. Click the Configure icon at the navigation control panel and select New Product from the pop-up menu. The New Product dialog box displays. See [Figure 2-25](#).

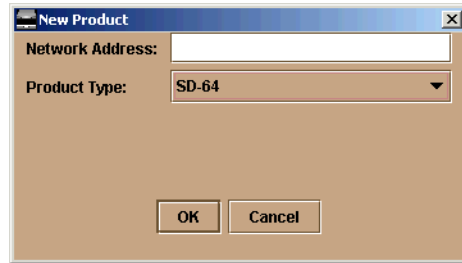


Figure 2-25: New Product dialog box




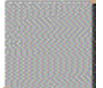
2. Type the IP address you configured earlier, see [Configure Network Information](#) on [Page 2-16](#).
3. Select SAN Director 64 from the Product Type field and click OK. A new Director icon displays at the Product View.
4. Repeat steps 1 through 3 for each new Director.

Verify Communication Between the Director and SDCM Server

Follow these steps to check Director-to-server communication.

1. At the Windows NT desktop, click the SDCM button at the task bar (bottom of the desktop) to maximize the Product View.
2. At the Product View, take note of the shape and color of the symbol behind the Director icon. [Table 2-2](#) explains the symbols.

Table 2-2: Director Operational States and Symbols

Operational State	Symbol
Operational—Director-to-server communication has been established, the Director is operational, and no failures are indicated.	
Degraded—Director-to-server communication has been established, but the Director is operating in degraded mode and requires service. This condition is typical if a port or redundant FRU fails. Go to step 3.	
Failed—Director-to-server communication has been established, but the Director failed and requires immediate service. Go to step 3.	
Status Unknown—the Director status is unknown because of a network communication failure between the Director and SDCM Server. Go to step 3.	

3. Click the SAN Director 64 icon. The Hardware View for the selected Director displays, see [Figure 2-26](#). In the example, FRU failures are indicated by blinking red and yellow diamonds, and Director degradation is indicated by the yellow triangle at the alert panel.
4. Check Director status at the Hardware View and complete one of the following steps.
 - a. If the Director appears operational (no FRU alert symbols and a green circle at the alert panel), go to the section, “Set Director Date and Time.”

- b. If Director operation appears degraded or a Director failure is indicated (FRU alert symbols and a yellow triangle or red diamond at the alert panel), refer to the *Compaq StorageWorks SAN Director 64 Service Manual*, “Maintenance Analysis Procedures” section.

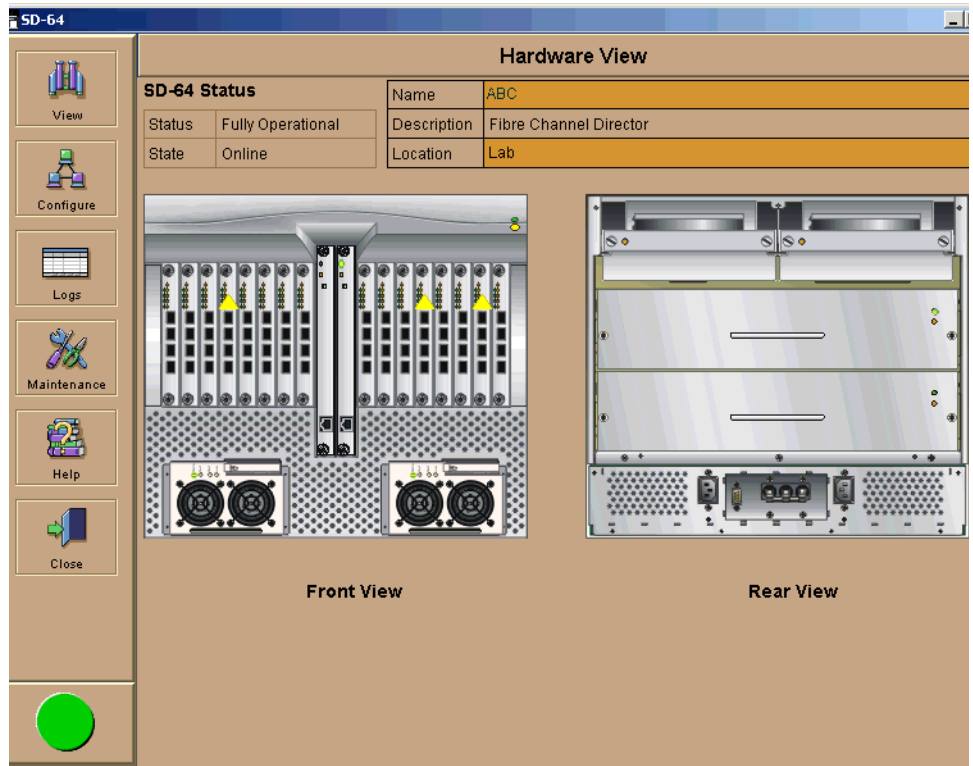


Figure 2-26: Hardware View (with FRU failures)

Set Director Date and Time

SAN Director 64 Product Manager log entries are stamped with the date and time received from the Director. Use these steps to set the effective date and time for the Director.

1. At the Hardware View for the selected Director, click the Configure icon at the navigation control panel.

2. Select Date/Time from the pop-up menu. The Configure Date and Time dialog box displays. See [Figure 2-27](#).

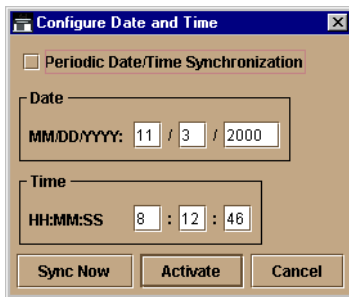


Figure 2-27: Configure Date and Time dialog box

Set Director date and time manually, or set for periodic updates. See the following sections for specific instructions.

NOTE: The Director and SDCM synchronize at least once daily.

Set Date and Time Manually

Use these steps to set the Director date and time manually.

1. At the Configure Date and Time dialog box, click the Periodic Date/Time Synchronization checkbox to deselect the option (no check mark in the box). The greyed-out Date and Time fields activate.
2. Click the Date fields that require change, and type numbers in the following ranges:
 Month (MM): 1 through 12
 Day (DD): 1 through 31
 Year (YYYY): greater than 1980
3. Click the Time fields that require change, and type numbers in the following ranges:
 Hour (HH): 0 through 23
 Minute (MM): 0 through 59
 Second (SS): 0 through 59
4. Click Activate to set the Director date and time, and close the Configure Date and Time dialog box.

Synchronize Date and Time

Use these steps to set the Director to periodically synchronize date and time with SDCM.

1. At the Configure Date and Time dialog box, click the Periodic Date/Time Synchronization checkbox to select the option (check mark in the box). The Date and Time fields are greyed-out and not selectable.
2. Click Activate to enable synchronization and close the Configure Date and Time dialog box. The Director date and time synchronize with the SDCM date and time at the next update period (at least once daily).
3. Click the Sync Now button to synchronize the Director and SDCM immediately. The Date and Time Synced dialog box displays.
4. Click OK.
5. Click Activate to enable synchronization and close the Configure Date and Time dialog box.

Frequently Used SDCM Settings

This section summarizes the most common SDCM tasks, as follows.

NOTE: For a complete reference on SDCM functionality, refer to the *Compaq SANworks Director Connectivity Manager User Guide*.

- Set the director online
- Set the director offline
- Configure director identification
- Configure operating mode
- Configure operating parameters
- Configure ports (Open Systems Mode)
- Configure SNMP Trap message recipients
- Configure and enable email notification
- Configure director ports
- Configure and Enable Call-Home
- Configure threshold alerts
- Enable EWS
- Enable telnet

Set the Director Online

When the director is set online, an attached device can log into the director if the port is not blocked. Attached devices can communicate with each other if they are configured in the same zone. Use these steps to set the director online.

1. Open SDCM. The Product View displays.
2. Select the appropriate director icon. The Hardware View for the selected director displays.
3. At the navigation control panel, select the Set Online State option from the Maintenance icon. If the director is offline, the Set Online State dialog box displays, indicating the status is offline.
4. Click Set Online. A Warning dialog box displays, indicating status is online.
5. Click OK. The Status table displays Online.

Set the Director Offline

When the SAN Director 64 is set offline, all ports are set offline. The director transmits the offline sequence (OLS) to attached devices, and the devices cannot log in to the director. Use these steps to set the director offline.

1. Notify the customer that the director is going offline.
2. Open SDCM. The Product View displays.
3. Select the appropriate director icon. The Hardware View for the selected director displays.
4. At the navigation control panel, select the Set Online State option from the Maintenance icon. If the director is online, the Set Online State dialog box displays, indicating the status is Online.
5. Click Set Offline. A Warning dialog box displays, indicating the director will be set offline.
6. Click OK.

Configure Director Identification

Perform this procedure to configure the Director name, description, location, and contact person for SDCM. The information appears in multiple dialog boxes throughout the application. In addition, the Name, Location, and Contact variables configured at the Configure Identification dialog box correspond respectively to the SNMP variables sysName, sysLocation, and sysContact. These variables are used by SNMP management workstations when obtaining data from managed Directors.

Follow these steps to configure the Director identification.

1. At the Hardware View (refer to [Figure 2-26](#)) for the selected Director, click the Configure icon at the navigation control panel and select Identification from the pop-up menu. The Configure Identification dialog box displays. See [Figure 2-28](#).

Figure 2-28: Configure Identification dialog box

- a. Type a Director name of 24 or fewer alphanumeric characters in the Name field. Each Director should be configured with a unique name.
If the Director is installed on a public LAN, the name should reflect the Director's Ethernet network DNS host name. For example, if the DNS host name is SAN64.compaq.com, the name entered in this dialog box is SAN64.
 - b. Type a Director description of 255 or fewer alphanumeric characters in the Description field.
 - c. Type the Director's physical location (255 or fewer alphanumeric characters) in the Location field.
 - d. Type the name of a contact person (255 or fewer alphanumeric characters) in the Contact field.
2. Click Activate to save the information and close the dialog box.

Configure Operating Mode

Follow these steps to configure the Director Operating Mode.

1. Verify that the Director is set offline. For instructions, refer to the “Set the Director Offline” section in this chapter.
2. At the Hardware View (refer to [Figure 2-26](#)) for the selected Director, click the Configure icon at the navigation control panel and select Operating Mode from the pop-up menu. The Configure Operating Mode dialog box displays. See [Figure 2-29](#).

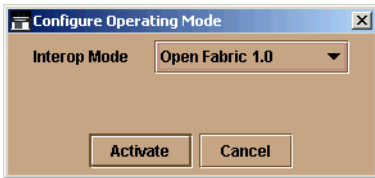


Figure 2-29: Configure Operating Mode dialog box

3. Select Open Fabric 1.0 to set the Director to Open Fabric Operating Mode.
4. Click the Activate button to save the selection and close the dialog box.

Configure Operating Parameters

Follow these steps to configure Director operating parameters, including:

- Buffer-to-Buffer credit (BB_Credit)
- Resource Allocation Time Out Value (R_A_TOV)
- Error Detect Time Out Value (E_D_TOV)
- Preferred Domain ID
- Switch Priority
- Rerouting Delay.

1. Verify that the Director is set offline. For instructions, refer to the “Set the Director Offline” section in this chapter.

2. At the Hardware View for the selected Director, click the Configure icon at the navigation control panel and select Operating Parameters from the pop-up menu. The Configure Operating Parameters dialog box displays. See [Figure 2-30](#).

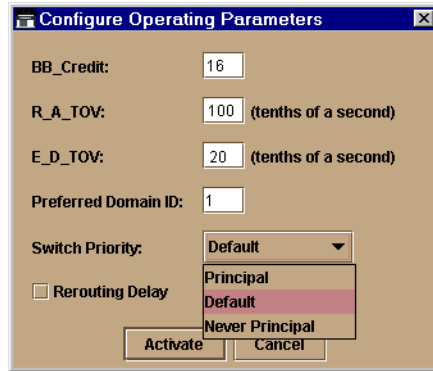


Figure 2-30: Configure Operating Parameters dialog box

- a. At the BB_Credit field, type a value between 1 and 60 buffers. Default value is 16.
- b. Resources allocated to a connection with detected errors are not released for reuse until the R_A_TOV expires. At the R_A_TOV field, type a value between 10 and 1200 tenths of a second (one through 120 seconds). The default value is 100.
- c. An error is reported if a device does not respond within the E_D_TOV specified. At the E_D_TOV field, type a value between 2 and 600 tenths of a second (0.2 through 60 seconds). The default value is 20.

NOTE: All fabric-attached Directors and switches must be set to the same R_A_TOV and E_D_TOV operating values. If the values are incompatible, the E_Port connection to the Director segments and the Director cannot communicate with the fabric. In addition, the R_A_TOV must be greater than the E_D_TOV. Compaq recommends that you obtain assistance from the Professional Services Organization prior to changing the default values.

- d. At the Preferred Domain ID field, type a value between 1 and 31 (default is 1). The domain ID uniquely identifies each Director or switch in a fabric.

NOTE: All fabric-attached Directors and switches must have unique domain IDs. If the value is not unique, the E_Port connection to the Director segments and the Director cannot communicate with the fabric.

- e. At the **Switch Priority** field, select **Principal**, **Never Principal**, or **Default** (the default setting is Default.) The switch priority value designates the fabric's principal switch. The principal switch is assigned a priority of 1 and controls the allocation and distribution of domain IDs for all fabric directors and switches.

NOTE: Principal is the highest priority setting, Default is the next highest, and Never Principal is the lowest priority setting. The setting Never Principal means that the switch is incapable of becoming a principal switch. If all switches are set to Principal or Default, the switch with the highest priority and the lowest WWN becomes the principal switch.

At least one switch in a multi-switch fabric must be set as Principal or Default. If all switches are set to Never Principal, all ISLs segment and the message No Principal Switch appears in the Reason field of the Port Properties dialog box.

- f. If rerouting delay is enabled, traffic is delayed through a fabric by the specified E_D_TOV value. This delay ensures Fibre Channel frames are delivered to their destination in order, even if a change to the fabric topology creates a new (shorter) transmission path. Select the Rerouting Delay checkbox to enable or disable the option. If a check mark displays, the option is enabled.
3. Click the **Activate** button to save operating parameters.

Configure Ports

Perform this procedure to define Fibre Channel port names, configure ports as blocked or unblocked, enable extended distance operation and Link Incident (LIN) alerts, and define port types.

1. At the Hardware View for the selected Director, click the Configure icon at the navigation control panel. Select Ports from the pop-up menu. The Configure Ports dialog box (open systems mode) displays.
 - a. Select a blank Name field and type a descriptive port name of 24 or fewer alphanumeric characters. Use a unique name that reflects the device connected to the port.
 - b. Click the Blocked checkbox to block or unblock a port (see [Figure 2-31](#)). A check mark in the box indicates the port is blocked. Blocking the port prevents the attached device from communicating with the Director. A blocked port continuously transmits the offline sequence.

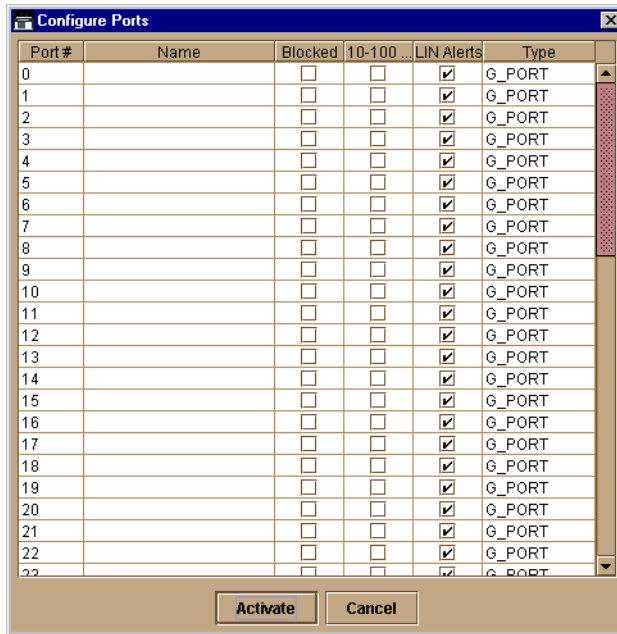


Figure 2-31: Configure Ports check boxes

- c. Click the 10-100 km checkbox to enable extended distance buffering for a port. A check mark in the box indicates the extended distance operation up to 100 kilometers (through repeaters) is enabled.
 - d. Click the LIN Alerts checkbox to enable or disable LIN alerts for a port. A check mark in the box indicates alerts are enabled. When the feature is enabled and an incident occurs on the link, an alert indicator (yellow triangle) displays at the Hardware View, Port List View, and Port Card View, and a message is sent to configured e-mail recipients. LIN alerts are enabled by default.
 - e. Select a Type field and choose generic port (G_Port), fabric port (F_Port), or expansion port (E_Port) from the list box. If F_Port or E_Port is selected, the port will only operate as the port type selected. If G_Port is selected, the port type is automatically detected and will operate as an E_Port or F_Port.
2. Use the vertical scroll bar as necessary to display additional port information rows (up to 64 ports).
 3. Click the Activate button to save the configuration information and close the dialog box.

Configure SNMP Trap Message Recipients

Use this procedure to configure community names, write authorizations, and network addresses for up to 12 SNMP trap message recipients. A trap recipient is a management workstation that receives notification through SNMP.

1. At the Hardware View for the selected Director, click the Configure icon at the navigation control panel and select SNMP Agent from the pop-up menu. The Configure SNMP dialog box displays. See [Figure 2-32](#).

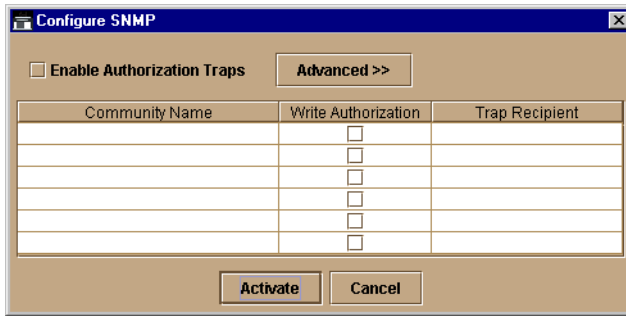


Figure 2-32: Configure SNMP dialog box

- a. For each trap recipient to be configured, type a community name of 32 or fewer alphanumeric characters in the associated Community Name field. The community name is incorporated in SNMP trap messages to ensure against unauthorized viewing or use.
- b. Click the checkbox in the Write Authorization column to enable or disable write authorization for the trap recipient (default is disabled). A check mark in the box indicates write authorization is enabled. When the feature is enabled, a management workstation user can change the SDCM Server's sysContact, sysName, and sysLocation SNMP variables.
- c. Type the IP address or DNS host name of the trap recipient (SNMP management workstation) in the associated Trap Recipient field. Use 64 or fewer alphanumeric characters. Compaq recommends using the IP address.
- d. The default user datagram protocol (UDP) port number for trap recipients is 162. To override this port number, click the Advanced button. The dialog box expands to show a UDP Port Number column. See [Figure 2-33](#).

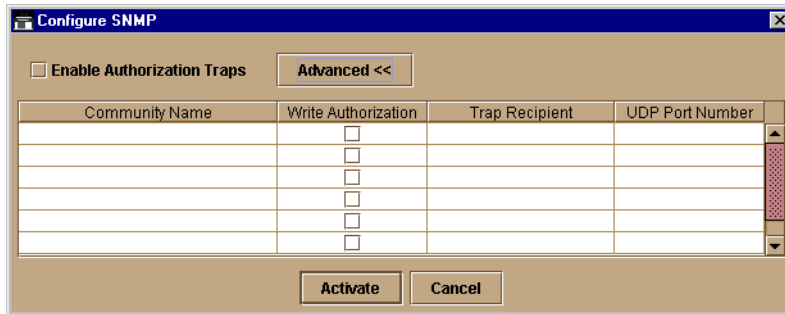


Figure 2-33: UDP Port Number column

- e. Type a decimal port number in the associated UDP Port Number field to override the default value.
2. To enable transmission of trap messages to configured SNMP management workstations, click the Enable Authorization Traps checkbox. A check mark appears in the box when transmission is enabled.
3. Click the Activate button to save the information and close the dialog box.

Configure and Enable Email Notification

Use this procedure to configure and enable e-mail addresses and Simple Mail Transfer Protocol (SMTP) server addresses to receive e-mail notification of Director (and other managed product) events. The addresses must be configured via SDCM, then enabled. See the “Test Remote Notification,” section in this chapter.

Use these steps to configure and enable e-mail and SMTP server addresses.

1. Open the Product View.

2. Click the Maintenance icon at the navigation control panel and select Configure E-Mail from the pop-up menu. The Configure E-Mail dialog box displays. See Figure 2-34.

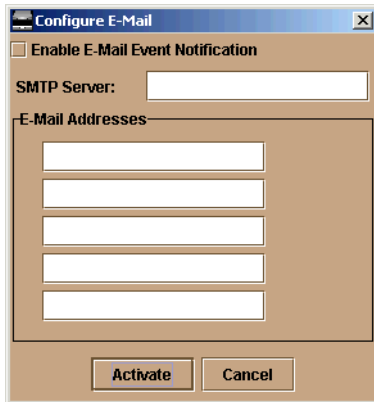


Figure 2-34: Configure E-Mail dialog box

- a. Type the IP address or DNS host name of the SMTP server in the SMTP Server field. Use 64 or fewer alphanumeric characters.
 - b. For the E-Mail Addresses fields, type the e-mail addresses of up to five recipients who should be informed of system events. Use 64 or fewer alphanumeric characters for each entry.
3. To enable e-mail transmission of configured addresses, click the Enable E-Mail Event Notification checkbox. A check mark appears in the box when transmission is enabled.
NOTE: Using SDCM, enable or disable Email Event notification for each director individually.
 4. Click the Activate button to save the information and close the dialog box.
 5. Click the SAN Director 64 icon. The Hardware View for the selected Director displays.
 6. At the Hardware View, click the Maintenance icon at the navigation control panel and select Enable E-Mail Notification from the pop-up menu. A check mark appears in the checkbox to indicate that e-mail notification for the Director is enabled.

Configure and Enable the Call-Home Feature

The SDCM Server call-home feature provides automatic event notification to a support center for reporting director problems. In order to report events, this feature requires the SDCM Server to have a valid LAN connection to a SANworks Management Appliance or other server running the Compaq Proactive Services software.

IMPORTANT: Compaq Proactive Services software is offered at no additional charge for subsystems covered under an on-site warranty or on-site storage hardware support contract. To order Proactive Services software, contact your Compaq customer service representative.

Set Up Call-Home

Use these steps to configure call-home on the SDCM Server.

NOTE: These steps are valid *only* for an initial installation.

1. Verify that the server is connected to a LAN with internet access.
2. Locate the `rns.properties` file in the following location:

`c:\Program Files\Compaq\SDCM`

Following is an example of file contents:

```
RnsDataDir=c:\SdcmData\RnsData
RnsEventDir=c:\SdcmData\RnsData
RnsLogDir=c:\SdcmData\Rnsdata
```

```
CSGIpAddress=
```

```
CSGPort=2069
```

```
CSGExePath=/ms/eventAsync
```

3. Using any ASCII text editor, such as Microsoft Notepad or Wordpad, make the following changes to the **rns.properties** file:
 - a. `CSGIpAddress`—Enter an IP address of the Compaq Services Gateway in appropriate format (xxx.xxx.xxx).
 - b. `CSGPort`—This is the port that data is sent to on the Compaq Services Gateway. By default, the value is set at 2069.
 - c. `CSGExePath`—This is the executable path that is configured in conjunction with `CSGIpAddress` and `CSGPort`. By default, the path is set to `/ms/eventAsync`.

You should only need to enter an IP address for `CSGIpAddress`, unless default values were changed on the Compaq Services Gateway.

4. Verify that call-home event notification is enabled through the SDCM Server.
 - a. In the Product, Fabric, on Session View, place the cursor over the Maintenance icon on the navigation control panel to open the Maintenance menu.
 - b. If a check mark appears in the check box, call home is enabled. If a check mark does not appear in the check box, click the menu option to add a check mark.
5. Enable Call-Home Notification for each director.
 - a. In the Hardware View for each director, place the cursor over the Maintenance icon on the navigation control panel to open the Maintenance menu.
 - b. Click the Enable Call-Home Notification option to place a check mark in the check box.
 - c. Repeat steps a and b for each director.
6. Reboot the SDCM Server.

NOTE: Rebooting the SDCM Server does not adversely effect the operation of the director or fabric.

Test Remote Notification

If the call-home and e-mail notification features are enabled, set up the SDCM application to test these remote notification features. Because the features are configured at the SDCM application, call-home and e-mail notification are enabled for multiple Directors.

NOTE: Complete the steps in the previous sections, “Configure and Enable Email Notification” and “Configure and Enable the Call-Home Feature,” prior to using test remote notification.

Use these steps to test remote notification.

1. Close the Hardware View for the Director and return to the Product View by clicking the Close icon at the navigation control panel.
2. Open Product View. Click the Maintenance icon at the navigation control panel and select Test Remote Notification from the pop-up menu. The Test Remote Notification dialog box displays. See [Figure 2-35](#).

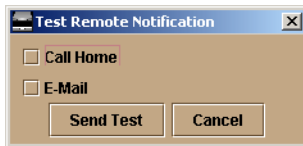


Figure 2-35: Test Remote Notification dialog box

3. Check the Call-Home and E-Mail check boxes.

4. Click the Send Test button. Call-home and e-mail test messages are transmitted and an Information dialog box displays. Click OK.
5. Verify with that the intended users received the Call-Home and E-mail notifications.

Configure Threshold Alerts

A threshold alert notifies users when the transmit (Tx) or receive (Rx) throughput reaches specified values for specific director ports or port types, (E_Ports or F_Ports).

You are notified of a threshold alert by:

- An attention indicator (yellow triangle) that displays on the port in the Port Card View.
- An attention indicator (yellow triangle) that displays on the port card in the Hardware View.
- An attention indicator (yellow triangle) that displays in the Alert column of the Port List View.
- An attention indicator (yellow triangle) that displays by the Threshold Alerts field in the Port Properties dialog box.
- Detailed threshold alert data recorded in the Threshold Alert Log.

Use the Threshold Alerts option on the Configure menu to configure the following:

- Name for the alert.
- Type of threshold for the alert (Rx, Tx, or either).
- Active or inactive state of the alert.
- Threshold criteria:
 - Percent traffic capacity utilized. This is the percent of the port's throughput capacity achieved by the measured throughput. This setting constitutes the threshold value. For example a value of 50 means that the port's threshold is reached when throughput is 50% of capacity.
 - Time interval during which throughput is measured and alert notification can occur.
 - The maximum cumulative time that the throughput percentage threshold can be exceeded during the set time interval before an alert is generated.
- Ports for which you are configuring threshold alerts.

You can configure up to 16 alerts, and any number of alerts can be active at one time.

Procedures

Use the following procedures to create a new threshold alert, or to modify, activate, deactivate, or delete an alert.

Create New Alerts

1. At the Hardware View for the selected SAN Director 64, select Threshold Alerts from the Configure menu.

The Configure Threshold Alerts dialog box displays, see [Figure 2-36](#).

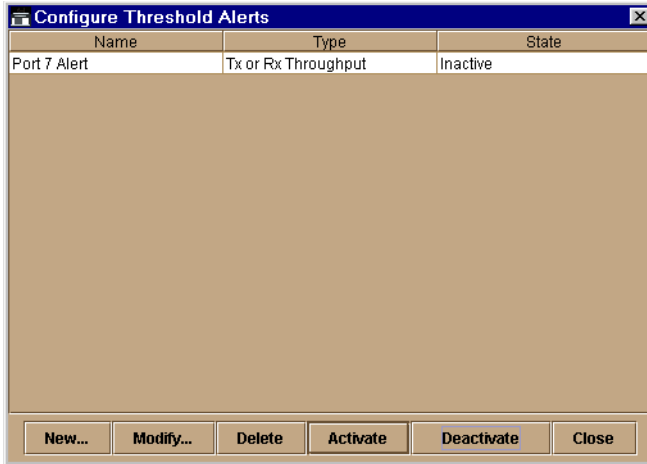
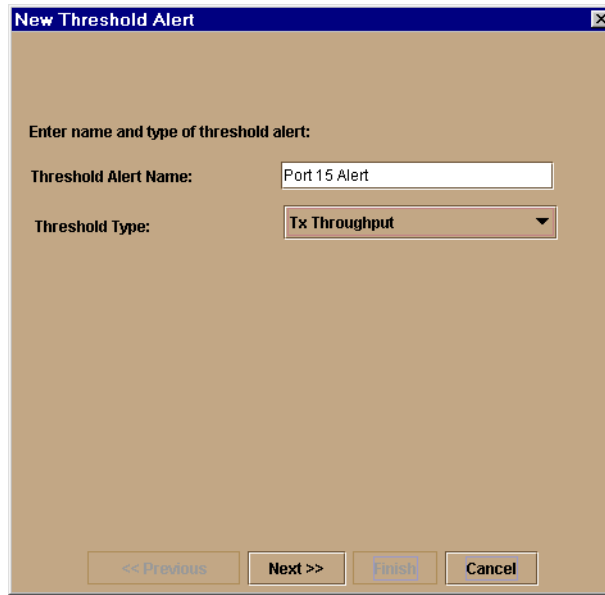


Figure 2-36: Configure Threshold Alerts dialog box

NOTE: If alerts are configured, they will display in table format showing the name of the alert, type of alert (Rx, Tx, or Rx or Tx), and alert state (inactive or active).

2. Click New.

The New Threshold Alert dialog box displays.



New Threshold Alert

Enter name and type of threshold alert:

Threshold Alert Name: Port 15 Alert

Threshold Type: Tx Throughput

<< Previous Next >> Finish Cancel

Figure 2-37: New Threshold Alerts Dialog Box - First Screen

3. Enter a name from one to 64 characters in length. All characters in the ISO Latin-1 character set, excluding control characters, are allowed.
4. Select one of the following from the drop-down list under the *Name* field:
 - Rx Throughput—An alert will occur if the threshold set for receive throughput is reached
 - Tx Throughput—An alert will occur if the threshold set for transmit throughput is reached.
 - Rx or Tx Throughput—An alert will occur if the threshold set for either receive or transmit throughput is reached.

5. Click Next.

A new screen appears with additional parameters. The name configured for the alert appears at the top of the screen.

NOTE: Click Previous if you need to return to the previous screen.

New Threshold Alert

Generate a threshold Alert named "Port 7 Alert", if Tx or Rx Throughput reaches:

15 % utilization

At any time

For more than 4 cumulative minutes

during the 10 minute notification interval.

<< Previous Next >> Finish Cancel

Figure 2-38: New Threshold Alerts Dialog Box - Second Screen

6. Enter a percentage from 1 through 100 for % utilization. When throughput reaches this percentage of port capacity, a threshold alert will occur.
7. Enter the amount of cumulative minutes in which the % utilization should exist during the notification interval before an alert is generated. You can also select *At any time* if you want an alert to occur whenever the set % utilization is reached. The valid range is 1 to the interval set in step 8 (following).
8. Enter the interval in minutes in which throughput is measured and threshold notifications can occur. The valid range is 5 minutes to 70,560 minutes.
9. Click Next.

A new screen appears for selecting ports for the alerts.

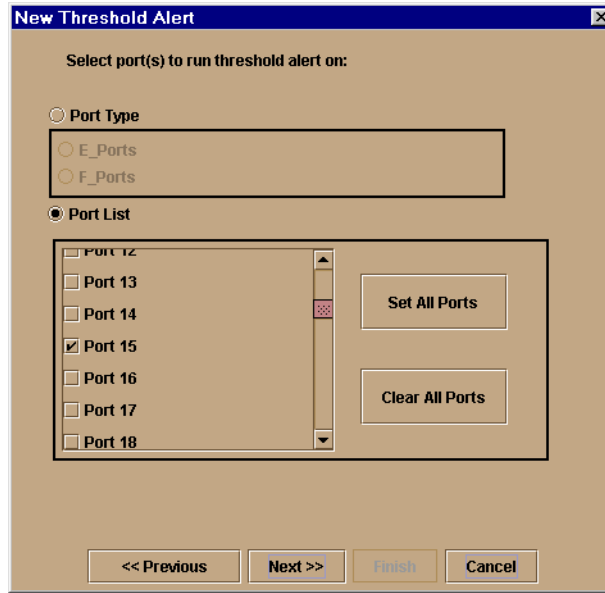


Figure 2-39: New Threshold Alerts Dialog Box - Third Screen

10. Either select Port Type or Port List.

- If you select Port Type, selecting either E_Ports or F_Ports will cause this alert to generate for all ports configured as E_Ports or F_Ports respectively.
- If you select Port List, you can select individual ports by clicking the check box by each port number or set all ports. Selecting Set All Ports places a check mark by each port number. Selecting Clear All Ports will clear the check marks by each port number.

11. Click Next.

A final screen appears to provide a summary of your alert configuration.

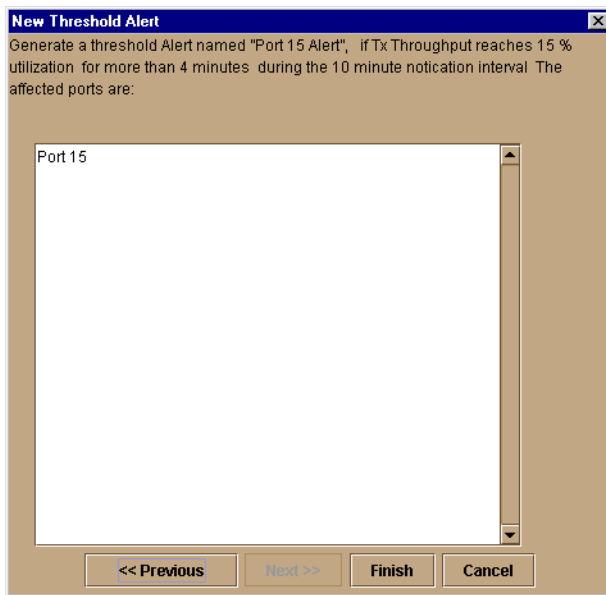


Figure 2-40: New Threshold Alerts Dialog Box - Summary Screen

12. Select Finish.

The Configure Threshold Alerts dialog box appears listing the name, type, and state of the alert that you just configured.

13. At this point, the alert is not active. To activate the alert, select the alert information that displays in the Configure Threshold Alerts table and select Activate.

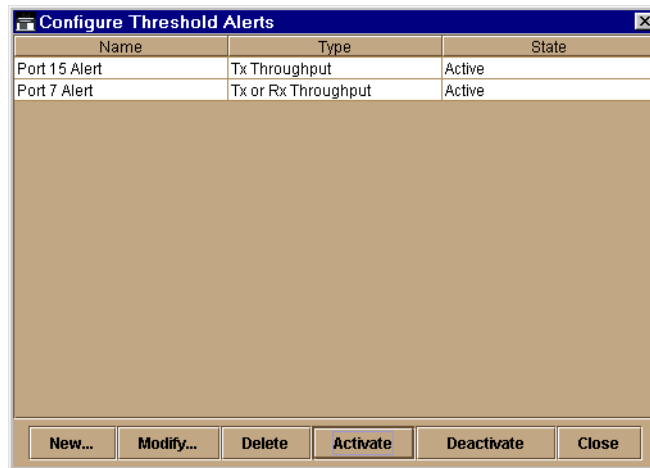


Figure 2-41: Configure Threshold Alerts Dialog Box - Alert Activated

Modify Alerts

Use the following steps to modify an existing threshold alert configuration.

- At the Hardware View for the selected director, select Threshold Alerts from the Configure menu.
The Configure Threshold Alerts dialog box displays.
- Select the alert that you want to modify by clicking the alert information in the table.
- If the alert is active, select Deactivate, then select the alert information in the table again.
- Select Modify.
If the alert is active, an error message displays prompting you deactivate the alert.
An initial Modify Threshold screen appears where you can change the threshold type.
- Select a threshold type from the drop-down list.
- Select Next when you are done. A Modify Threshold screen appears where you can change the % utilization, cumulative minutes for the threshold to occur before notification, and the time interval for measuring throughput and for alert notification.

7. Make appropriate changes, then continue through the Modify Threshold screens, making changes as necessary, until the summary screen appears displaying the alert configuration.
8. Perform either of the following steps:
 - If you need to change any parameters, select Previous and Next to display the desired Modify Threshold screen.
 - Select Finish when you are done.

Activate or Deactivate Alerts

Use the following steps to activate or deactivate existing threshold alerts. In the active state, notifications are generated for the alert. In the inactive state, notifications do not occur.

1. At the Hardware View for the selected director, select Threshold Alerts from the Configure menu.

The Configure Threshold Alerts dialog box displays. The port's current state, inactive or active, is listed under the *State* column.
2. To change the state, select the alert by the alert information in the table.
3. If the alert is active, select Deactivate to change to the inactive state. If the alert is inactive, select Activate to change to the active state.

Delete Alerts

Use the following steps to delete existing threshold alerts.

1. At the Hardware View for the selected director, select Threshold Alerts from the Configure menu.

The Configure Threshold Alerts dialog box displays.
2. Select the alert that you want to delete by selecting the alert information in the table.
3. Select Delete.

A message displays asking you to confirm the deletion.
4. Select Yes. The alert is removed from the dialog box.

Enable Embedded Web Server

At the Hardware View for the selected director, select Enable Web Server from the Configure menu. Selecting Enable Web Server automatically places a check mark in the check box. Select Enable Web Server again to remove the check mark and disable the EWS interface. When disabled, remote users cannot access the interface.

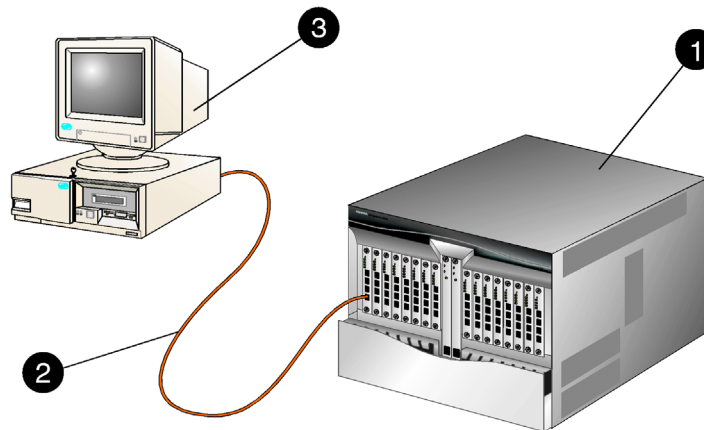
Enable Telnet

At the Hardware View for the selected director, select Enable Telnet from the Configure menu. Selecting Enable Telnet automatically places a check mark in the check box. Select Enable Telnet again to remove the check mark and disable telnet access. When disabled, remote users cannot access the director through telnet.

Connect Cables to the Fibre Channel Ports

Use these steps to connect Fibre Channel port cables.

1. Route the fiber-optic cables from customer-specified devices to ports at the front of the SAN Director 64. See [Figure 2-42](#).



① Director

② Fibre Channel Cables

③ Workstation

SHR-2271

Figure 2-42: Connect the Fibre Channel cables

2. Connect device cables to ports and route the cables through the cable management assembly at the bottom front of the director. Start with the center FPM cards (cards 7 and 8) adjacent to the CTP cards and work outward. In addition, start with the bottom port of each FPM card and work upward.
3. Bundle Fibre Channel cables from the Director and other equipment (groups of 16 maximum), and secure them as directed by the customer.
4. Set the Director online. For instructions, refer to the “Set the Director Online” section in this chapter.

Connect the Director to a Fabric

To attach the Director to a multi-switch fabric, connect the Director to an E_Port of another Director or switch. The E_Port to E_Port connection is referred to as an ISL.

Use these steps to fabric-attach the Director and create an ISL.

1. Verify that the Director is defined via SDCM. See the “Enabling SDCM to Manage the Director” section in this chapter.
2. Verify that the preferred domain ID for the Director is unique and does not conflict with the ID of another Director or switch participating in the fabric. To change the domain ID, refer to the “Configure Operating Parameters” section in this chapter.
3. Verify that the R_A_TOV and E_D_TOV values for the Director are identical to the values for all Directors and switches participating in the fabric.
4. Route a multimode or single-mode fiber-optic cable (depending on the ISL distance between directors) between customer-specified E_Ports of both Directors.
5. At the Product View, click the SAN Director 64 icon. The Hardware View for the selected Director displays.
6. Click the FPM card graphic supporting the E_Port connection to open the Port Card View.

7. Click the E_Port connector to open the Port Properties dialog box. See [Figure 2-43](#).

Port Number	3
Port Name	
Type	F_Port
Fibre Channel Address	010713
Port WWN	McDATA-20:07:08:00:88:00:21:00
Attached Port WWN	Emulex-20:03:00:00:C9:00:00:00
Block Configuration	Unblocked
10-100 km Configuration	Off
LIN Alerts Configuration	On
Beaconing	Off
Link Incident	None
Operational State	Online
Reason	N/A

Figure 2-43: Port Properties dialog box

8. Verify that the Link Incident field displays None and the Segmentation Reason field is blank or displays N/A. If an ISL segmentation or other problem is indicated, consult the *Compaq StorageWorks SAN Director 64 Service Manual* to isolate the problem. If no problems are indicated, installation is complete.

Using SDCM from a Remote Location

Read this section for information on installing the SDCM client on a remote workstation.

Remote Workstation Minimum Requirements

The following minimum requirements must be met in order to install SDCM on a remote workstation.

- Windows, UNIX or Workstation with color monitor, keyboard, and mouse using:
 - Intel Pentium processor with a 200 MHz or greater clock speed, and the Microsoft Windows 95, Windows 98, Windows 2000, Windows NT 4.0, Unix, or Linux 2.2 operating system.
 - Hewlett-Packard HA PA-RISC processor with a 360 MHz or greater clock speed, using the HP-UX 11 or higher operating system.

- ❑ Sun Microsystems UltraPARC-II processor with a 300 MHz or greater clock speed, using the SunOS Version 5.5.1 or higher operating system, or Solaris Version 2.5.1 or higher operating system.
- ❑ IBM PowerPC microprocessor with a 233 MHz or greater clock speed, or POWER3 microprocessor with a 333 MHz or greater clock speed, using the AIX Version 4.3.3 or higher operating system.
- At least 15 MB available on the internal hard drive.
- 32 MB or greater RAM.
- Video card supporting 256 colors at 800 x 600 pixel resolution.
- Ethernet network adapter.
- Java-enabled Internet browser, such as Microsoft Internet Explorer (Version 4.0 or later) or Netscape Navigator (Version 4.0 or later).

IMPORTANT: In order for SDCM to function properly, compatible versions must be installed on both the client and server machines.

Install SDCM Client on a Remote Workstation

Use these steps to install SDCM on a remote client.

1. Verify the workstation and the Ethernet LAN segment (with the SAN Director 64 attached) are connected through the Internet.
2. At the workstation, launch the browser application.
3. At the browser, type the SDCM Server IP address.
4. The SDCM splash screen displays with the following options, see [Figure 2-44](#).
 - a. Install SDCM Manager remote client application—select this option to install the application for your workstation platform.

- b. Download SNMP Management Information Base (MIB) files—These MIB files are provided in standard ASN.1 syntax and may be installed into the MIB database of any SNMPv2 compliant Network Management Station.



Figure 2-44: SDCM remote client install

5. To install the remote client application, scroll down to the information that pertains to your platform, and follow the instructions provided.
6. After you have downloaded the installer executable, the InstallAnywhere Wizard displays. Follow the instructions provided to continue the installation.

Launch SDCM from the Remote Client

Use these steps to launch SDCM from a remote client.

1. Double click the SDCM icon to launch SDCM.
2. The SDCM Login screen displays. Type the user name and password.
3. Select an SDCM Server from the SDCM Server drop-down list.

NOTE: The default user name is Administrator. The default password is password. Both user name and password are case-sensitive.

4. Click the Login button. The Product View displays.

Using the Network View Management Tool

Network View is a management application that runs on the SAN Appliance. If installed in your network, Network View provides easy access to SAN Director 64 management applications, including EWS and SDCM. Additional Network View features include:

- Track performance of SAN devices and connections
- Distribution analysis on SAN devices
- Management of devices in zones
- Network map of SAN devices and connections
- Alert and notification functions for all devices on a SAN

NOTE: This section lists Network View procedures relative to the SAN Director 64 switch only. For more detailed information on Network View, refer to the *Network View Installation Guide*, Part Number PNAA-RP8AB-TE.

Accessing the Network View Management Tool

Use these steps to access Network View from the SAN Appliance already running in your network.

1. Access your browser. Type the SAN Appliance IP address and port number.
2. Type your username and password at the Login.

NOTE: The default username is administrator. The default password is administrator.

The Open SAN Manager window displays.

3. Click OK.
4. Click the Applications folder.
5. Click the Network Utilities folder.
6. Click the Network View icon. See [Figure 2-45](#).
7. Click the Launch button. See [Figure 2-46](#). The SAN Topology screen displays.

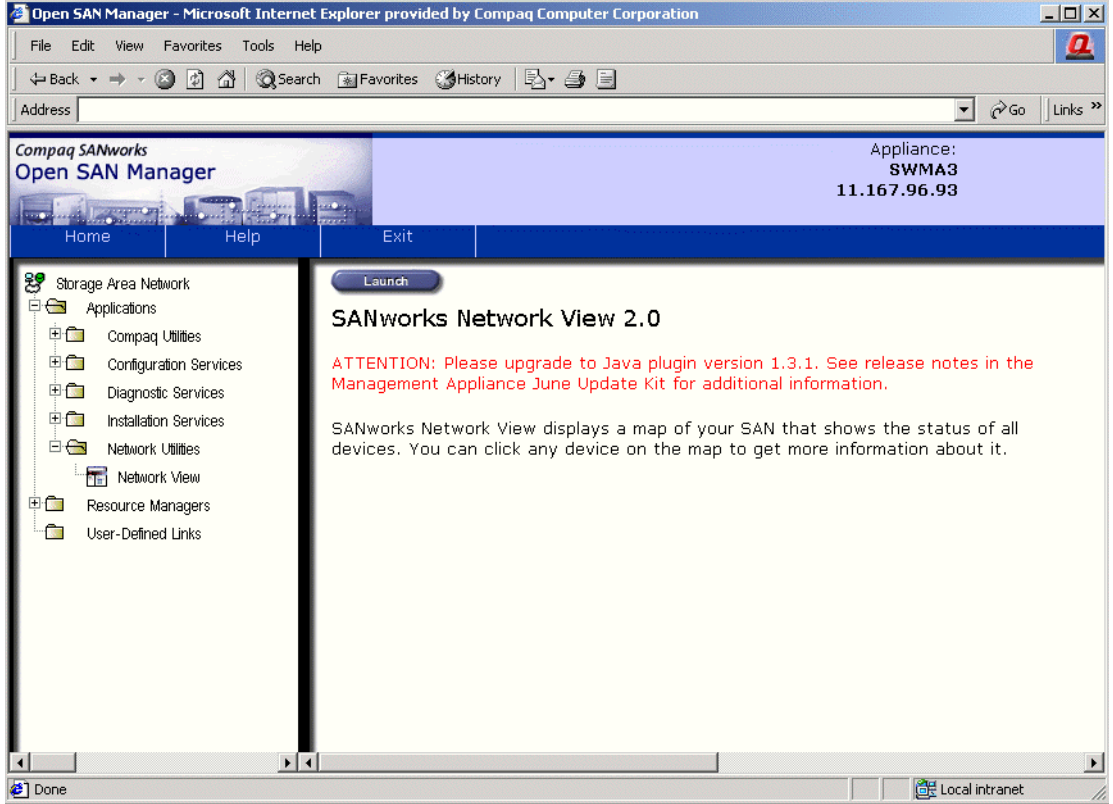


Figure 2-45: Open SAN Manager window

8. Use Network View to discover the SDCM Server as follows.
 - a. At the Session Pane, click the Configure button.
 - b. Add the IP address of the SDCM Server.
 - c. Click the Start Discovery button.
 - d. Click OK.

Launching EWS from Network View

Use these steps to access EWS from Network View.

1. At the SAN Topology screen, double-click the SAN Director 64 icon.

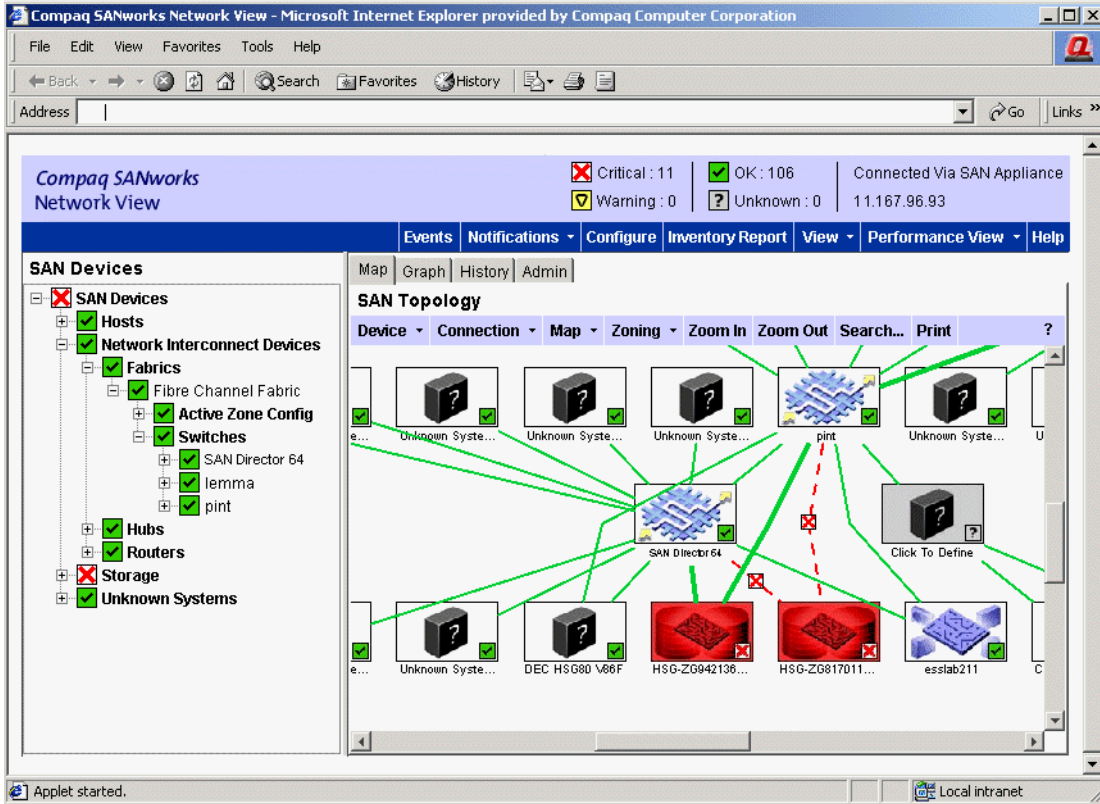


Figure 2-46: Network View, SAN Topology screen

2. Type your username and password at the Login. The default username is Administrator. The default password is password.
3. To view SAN Director 64 properties, right click the SAN Director 64 icon, and select Properties from the drop-down list. See [Figure 2-47](#).

NOTE: The appearance and behavior of the window as shown in Figure 2-39 is based on the device. The properties that are known to Network View, such as display names and device types, are displayed. For each device, a different set of properties is displayed.

The screenshot shows a Java Applet Window titled "Switch Properties". The window contains the following information:

Switch Properties	
Name:	SAN Director 64
Status:	<input checked="" type="checkbox"/> OK
Serial Number:	3A14DRXZM019
Number of Ports:	32
Vendor:	
TCP/IP Address:	11.167.71.26
TCP/IP Host Name:	SAN Director 64
World Wide Node Name:	10:69:69:60:69:12:2E:24
Last Polled At:	Thu Oct 02 19:47:07 EDT 2001
SNMP Read Community:	public
SNMP Write Community:	public
Polling Rate:	30 Seconds
Device Management URL:	http://ElementMgr/WebAgent/Switch@/index.html <input type="button" value="Go"/>
Related URL:	http://www.compaq.com/storage <input type="button" value="Go"/>
Location:	End User Premise
Contact:	Field Support
Notes:	

At the bottom of the window are buttons for **OK**, **Cancel**, and **Print**. The status bar at the bottom left indicates "Java Applet Window".

Figure 2-47: Switch Properties window

Launching SDCM from Network View

Use these steps to access or install SDCM from the Network View application.

1. At the SAN Topology screen, double-click the SDCM Server icon.
2. The following prompt appears,
 - Have you already installed the SDCM application?
 - Yes. The application has been enabled. Launch it now.
 - No. The application has not been installed. Take me to the installer page.
 Select Yes or No, depending on whether or not you wish to install, or launch the application.

Chapter 3

Using EWS to Configure the Director

This chapter contains information on how to use the Embedded Web Server to define SAN Director 64 system settings. Settings include:

- Ports
- Network addresses
- Identification and contact information
- Date and time
- Operating parameters
- SNMP settings
- Passwords and user privileges.

Launch EWS

Use the following steps to launch EWS.

NOTE: Internet access and a standard Web browser is required. Compaq recommends Netscape Navigator 4.6 or higher, or Microsoft Internet Explorer 4.0 or higher.

1. Verify that the computer and Ethernet LAN segment (with the SAN Director 64 attached) connect through the Internet.
2. Launch the browser application.

3. At the browser, enter the director IP address in the Uniform Resource Locator (URL) field. The Enter Network Password dialog box displays. See [Figure 3-1](#).



Figure 3-1: Enter Network Password dialog box

4. Type the default user name and password, or the user name and password assigned by the administrator.

NOTE: The default user name is Administrator and the default password is password. The user name and password are case-sensitive.

- Click OK. EWS opens showing the View panel. See [Figure 3-2](#).

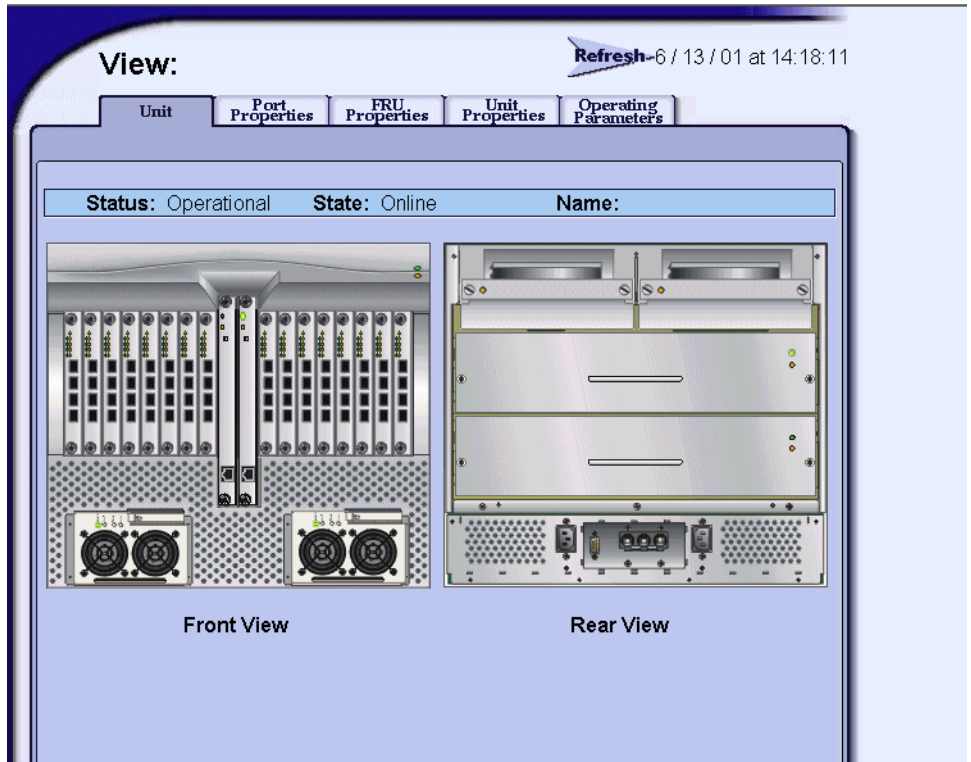


Figure 3-2: View panel

Configure Director Ports

Use this procedure to configure the names and settings for Director Fibre Channel ports.

- At the View panel, select the Configure option at the left side of the panel. The Configure panel opens with the Ports page displayed as shown in [Figure 3-3](#). Use the vertical scroll bar as necessary to display additional port information rows (up to 64 ports).
 - For each port, type a port name of 24 or fewer alphanumeric characters in the associated Name field. The port name should identify the device to which the port is attached.

- b. Click the checkbox in the Blocked column to block or unblock a port (default is unblocked). A check mark indicates a blocked port. Blocking a port prevents the attached device from communicating with the Director.

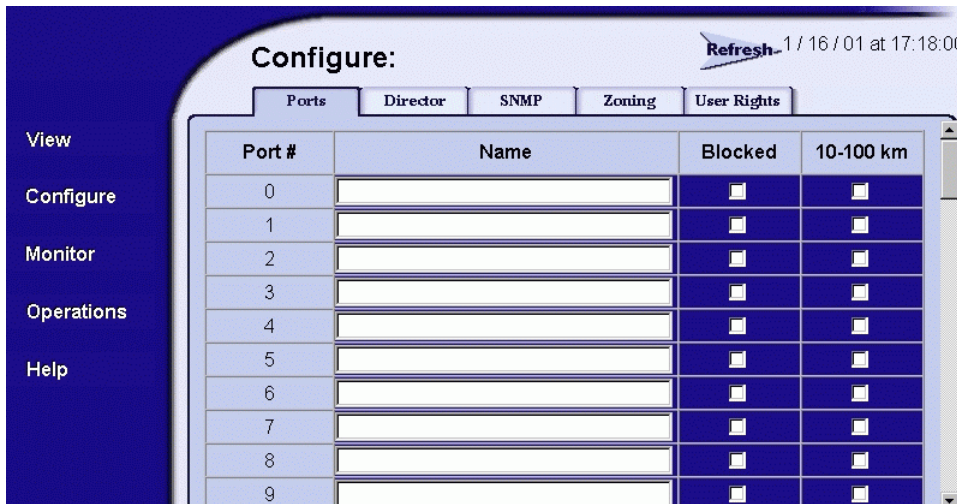


Figure 3-3: Configure ports

- c. Click the checkbox in the 10-100 km column to enable extended distance buffering for a port (the default is disabled). A check mark in the box enables extended distance operation up to 100 kilometers (through repeaters).
2. Scroll down to the bottom of the page and click the Activate button to save the information. The message “Your changes to the port configuration have been successfully activated” appears.

Configure Director Identification

Perform this procedure to configure the Director name, description, location, and contact person. The Name, Location, and Contact variables configured here correspond respectively to the SNMP variables sysName, sysLocation, and sysContact. SNMP management workstations use these variables to obtain data from Directors.

Use the following steps to configure the Director identification.

1. At the Configure panel, click the Director tab. The Director page displays with Identification selected as shown in [Figure 3-4](#).

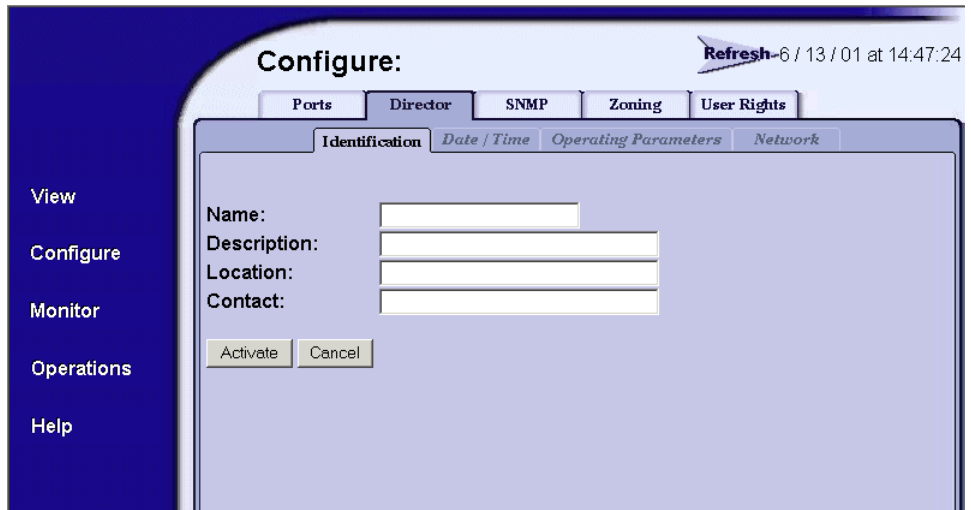


Figure 3-4: Configure Director, Identification

- a. Type a Director name of 24 or fewer alphanumeric characters in the Name field. Configure each Director with a unique name.
 - b. If the Director is installed on a public LAN, the name should reflect the Director's Ethernet network DNS host name. For example, if the DNS host name is SAN64.compaq.com, the name entered in this dialog box is SAN64.
 - c. Type a Director description of 255 or fewer alphanumeric characters in the Description field.
 - d. Type the Director's physical location (255 or fewer alphanumeric characters) in the Location field.
 - e. Type the name and phone number of a contact person (255 or fewer alphanumeric characters) in the Contact field.
2. Click the Activate button to save the information. The message "Your changes to the identification configuration have been successfully activated" appears.

Configure Date and Time

Use this procedure to configure the director date and time.

1. At the Configure panel, click the Director tab, then select the Date/Time option. The Director page displays with Date/Time selected. See [Figure 3-5](#).

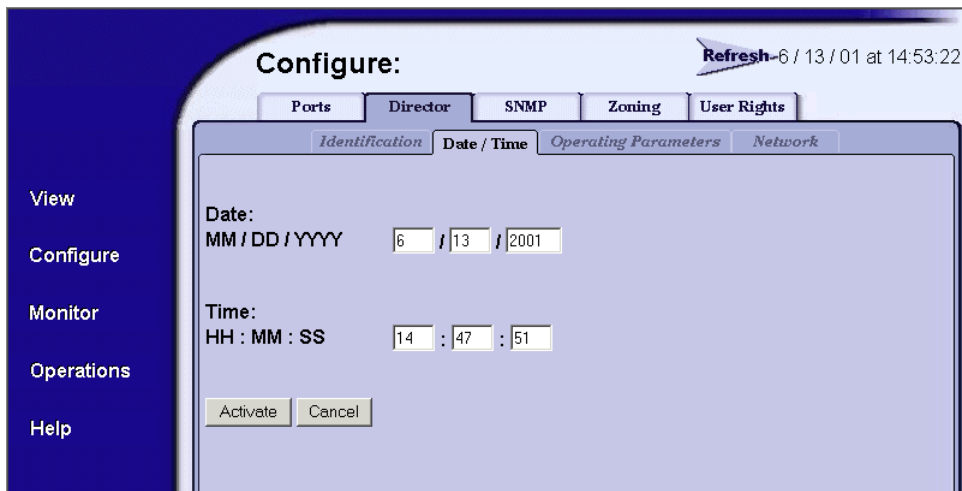


Figure 3-5: Configure Director, Date/Time

- a. Click the Date fields that require change. Type changes using the following ranges:
 - Month (MM): 1 through 12
 - Day (DD): 1 through 31
 - Year (YYYY): greater than 1980
 - b. Click the Time fields that require change. Type changes in the following ranges:
 - Hour (HH): 0 through 23
 - Minute (MM): 0 through 59
 - Second (SS): 0 through 59
2. Click the Activate button to save the information. The message “Your changes to the date/time configuration have been successfully activated” appears.

Configure Operating Parameters

Use this procedure to configure the following operating parameters.

- BB_Credit
- R_A_TOV
- E_D_TOV
- Preferred Domain ID
- Interop Mode
- Switch Priority
- Rerouting Delay

First, set the Director offline as follows.

1. At the View panel, select the Operations option at the left side of the panel. The Operations panel opens with the Port Beaconsing page displayed.
2. At the Operations panel, click the Online State tab, then click the Set Offline button. The message “Your operations changes have been successfully activated” appears. See [Figure 3-6](#).

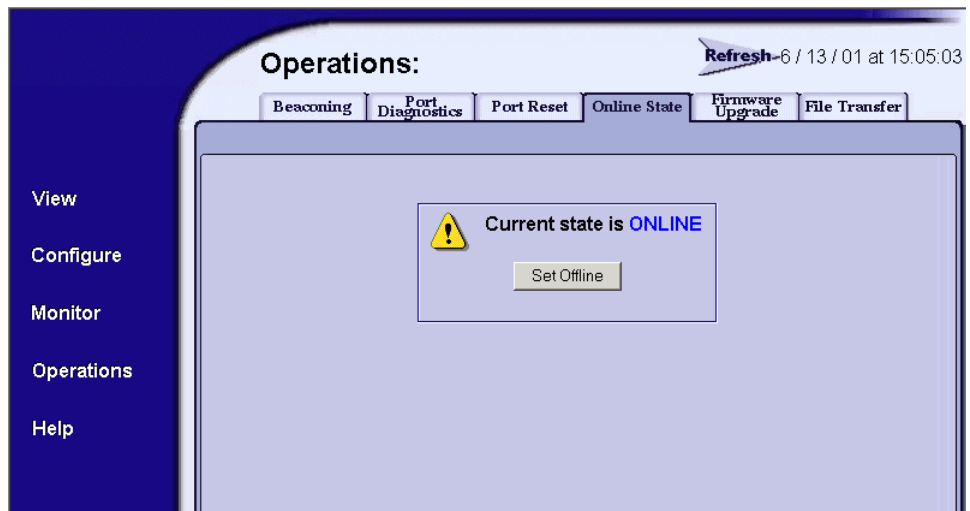


Figure 3-6: Set the Director offline

3. Next, select the Configure option at the left side of the panel. The Configure panel opens with the Ports page displayed.

4. Click the Director tab, then select the Operating Parameters option. The Director page displays with Operating Parameters selected. See Figure 3-7.

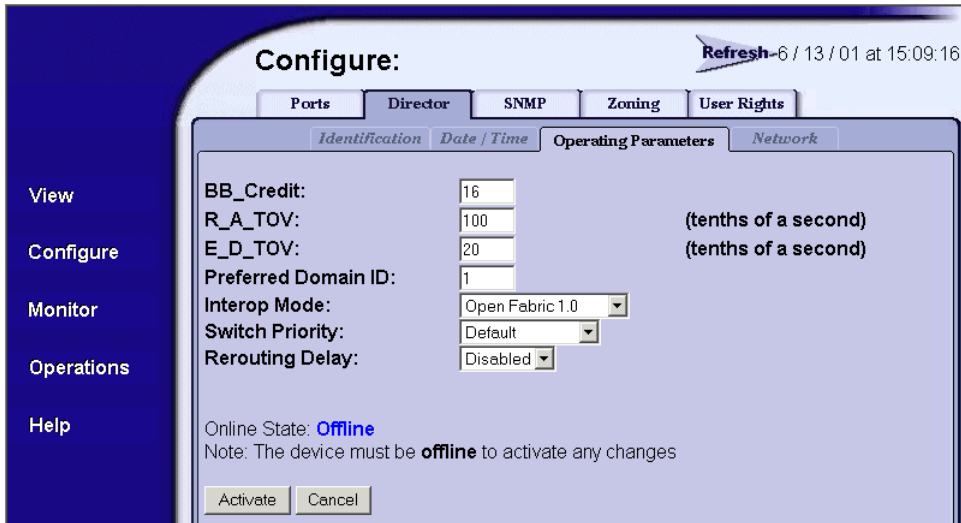


Figure 3-7: Configure Director, Operating Parameters

- a. At the BB_Credit field, type a value between 1 and 60 buffers. The default value is 16. Use a value of 60 buffers only for extended distance port operation.
- b. At the R_A_TOV field, type a value between 10 through 1200 tenths of a second (one through 120 seconds). The default value is 100.
- c. At the E_D_TOV field, type a value between 2 through 600 tenths of a second (0.2 through 60 seconds). The default value is 20.

NOTE: All fabric-attached Directors and switches must be set to the same R_A_TOV and E_D_TOV operating values. If the values are incompatible, the E_Port connection to the Director segments and the Director cannot communicate with the fabric. In addition, the R_A_TOV must be greater than the E_D_TOV. Compaq recommends that you obtain assistance from the Professional Services Organization prior to changing the default values.

- d. At the Preferred Domain ID field, type a value between 1 through 31 (default is 1). The domain ID uniquely identifies each Director or switch in a fabric.

NOTE: All fabric-attached Directors and switches must have unique domain IDs. If the value is not unique, the E_Port connection to the Director will segment and the Director will not be able to communicate with the fabric.

- e. At the Switch Priority field, select Principal, Never Principal, or Default (the default setting is Default.) The switch priority value designates the fabric's principal switch. The principal switch is assigned a priority of 1 and controls the allocation and distribution of domain IDs for all fabric directors and switches.

NOTE: Principal is the highest priority setting, Default is the next highest, and Never Principal is the lowest priority setting. The setting Never Principal means that the switch is incapable of becoming a principal switch. If all switches are set to Principal or Default, the switch with the highest priority and the lowest WWN becomes the principal switch.

At least one switch in a multi-switch fabric must be set as Principal or Default. If all switches are set to Never Principal, all ISLs segment and the message No Principal Switch appears in the Reason field of the Port Properties dialog box.

- f. Click the Rerouting Delay checkbox to enable or disable the option. A check mark signifies that the option is enabled. If Rerouting Delay is enabled, traffic is delayed through a fabric by the specified E_D_TOV time. This delay ensures that Fibre Channel frames are delivered to their destination in order, even if a change to the fabric topology creates a new, shorter transmission path.
5. Click the Activate button to save the information. The message “Your changes to the operating parameters configuration have been successfully activated” appears.
 6. Return the director to online as follows.
 - a. At the View panel, select the Operations option at the left side of the panel. The Operations panel opens with the Port Beaconsing page displayed.
 - b. At the Operations panel, click the Online State tab, then click the Set Online button. The message “Your operations changes have been successfully activated” appears.

Configure Network Information

Verify the type of LAN installation with the customer's network administrator. If one Director is installed on a dedicated LAN, network information (IP address, subnet mask, and gateway address) does not require change.

If multiple Directors are installed, or a public LAN segment is used, network information must be changed to conform to the customer's LAN addressing scheme.

Use the following steps to change a Director's IP address, subnet mask, or gateway address.

1. Select the Configure option at the left side of the panel. The Configure panel opens with the Ports page displayed.

2. At the Configure panel, click the Director tab, then select the Network option. The Director page displays with Network selected as shown in [Figure 3-8](#).

The screenshot shows the 'Configure' window with the 'Director' tab selected. Under the 'Director' tab, the 'Network' sub-tab is active. The configuration fields are as follows:

Field	Value
IP Address:	[Empty]
Subnet Mask:	[Empty]
Gateway Address:	[Empty]

Buttons: Activate, Cancel

Refresh: 6/13/01 at 15:42:29

Figure 3-8: Configure Director, Network

- a. At the IP Address field, type the new value as specified by the customer's network administrator (factory preset is 10.1.1.10).
 - b. At the Subnet Mask field, type the new value as specified by the customer's network administrator (default is 255.0.0.0).
 - c. At the Gateway Address field, type the new value as specified by the customer's network administrator (default is 0.0.0.0).
3. Click the Activate button to save the information. See [Figure 3-9](#).

Your changes to the Network configuration have been successfully activated. The following Network information has been configured to the switch:

IP Address:	10.1.1.11
Gateway Address:	0.0.0.0
Subnet Mask:	255.0.0.0

In order to re-establish your browser management connection, you must update local ARP tables on your operating system and direct your web browser to the new IP Address displayed above. Please consult the user documentation provided with this product for more information.

Figure 3-9: Activate message box

4. Update the address resolution protocol (ARP) table as follows.
 - a. Select the Close option from the File menu. The Windows desktop displays.
 - b. At the Windows desktop, click the Start button at the left side of the task bar. The Windows Workstation menu displays.
 - c. At the Windows Workstation menu, select Programs > Accessories > Command Prompt. A disk operating system (DOS) window displays.
 - d. Delete the Director's old IP address from the ARP table. At the command (C:\) prompt, type `arp -d xxx.xxx.xxx.xxx`, where `xxx.xxx.xxx.xxx` is the old IP address for the SAN Director 64.
 - e. Click the close button [X] at the upper right corner of the DOS window to close the window.

Configure SNMP Trap Message Recipients

Use this procedure to configure community names, write authorizations, and network addresses for up to 12 SNMP trap message recipients. A trap recipient is a management workstation that receives notification (through SNMP) if a Director event occurs.

1. Launch EWS. See the steps listed in the "Launch EWS" section at the beginning of this chapter.
2. If network information was configured at the browser, go to step 3. If network information was not configured, select the Configure option at the left side of the panel. The Configure panel opens with the Ports page displayed.
3. At the Configure panel, click the SNMP tab. The SNMP page displays with Standard selected. See [Figure 3-10](#).

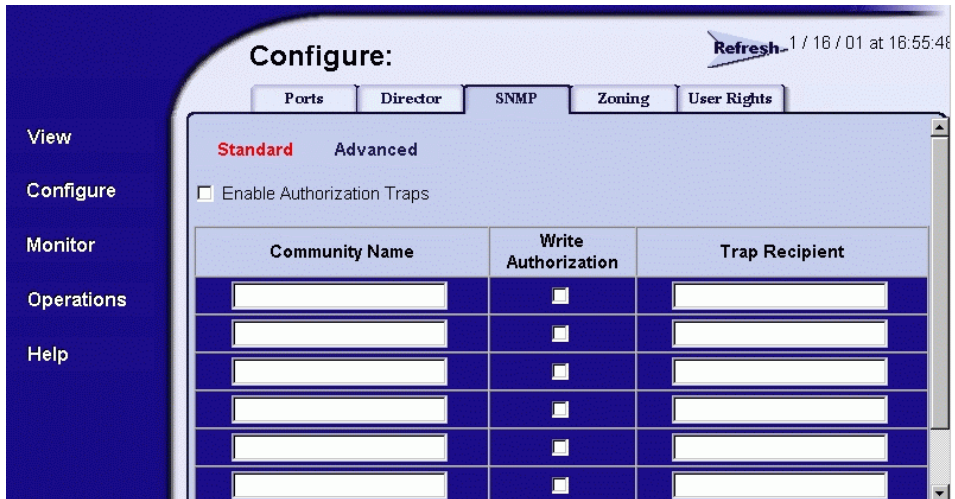


Figure 3-10: Configure SNMP

- a. For each trap recipient, type a community name of 32 or fewer alphanumeric characters in the associated Community Name field. The community name is incorporated in SNMP trap messages to prevent unauthorized viewing or use.
 - b. Click the checkbox in the Write Authorization column to enable or disable write authorization for the trap recipient (default is disabled). A check mark in the box indicates write authorization is enabled. When the feature is enabled, a management workstation user can change sysContact, sysName, and sysLocation SNMP variables.
 - c. Type the IP address or DNS host name of the trap recipient (SNMP management workstation) in the associated Trap Recipient field. Use 64 or fewer alphanumeric characters. Compaq recommends using the IP address.
 - d. The default UDP port number for trap recipients is 162. To override this port number, click the Advanced option. The dialog box expands to show a UDP Port Number column.
 - e. Type a decimal port number in the associated UDP Port Number field to override the default value.
4. Click the Activate button to save the information. The message “Your changes to the SNMP configuration have been successfully activated” appears.

Configure User Rights

Use this procedure to configure the administrator-level and operator-level passwords used to access EWS through the Username and Password Required dialog box.

1. At the Configure panel, click the User Rights tab. The User Rights page displays. See [Figure 3-11](#).

User	Access Level:	New User Name:	New Password:	Confirm New Password:
Administrator		Administrator	*****	*****
Operator		Operator	*****	*****

Buttons: Activate, Cancel

Figure 3-11: Configure User Rights

2. For the Administrator set of data fields:
 - a. Type the administrator user name (as specified by the customer's network administrator) in the New User Name field. Use 16 or fewer alphanumeric characters.
 - b. Type the administrator password (as specified by the customer's network administrator) in the New Password field. Use 16 or fewer alphanumeric characters.
 - c. Type the administrator password again in the Confirm New Password field.

3. For the Operator set of data fields:
 - a. Type the operator user name (as specified by the customer's network administrator) in the New User Name field. Use 16 or fewer alphanumeric characters.
 - b. Type the operator password (as specified by the customer's network administrator) in the New Password field. Use 16 or fewer alphanumeric characters.
 - c. Type the operator password again in the Confirm New Password field.
4. Click the Activate button to save the information. The message "Your changes to the user rights configuration have been successfully activated" appears.
5. Select the Close from the File menu to exit.

Chapter 4

Backing up Configuration Data and Upgrading Firmware

This chapter contains the following information.

- How to backup the SDCM configuration
- How to restore the SDCM Configuration
- How to manage firmware versions
- How to upgrade firmware

Back up Configuration Data

Back up of critical SDCM configuration data is provided by a third party application installed on the SDCM Server, called Iomega QuikSync. Iomega QuikSync automatically mirrors the contents of the directory on the SDCM Server hard drive. If SDCM directory contents change, or the SDCM Server is rebooted, content on the external Zip drive is updated as well. The directory contains all SDCM configuration data and is used to restore the SDCM Server operating environment in case of hard drive failure.

The SDCM data directory contains:

- SDCM configuration data (Director definitions, user names and passwords, Director date and time, operating mode, port configurations, operating parameters, SNMP recipients, and e-mail recipients).
- Log files (SDCM application logs and SAN Director 64 logs).
- Director firmware versions stored in the firmware library.

- Configuration data for the Director is stored in nonvolatile RAM on the CTP card and is backed up through SDCM. The data is recorded in the SDCM data directory each time a backup occurs.

The QuikSync application does not back up Windows NT operating system data, such as NT user names, passwords, PC date and time, and TCP/IP network information. This information was recorded while performing several installation tasks. See the “Record or Verify SDCM Server Restore Information” section in this chapter.

1. Insert a blank Zip disk into the SDCM Server’s external Zip drive.
2. Back up the Director configuration file to the SDCM Server. For instructions, refer to "Back Up Configuration" section in this chapter.
3. If the Hardware View for the Director is open, click the Close icon and return to the Product View.
4. Close SDCM. Click the Logout/Exit icon at the navigation control panel and select Exit from the pop-up menu.
5. Use these steps to reboot the SDCM Server.
 - a. At the Windows NT desktop, click the Start button at the left side of the task bar, then select Shut Down. The Shut Down Windows dialog box displays.
 - b. Select the “Restart the computer?” radio button and click Yes. The computer powers down and restarts.
 - c. After the operating system starts, the Begin Logon dialog box displays.
 - d. Press **Ctrl-Alt-Del**. The Logon Information dialog box displays.
 - e. Type a Windows NT user name and password and click the OK button. The Windows NT desktop opens and the SDCM Login dialog box displays.

NOTE: The default user name is Administrator and the default password is password. The user name and password are case-sensitive.
 - f. Type the user name and password and select a SDCM Server from the SDCM Server drop-down list.
 - g. Click the Login button. The Product View displays.

Record or Verify SDCM Server Restore Information

Configuration information must be recorded to restore the SDCM Server in case of hard drive failure. The Windows NT operating system and the applications must also be restored. Use these steps to record or verify SDCM Server configuration information.

1. Verify that the following network configuration information is recorded.
 - a. Default computer name SDCMSERVER or changed computer name is recorded.
 - b. Default or changed network addresses are recorded for the the NIC installed in the server:
 - IP address—preset factory default is 10.1.1.2
 - Subnet mask—default is 255.0.0.0
 - Gateway address—default is blank
 - c. DNS Server IP address is recorded.
2. Verify that the following date and time information is recorded.
 - a. Time zone
 - b. Daylight savings time setting, if appropriate
3. Verify that user information is recorded.
 - a. Verify that all new user information (name, description, checkbox selections) is recorded from the New User dialog box.
 - b. Verify that all changed user information (name, description, checkbox selections) is recorded from the User Properties dialog box.
4. Record the Product ID number as follows:
 - a. Minimize the Product View panel to view the Windows NT desktop.
 - b. At the Windows NT desktop, click the Start button at the left side of the task bar (bottom of the desktop), then select Settings > Control Panel. The Control Panel window displays.
 - c. At the Control Panel window, double-click the System icon. The System Properties window displays with the General page open. Record the Product ID number listed under the “Registered to:” heading.
 - d. Click the Cancel button to close the System Properties window.
 - e. Click the close button (X) at the upper right corner of the Control Panel window and return to the Windows NT desktop.

Restoring the SDCM Server

Use these steps to restore the SDCM Server.

1. Print the **readme.txt** instructions provided on the *SDCM Server Restore/Boot* CD-ROM.
2. Verify that the SDCM Server is powered off.

CAUTION: The following the instructions deletes all data from all hard drive partitions.

3. Insert the *SDCM Server Restore/Boot* CD-ROM in the CD-ROM drive and power on the server.
4. Follow the printed readme.txt instructions.

Manage Firmware Versions

The SAN Director 64 internal operating code is downloaded from the SDCM Server and stored on a CTP card. Up to eight versions can be stored on the SDCM Server hard drive and made available for download to a director. Service personnel can perform the following firmware management tasks:

- Determine the firmware version active on a director.
- Add to and maintain a library of up to eight firmware versions on the SDCM Server hard drive.
- Modify a firmware description stored on the SDCM Server hard drive.
- Delete a firmware version from the SDCM Server hard drive.
- Concurrently download a firmware version to a selected director.

Determine a Director Firmware Version

Use these steps to determine the SAN Director 64 firmware version.

1. At the SDCM Server, open the SDCM application. The Product View displays.
2. Select (click) the icon representing the switch to be inspected for firmware version. The Hardware View for the selected switch displays.
3. At the navigation control panel, select the Firmware Library option from the Maintenance icon. The StorageWorks SAN Director 64 Firmware Library dialog box displays. See [Figure 4-1](#).

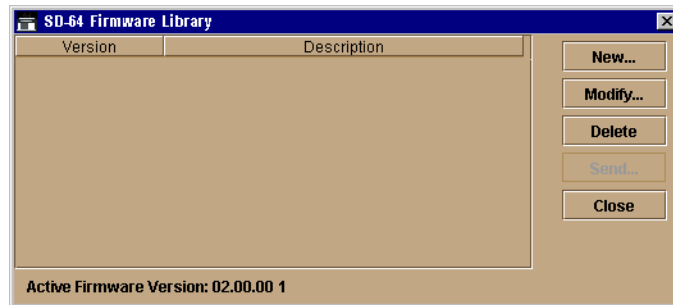


Figure 4-1: Firmware Library dialog box

4. The firmware version displays at the lower left corner of the dialog box in **XX.YY.ZZ** format, where **XX** is the version level, **YY** is the release level, and **ZZ** is the patch level.
5. Click the Close button to return to the Hardware View.

Add a Firmware Version

The firmware version shipped with the director is provided on the SAN Director 64 Documentation Kit CD. Subsequent firmware versions to upgrade the director are provided to customers through Compaq's website.

NOTE: When adding a firmware version, follow procedural information in the Release Notes that accompany the firmware version. This information supplements information provided in this general procedure.

Use these steps to add a director firmware version to the library stored on the SDCM Server hard drive.

1. Obtain the new firmware version from the Compaq website.

NOTE: The following path is subject to change.

- a. At the SDCM Server or other personal computer (PC) with Internet access, open the Compaq website. The uniform resource locator (URL) is www.compaq.com/products/storageworks/director.
 - b. Click on Firmware Downloads in left panel.
 - c. Click the SD-64 Firmware Version XX.YY.ZZ entry, where XX.YY.ZZ is the desired version. The Windows NT Save As dialog box appears.
 - d. Verify that the correct directory path is specified at the Save in field and the correct file is specified in the File name field. Click Save. The new firmware version is downloaded and saved to the SDCM Server or PC hard drive.
 - e. If the new firmware version was downloaded to a PC (not the SDCM Server), transfer the firmware version file to the SDCM Server by Zip disk, CD-ROM, or other electronic means.
2. At the SDCM Server, open the SDCM application. The Product View displays.
 3. Click the icon representing the director to which the firmware version will be added. The Hardware View for the selected director displays.
 4. At the navigation control panel, select Firmware Library from the Maintenance icon. The SD-64 Firmware Library dialog box displays. See [Figure 4-1](#).

5. Click New. The New Firmware Version dialog box displays. See [Figure 4-2](#).

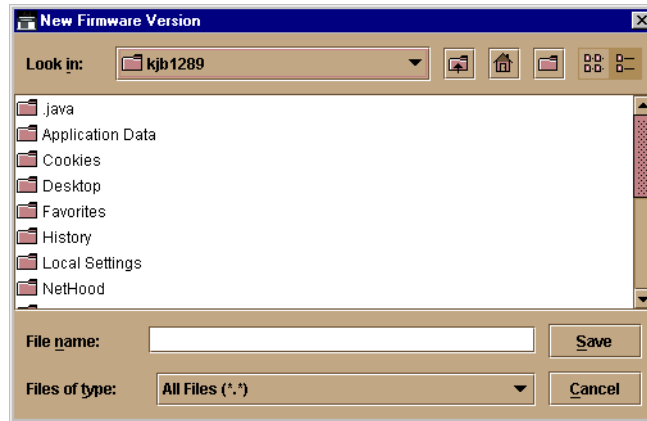


Figure 4-2: New Firmware Version dialog box

6. Select the desired firmware version file (downloaded in step 1) from the SDCM Server Zip drive, CD ROM drive, or hard drive. Verify that the correct Directory path and filename appear in the File name field and click Save. The New Firmware Description dialog box displays. See [Figure 4-3](#).

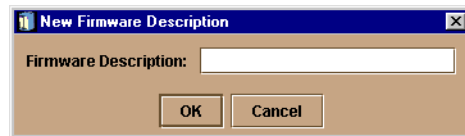


Figure 4-3: New Firmware Description dialog box

7. Enter a description (up to 24 characters in length) for the new firmware version and click OK. It is recommended the description include the installation date and text that uniquely identifies the firmware version.
8. A Transfer Complete message box appears indicating the new firmware version is stored on the SDCM Server hard drive. Click the Close button to close the message box.
9. The new firmware version and associated description appear in the SD-64 Director Firmware Library dialog box. Click the Close button to close the dialog box and return to the Product Manager application.
10. To send the firmware version to a director, refer to the “Download a Firmware Version to a Director” section later in this chapter.

Modify a Firmware Version Description

Use these steps to modify the description of a director firmware version in the library stored on the SDCM Server hard drive.

1. At the SDCM Server, open the SDCM application. The Product View displays.
2. Click the icon representing the director for which the firmware version description will be modified. The Hardware View for the selected director displays.
3. At the navigation control panel, select the Firmware option from the Maintenance icon. The SD-64 Director Firmware Library dialog box displays. See [Figure 4-4](#).

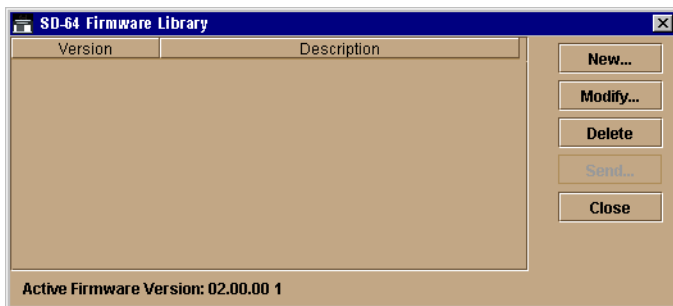


Figure 4-4: Change the firmware version

4. Select the firmware version to be modified and click the Modify button. The Modify Firmware Description dialog box displays. See [Figure 4-5](#).

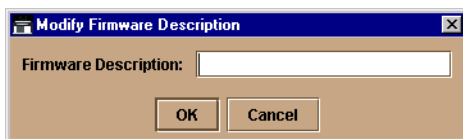


Figure 4-5: Modify Firmware Description dialog box

5. Enter a modified description (up to 24 characters in length) for the firmware version and click OK. It is recommended the description include the installation date and text that uniquely identifies the firmware version.
6. The new description for the firmware version displays in the SD-64 Director Firmware Library dialog box. Click Close to close the dialog box and return to the Product Manager application.

Delete a Firmware Version

Use these steps to delete a firmware version from the library stored on the SDCM Server hard drive.

1. At the SDCM Server, open the SDCM application. The Product View displays.
2. Click the icon representing the director from which the firmware version will be deleted. The Hardware View for the selected director displays.
3. At the navigation control panel, select the Firmware Library option from the Maintenance icon. The SD-64 Director Firmware Library dialog box displays, see [Figure 4-1](#).
4. Select the firmware version to be deleted and click Delete. A confirmation dialog box displays.
5. Click OK. The selected firmware version is deleted from the SD-64 Firmware Library dialog box.
6. Click Close to close the dialog box and return to the Product Manager application.

Download a Firmware Version to a Director

This procedure downloads a selected firmware version from the SDCM Server library to a director managed by the open instance of the Product Manager application. The procedure applies to a director with two (redundant) CTP cards. The process occurs concurrently without taking the director offline or disrupting operation. The new firmware version takes effect when control is passed from the active to the backup CTP card. Although director operation is not affected, name server, alias server, and login server functions are momentarily unavailable during CTP card switchover.

NOTE: When downloading a firmware version, follow procedural information in the Release Notes that accompany the firmware version. This information supplements information provided in this general procedure.

Use these steps to download a firmware version to a director.

1. At the SDCM Server, open the SDCM application. The Product View displays.
2. Before downloading firmware version *XX.YY.ZZ* to a director, ensure the required, compatible version of the SDCM application is running on the SDCM Server (Refer to the Release Notes that shipped with SDCM).
 - a. Select the About option from the Help icon. The About dialog box displays and lists the SDCM application version. Click OK to close the dialog box.

- b. If required, install the correct version of the SDCM application. For instructions, refer to the “Install or Upgrade Software” section in this chapter, and return here.
3. Click the icon representing the director to which the firmware version will be downloaded. The Hardware View for the selected director displays.
4. As a precaution to preserve director configuration information, complete the data collection procedure as follows.
 - a. At the SDCM Server, open the SDCM application. The Product View displays.
 - b. Click the icon representing the director for which the configuration file will be backed up. The Hardware View for the selected director displays.
 - c. At the navigation control panel, select the Backup & Restore Configuration option from the Maintenance icon. The Backup and Restore Configuration dialog box displays.
 - d. Click Backup. When the backup process finishes, the Backup Complete dialog box displays.
 - e. Click OK to close the dialog box and return to the Hardware View.
5. At the navigation control panel, select the Firmware Library option from the Maintenance menu. The SD-64 Firmware Library dialog box displays, see [Figure 4-1](#).
6. Select the firmware version to be downloaded and click Send. The send function verifies existence of certain director conditions before the download process begins. If an error occurs, a message displays indicating the problem must be fixed before firmware is downloaded. Conditions that terminate the process include:
 - A redundant CTP card failure.
 - The firmware version is being installed to the director by another user.
 - The director-to-SDCM Server link is down.

If a problem occurs and a corresponding message displays, refer to the *StorageWorks SAN Director 64 Service Manual* for specific information on isolating the problem. If no error occurs, the Send Firmware confirmation box displays. See [Figure 4-6](#).

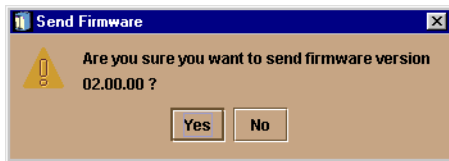


Figure 4-6: Send Firmware confirmation box

7. Click Yes. The Send Firmware dialog box displays.

As the download begins, a “Writing data to FLASH” message displays at the top of the dialog box, followed by a “Sending Files” message. This message remains as a progress bar travels across the dialog box to show percent completion of the download. The bar progresses to 50% when the last file is transmitted to the first CTP card. The bar remains at the 50% point until the director performs an Initial Program Load (IPL) (indicated by an “IPLing” message). During the IPL, the Director-to-SDCM Server link drops momentarily and the following occur at the Product Manager:

- ❑ As the network connection drops, the SD-64 Status table turns yellow, the Status field displays “No Link”, and the State field displays a reason message.
- ❑ The alert panel at the bottom of the navigation control panel displays a grey square, indicating director status is unknown.
- ❑ Illustrated FRUs in the Hardware View disappear, and appear again as the connection is re-established.

After the IPL, a “Synchronizing CTPs” message displays. This message remains as files are transmitted to the second CTP card and the progress bar travels across the dialog box to 100%. When the download reaches 100%, a “Send firmware complete” message displays.

8. Click Close to close the dialog box.
9. Click Close to close the SD-64 Firmware Library dialog box and return to the Hardware View.

Back Up the Configuration

Use these steps to back up the configuration file to the SDCM Server.

1. At the SDCM Server, open the SDCM application. The Product View displays.
2. Select the icon representing the director for which the configuration file will be backed up. The Hardware View for the selected director displays.

3. At the navigation control panel, select the Backup & Restore Configuration option from the Maintenance icon. The Backup and Restore Configuration dialog box displays. See Figure 4-7.

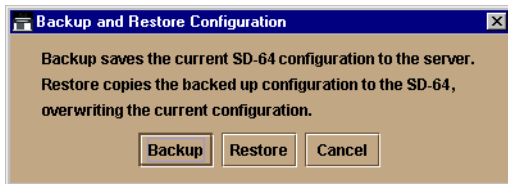


Figure 4-7: Backup and Restore Configuration dialog box

4. Click Backup. When the backup process finishes, the Backup Complete dialog box displays.
5. Click OK to close the dialog box and return to the Hardware View.

Install or Upgrade Software

This section describes the procedure to install or upgrade the SDCM application to the SDCM Server.

The SDCM application shipped with the SAN Director 64 is provided on the *SDCM Management Applications* CD-ROM. Subsequent software versions for upgrading the director are provided to customers through the *SDCM Management Applications* CD-ROM or through Compaq's website.

NOTE: When installing or upgrading a software version, follow all procedural information in the Release Notes that accompany the software version. This information supplements information provided in this general procedure.

Use these steps to install or upgrade the SDCM application and associated applications to the SDCM Server.

1. Log out of all SDCM sessions (local and remote).
2. Obtain the new software version from Compaq's website:

NOTE: The following path is subject to change.

- a. At the SDCM Server or other personal computer (PC) with Internet access, open the Compaq website. The uniform resource locator (URL) is www.compaq.com/products/storageworks/director.
- b. Click the SDCM Downloads folder in the left panel.

- c. Click the SD-64 SDCM Version XX.YY.ZZ entry, where XX.YY.ZZ is the desired version. The Windows NT Save As dialog box appears.
 - d. Verify that the correct directory path is specified at the Save in field and the correct file is specified in the File name field. Click Save. The new SDCM version is downloaded and saved to the SDCM Server or PC hard drive.
 - e. If the new SDCM version was downloaded to a PC (not the SDCM Server), transfer the SDCM version file to the SDCM Server by CD ROM or other electronic means. Continue with step 3.
3. Insert the *SDCM Applications* into the SDCM Server's CD-ROM drive.
 4. Click the Windows Start button. The Windows NT Workstation menu displays.
 5. At the Windows NT Workstation menu, select Run. The Run dialog box appears.
 6. At the Run dialog box, select the directory path (hard drive or CD-ROM drive) and filename of the executable file (*SDCM_ServerInstall.exe*) using the Browse button. The directory path and filename display in the Open field.
 7. Click OK. A series of message boxes appear as the InstallAnywhere third-party application prepares to install the SDCM software.
 8. Follow the online instructions for the InstallAnywhere program. Click Next, Install, or Done as appropriate. See [Figure 4-8](#).

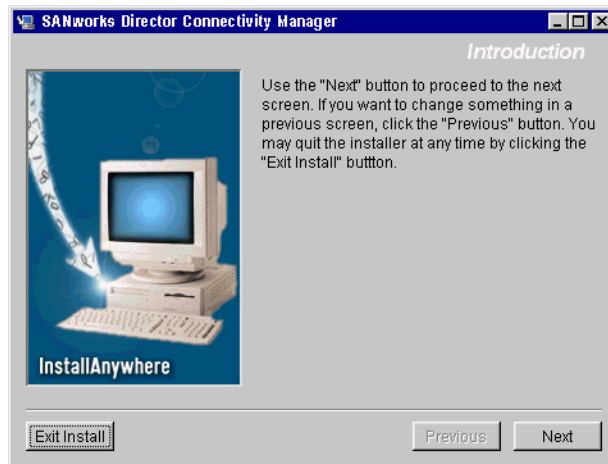


Figure 4-8: SDCM Installer window

9. Reboot the SDCM Server PC.
 - a. Press **Ctrl-Alt-Del** to display the Windows NT Logon Information dialog box.

- b. Type the user name and password and click OK. The Windows NT desktop displays.

NOTE: If required, obtain the user name and password from the customer or next level of support.

10. The SDCM application automatically opens. At the SDCM application Login screen, enter a user name, password, and SDCM Server name (all are case sensitive), and click Login. The application opens and the Product View displays.

NOTE: If required, obtain the user name, password, and SDCM Server name from the customer or next level of support.

Appendix **A**

Regulatory Compliance Notices

This appendix covers the following topics.

- Regulatory Compliance Identification Numbers
- Federal Communications Commissions Notice
- Canadian Notice (*Avis Canadien*)
- European Union Notice
- Japanese Notice
- Taiwanese Notice (July 14, 1998)
- Laser Devices

Regulatory Compliance ID Numbers

For the purpose of regulatory compliance certifications and identification, your Compaq StorageWorks SAN Director 64 is assigned a Compaq Series Number. The Compaq Series Number for this product is:

Series NA2105

The SAN Director 64 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 SAN Director 64.

Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

The rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC logo or ID on the label. After the class of the device is determined, refer to the corresponding statement in the sections below.

Class A Equipment

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.

Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or

television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Declaration of Conformity for Products Marked with FCC Logo – United States Only

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

For questions regarding your product, contact:

Compaq Computer Corporation
P. O. Box 692000, Mail Stop 530113
Houston, Texas 77269-2000

Or call 1-800-652-6672 (1-800-OK COMPAQ). (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact:

Compaq Computer Corporation
P. O. Box 661
Marlboro, MA 01752

Or call 1-800-OK COMPAQ

To identify this product, refer to the part, series, or model number found on the product.

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.

Network and Serial 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.

Class B Equipment

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

Cet appareil numérique de la classe B 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 (the equivalent international standards are in parenthesis):

- EN55022 1998 (CISPR 22)—Electromagnetic Interference

- EN55024 1998 (IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8, IEC61000-4-11)—Electromagnetic Immunity
- EN60950 (IEC950)—Product Safety
- Power Quality: (IEC61000-3-2)—Harmonics and (IEC61000-3-3)—Voltage Fluctuations and Flicker
- Also approved under UL 1950, 3rd Edition/CSA C22.2 No. 950-95, Safety of Information Technology Equipment

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。

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取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

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A情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Taiwanese Notice

警告使用者：

這是中類的資訊產品，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 Devices

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.

Laser Safety Warnings

WARNING: To reduce the risk of exposure to hazardous radiation:

- Do not try to open the laser device 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 laser device.

Compliance with CDRH Regulations

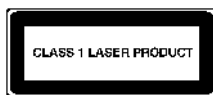
The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

Compliance with International Regulations

All Compaq systems equipped with laser devices comply with appropriate safety standards including IEC 825.

Laser Product Label

The following label or equivalent is located on the surface of the Compaq-supplied laser device.



This label indicates that the product is classified as a CLASS 1 LASER PRODUCT. This label appears on a laser device installed in your product.

Laser Information

Three configurations of cards with fixed optics will be provided for each of the connector types: four long-wave ports, four short-wave ports, and a combination card with three short-wave ports and one long-wave port. The combination boards will have the long-wave port on the bottom of the card.

Table A-1: Laser Specifications

Part Number	Transceivers on FPM Card	Wave Length	Media/ Distance	Standard
DS-DMGGD-AC	4 Long wave	1300nm	9 μ m Single-mode: 2 m—20 Km	100-SM-LL-L
DS-DMGGD-AD	4 Short wave	780nm	50 μ m Multimode: 2 m—500 m 62.5 μ m Multimode: 2 m—200 m	100-M5-SN-I 100-M6-SN-I
DS-DMGGD-AE	3 Short wave 1 Long wave		Same as above	

Appendix **B**

Technical Specifications

This appendix contains the following information.

- Dimensions
- Environmental Specifications
- Power Requirements
- Operating Tolerances

Physical Dimensions

[Table B-1](#) lists SAN Director 64 dimensions.

Table B-1: Dimensions

Dimension	Size
Height	39.9 cm (15.75 in.)
Width	44.5 cm (17.5 in.)
Depth	54.6 cm (21.5 in.)
Weight	52.3 kg (115 lb.)
Shipping Weight	76.4 kg (168 lb.)

Environmental Specifications

Table B-2 lists environmental ranges for shipping, storing and operating the SAN Director 64.

Specification	Shipping	Storage	Operating
Weight	76.4 kg (168 lb.)	52.3 kg (115 lb.)	52.3 kg (115 lb.)
Temperature	-40°F to 140°F (40°C to 60 °C)	34°F to 140°F (1°C to 60 °C)	40°F to 104°F (4°C to 40 °C)
Humidity	5% to 100%	5% to 80%	8% to 80%
Maximum wet-bulb temperature	84°F (29°C)	84°F (29°C)	81°F (27°C)
Altitude	40,000 ft (12,192 km)	10,000 ft (3,048 km)	10,000 ft (3,048 km)

Power Requirements

Table B-3 lists SAN Director 64 power requirements.

Specification	Value
Input voltage	100 to 120 or 200 to 240 VAC
Input frequency	50 to 60 Hz

Operating Tolerances

Table B-4 lists heating and cooling specifications, shock tolerances, vibration, acoustical noise and inclination.

Specification	Value
Heat dissipation	16 FPM cards (maximum): 490W (1,672 BTU/hr)
Cooling airflow clearances	Right and left sides: 5.1 cm (2.0 in) Front and rear: 7.6 cm (3.0 in) Top and bottom: No clearance required
Shock and vibration tolerance	60 Gs for 10 milliseconds without nonrecoverable errors

Table B-4: Operating Tolerances (Continued)

Specification	Value
Acoustical noise	55 dB "A" scale
Inclination	10° maximum

Electrostatic Discharge

This appendix contains the following information.

- Precautions Against Electrostatic Discharge
- Ground Methods

Precautions Against Electrostatic Discharge

To prevent damaging 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.
- Always make sure you are 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 a Compaq authorized reseller install the part.

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

Glossary

This glossary defines terms used in this guide or in other guides in this series, and is not a comprehensive glossary of computer terms.

The following cross-references are used in this glossary:

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

See. This refers the reader to another keyword or phrase for the same term.

See also. This refers the reader to additional information contained in another entry.

access control

List of all devices that can access other devices across the network and the permissions associated with that access. *See also* persistent binding and zoning.

active FRU

A field-replaceable unit that is currently operating as the active and not the backup FRU.

active zone set

Single zone set that is active in a multi-switch fabric. It is created when you enable a specified zone set. This zone set is compiled by checking for undefined zones or aliases.

agent

Software that processes queries on behalf of an application and returns replies.

alarm

SNMP message notifying an operator of a network or device problem.

alias server

Fabric software facility that supports multicast group management.

arbitration

Process of selecting one device from a collection of devices that request service simultaneously.

audit log

Log summarizing actions (audit trail) made by the user.

authentication

Verification of identity for a person or process.

backplane

The backplane provides 48 VDC power distribution and connections for all logic cards.

backup FRU

When an active FRU fails, an identical backup FRU takes over operation automatically (failover) to maintain Director and Fibre Channel link operation.

beaconing

Use of light-emitting diodes on ports, port cards, field-replaceable units, and Directors to aid in the fault-isolation process; when enabled, active beaconing will cause LEDs to flash for selected components.

BB_Credit

Also known as Buffer-to-Buffer Credit. Indicates the maximum number of frames a port can transmit without receiving a receive ready signal from the receiving device.

ber

See bit error rate.

bidirectional

In Fibre Channel, the capability to simultaneously communicate at maximum speeds (100 Mbps) in both directions over a link.

bit error rate

Ratio of received bits that contain errors to total of all bits transmitted.

blocked port

Devices communicating with the port are prevented from logging into the Director or communicating with other devices attached to the Director. A blocked port continuously transmits the offline sequence.

bridge

Device that connects and passes packets between two network segments that use the same communications protocol.

broadcast

Send a transmission to all N_Ports on a fabric.

broadcast frames

Data packet, also known as a broadcast packet, whose destination address specifies all computers on a network. *See also* multicast.

buffer

Storage area for data in transit. Buffers compensate for differences in processing speeds between devices. *See also* BB_Credit.

CHPID

See channel path identifier.

call-home

Product feature which enables the SDCM Server to automatically contact a support center and report system problems. The support center server accepts calls from the SDCM Server, logs reported events, and can notify one or more support center representatives.

channel

Point-to-point link that transports data from one point to the other.

channel path

A single interface between a central processor and one or more control units along which signals and data can be sent to perform I/O requests.

channel path identifier

In a channel subsystem, a value assigned to each installed channel path of the system that uniquely identifies that path to the system.

channel wrap test

A diagnostic procedure that checks host-to-Director connectivity by returning the output of the host as input. The test is host-initiated, and transmits Fibre Channel frames to a Director port. A Director port enabled for channel wrapping echoes the frame back to the host.

class of Fibre Channel service

Defines the level of connection dedication, acknowledgment, and other characteristics of a connection.

Class F Fibre Channel service

Used by switches to communicate across interswitch links (ISLs) to configure, control, and coordinate a multi-switch fabric.

Class 2 Fibre Channel service

Provides a connectionless (not dedicated) service with notification of delivery or nondelivery between two N_Ports. In-order delivery of frames is not guaranteed.

Class 3 Fibre Channel service

Provides a connectionless (not dedicated) service without notification of delivery or nondelivery between two N_Ports. Also known as datagram.

community profile

Information that specifies which management objects are available to what management domain or SNMP community name.

concurrent maintenance

Ability to perform maintenance tasks, such as removal or replacement of field-replaceable units, while a hardware product is operating.

configuration data

Configuration data includes: identification data, port configuration data, operating parameters, SNMP configuration, and zoning configuration. A configuration backup file is required to restore configuration data if the CTP card in a non-redundant Director is removed and replaced.

connectionless

Non-dedicated link. Typically used to describe a link between nodes which allows the switch to forward Class 2 or Class 3 frames as resources (ports) allow. Contrast this to the dedicated bandwidth that is required in a Class 1 Fibre Channel Service point-to-point link.

connector

See optical fiber connector.

control processor card

Circuit card that contains the Director microprocessor. The CTP card also initializes hardware components of the system after power-on. A 10 Mbps RJ-45 twisted pair connector is located on the CTP card to connect to the Ethernet LAN and communicate with the SDCM Server or a specific management station.

control unit

A hardware unit that controls the reading, writing, or displaying of data at one or more input/output units.

control unit port

An internal Director port on the CTP card that communicates with the attached processor channels to report error conditions and link initialization.

CRC

See cyclic redundancy check.

CTP

See control processor card.

CUP

See control unit port.

cyclic redundancy check

System of error checking performed at both the sending and receiving station using the value of a particular character generated by a cyclic algorithm. When the values generated at each station are identical, data integrity is confirmed.

DASD

Direct access storage device such as a disk drive.

datagram

See Class 3 Fibre Channel service.

default

Pertaining to an attribute, value, or option that is assumed when none is explicitly specified.

default zone

Contains all attached devices that are not members of a separate zone.

destination address

Address identifier that indicates the targeted destination of a data frame.

device

Product, connected to a managed Director, that is not controlled directly by the Product Manager. *See also* node.

diagnostics

Procedures used by computer users and service personnel to diagnose hardware or software error conditions.

dialog box

Dialog box is a window containing informational messages or data fields to be modified or filled in with desired options.

D_ID

See destination address.

Director

An intelligent Fibre Channel switching device providing any-to-any port connectivity between nodes (end devices) on a switched fabric. The Director sends data transmissions (data frames) between nodes in accordance with the address information present in the frame headers of those transmissions.

DNS name

Domain name system or domain name service. Host or node name for a device or managed product that is translated to an IP address through a domain name server.

domain ID

Number (1 through 31) that uniquely identifies a switch in a multi-switch fabric. A distinct domain ID is automatically allocated to each switch in the fabric by the principal switch.

E_Port

See expansion port.

port card map

Map showing numbers assigned to each port card by card slot.

Product Manager

Application that implements the management user interface for the Director.

E_D_TOV

See error-detect time-out value.

Embedded Web Server

Administrators or operators with a browser-capable PC and an Internet connection can monitor and manage the Director through an embedded Web server interface. The interface provides a GUI similar to the Product Manager application, and supports Director configuration, statistics monitoring, and basic operation.

error detect time out value

E_D_TOV defines the time the switch waits for an expected response before declaring an error condition.

error message

Indication that an error has been detected. *See also* information message and warning message.

Ethernet

A widely implemented local area network (LAN) protocol that uses a bus or star topology and served as the basis for the IEEE 802.3 standard, which specifies the physical and software layers. Baseband LAN allows multiple station access to the transmission medium at will without prior coordination and which avoids or resolves contention.

Ethernet hub

A device used to connect the EFM Server and the Directors it manages.

event code

Code that provides the operator with information concerning events.

event log

Record of significant events that have occurred on the Director, such as FRU failures, degraded operation, and port problems.

expansion port

Physical interface on a Fibre Channel switch within a fabric, that attaches to an expansion port (E_Port) on another Fibre Channel switch to form a multi-switch fabric. *See also* segmented E_Port.

explicit fabric login

Data field size, supported by an F_Port, that is agreed upon during fabric login.

fabric

Entity that interconnects N_Ports and is capable of routing (switching) Fibre Channel frames using the destination ID information in the Fibre Channel frame header accompanying the frames.

fabric element

Any active Director or node in a switched fabric.

fabric port

Physical interface within the fabric that connects to an N_Port through a point-to-point full duplex connection.

failover

Automatic and non-disruptive transition of functions from an active FRU that has failed to a backup FRU.

FCC-IOC

See Fibre Channel I/O controller.

FE-MIB

See Fibre Channel fabric element.

fiber

Physical media types supported by the Fibre Channel specification, such as optical fiber, twisted pair, and coaxial cable.

fiber optics

Branch of optical technology concerned with the transmission of light pulses through fibers made of transparent materials such as glass, fused silica, and plastic.

fiber port module card

Each fiber port module card provides four Fibre Channel connections through duplex small form factor (SFF) pluggable fiber-optic transceivers.

Fibre Channel

Integrated set of standards recognized by ANSI which defines specific protocols for flexible information transfer. Logically, a point-to-point serial data channel, structured for high performance.

Fibre Channel fabric element

Any device linked to a fabric. Information about these devices is recorded in a management information base (MIB) which can be accessed by fabric management software.

Fibre Channel I/O controller

A device that controls the embedded Fibre Channel port and configures the ports' ASICs.

field-replaceable unit

Assembly removed and replaced in its entirety when any one of its components fails.

firmware

Embedded program code that resides and executes on the Director.

FPM card

See fiber port module card.

F_Port

See fabric port.

FRU

See field-replaceable unit.

gateway

A multi-homed host used to route network traffic from one network to another, and to pass network traffic from one protocol to another.

gateway address

A unique string of numbers (in the format xxx.xx.xxx.xxx) that identifies a gateway on the network.

generic port

Also known as G_Port. Physical interface on a Director that can function either as a fabric port (F_Port) or an extension port (E_Port) depending on the port type to which it connects.

G_Port

See generic port.

hardware log

Record of FRU insertions and removals in the Director.

hardware management console

The console runs the Hardware Management Console application (HWMCA), and is the operations and management PC platform for 2/Series servers.

HBA

See host bus adapter.

high availability

A performance feature characterized by hardware component redundancy (enabling non-disruptive maintenance). High-availability systems maximize system uptime while providing superior reliability, availability, and serviceability.

hop

Data transfer from one node to another node.

homogeneous fabric

A fabric consisting of only Compaq products.

hop count

The number of hops a unit of information traverses in a fabric.

host bus adapter

Logic card that provides a link between the server and storage subsystem, and that integrates the operating systems and I/O protocols to ensure interoperability.

hot-swapping

Removing and replacing a device's components while the device continues to operate normally.

hub

In Fibre Channel, a device that connects nodes into a logical loop by using a physical star topology.

IML

See initial machine load.

inband management

Management of the Director through a Fibre Channel connection to a port card.

information message

Message telling a user that a function is performing normally or has completed normally.

See also error message and warning message.

initial machine load

Also known as IML. Hardware reset for all installed CTP cards on the Director. It does not affect other hardware. It is initiated by pushing the white button on a Director's CTP card.

initial program load

Process of initializing the device and causing the operating system to start. Initiated through a menu in the Product Manager, this option performs a hardware reset on the active CTP only.

interface

Hardware, software, or both, linking systems, programs, or devices.

internet protocol address

Unique string of numbers (in the format xxx.xxx.xxx.xxx) that identifies a device on a network.

interoperability

Ability to communicate, execute programs or transfer data between various functional units over a network.

interswitch link

Also known as ISL. Physical E_Port connection between two Directors in a fabric.

I/O configuration

See input/output configuration.

IOCDs

A data set that contains an I/O configuration definition built by the IOCP.

IOCP

See input/output configuration program.

IP address

See internet protocol address.

IPL

See initial program load.

ISL

See interswitch link.

jumper cable

Optical cable that provides physical attachment between two devices or between a device and a distribution panel. *Contrast with* trunk cable.

latency

When used in reference to a Fibre Channel switching device, latency refers to the amount of time elapsed between receipt of a data transmission at a switch's incoming F_Port (from the originating node port) to retransmission of that data at the switch's outgoing F_Port (to the destination N_Port). The amount of time it takes for data transmission to pass through a switching device.

LIN

See link incident.

link

Physical connection between two devices on a switched fabric.

link incident

Interruption to link due to loss of light or other causes.

load balancing

Ability to evenly distribute traffic over multiple interswitch links within a fabric. Load balancing on a Director occurs automatically.

logical unit number

Also known as LUN. In Fibre Channel addressing, a logical unit number is a number assigned to a storage device which, in combination with the storage device's node port's world wide name, represents a unique identifier for a logical device on a storage area network.

loopback plug

In a fiber optic environment, a type of duplex connector used to wrap the optical output signal of a device directly to the optical input.

loopback test

Test that checks attachment or control unit circuitry, without checking the mechanism itself, by returning the output of the mechanism as input.

LUN

See logical unit number.

MAC address

See media access control address.

maintenance port

Connector on the Director where a PC running an ASCII terminal emulator can be attached or dial-up connection made for specialized maintenance support.

managed product

Hardware product that can be managed with the SDCM. For example, the SAN Director 64 is a managed product. *See also* device.

management information base

Related set of software objects (variables) containing information about a managed device and accessed via SNMP from a network management station.

management session

Management session exists when a user logs onto the SDCM Server. SDCM can support multiple concurrent management sessions. The user must specify the network address of the Server at logon time.

Media Access Control address

Hardware address of a node (device) connected to a network.

MIB

See management information base.

multicast

Delivery of a single transmission to multiple destination N_Ports. Can be one to many or many to many. All members of the group are identified by one IP address.

multi-switch fabric

Fibre Channel fabric created by linking more than one Director or fabric switching device within a fabric.

name server

Program that translates names from one form into another. Domain name servers (DNS) translate domain names into IP addresses.

name server zoning

N_Port access management that allows N_Ports to communicate if and only if they belong to a common name server zone.

network address

Name or address that identifies a managed product on a TCP/IP network. The network address can be either an IP address in dotted-decimal notation containing four three-digit octets in the format xxx.xxx.xxx.xxx), or a domain name (as administered on a customer network).

nickname

Alternate name assigned to a world wide name for a node or Director in the fabric.

node

In Fibre Channel terminology, node refers to an end device (server or storage device) that is or can be connected to a switched fabric.

node port

Physical interface within an end device which can connect to an F_Port on a switched fabric or directly to another N_Port (in point-to-point communications).

non-disruptive maintenance

Ability to service FRUs (including maintenance, installation, removal and replacement) while normal operations continue without interruption. *See also* concurrent maintenance.

N_Port

See node port.

offline sequence

Sequence sent by the transmitting port to indicate that it is attempting to initialize a link and has detected a problem in doing so.

OLS

See offline sequence.

operating state (Director)

The operating states are described as follows:

Online - when the Director is set online, an attached device can log in to the Director if the port is not blocked. Attached devices can communicate with each other if they are configured in the same zone.

Offline - when the Director is set offline, all ports are set offline. The Director transmits the offline sequence (OLS) to attached devices, and the devices cannot log in to the Director.

operating state (port)

Valid states include Online, Offline, Testing, Beaconsing, Invalid Attachment, Link Incident, No Light, Not Operational, Port Failure, Segmented E_Port.

operating status (Director)

The operating status depends on hardware component failures, which are indicated by alert symbols that display in SDCM application views.

Open Systems Management Server

An optional feature that can be enabled on the Director or switch through the Product Manager application. When enabled, host control and management of the Director or switch are provided through an open systems interconnection (OSI) device attached to a Director or switch port.

optical cable

Fiber, multiple fibers, or a fiber bundle in a structure built to meet optical, mechanical, and environmental specifications. *See also* jumper cable, optical cable assembly, and trunk cable.

optical cable assembly

Optical cable that is connector-terminated. *See also* jumper cable and optical cable.

optical fiber connector

Hardware component that transfers optical power between two optical fibers or bundles and is designed to be repeatedly connected and disconnected.

out-of-band management

Transmission of management information using frequencies or channels other than those routinely used for information transfer.

packet

Logical unit of information (usually in the form of a data frame) transmitted on a network. It contains a header (with all relevant addressing and timing information), the actual data, and a trailer (which contains the error checking function, usually in the form of a cyclic redundancy check).

password

Unique string of characters known to the computer system and to a user who must specify it to gain full or limited access to a system and to the information stored within it.

path

In a network, any route between any two ports.

persistent binding

A form of server-level access control that uses configuration information to bind a server to a specific Fibre Channel storage volume (or logical device) using a unit number.

port

Receptacle on a device to which a cable leading to another device can be attached.

port card

Field-replaceable hardware component that provides the port connections for fiber cables and performs specific device-dependent logic functions.

port name

Name that the user assigns to a particular port through the Product Manager.

POST

See power-on self test.

power-on self-test

Series of self-tests executed each time the unit is booted or reset.

preferred domain ID

Domain ID that a switch is assigned by the principal switch in a switched fabric. The preferred domain ID becomes the active domain ID except when configured otherwise by the user.

preventive service planning bucket

Collected problems after early ship of an IBM product.

principal switch

The switch that allocates domain IDs to itself and to all other switches in the fabric. There is always one principal switch in a fabric. If a switch is not connected to any other switches, it acts as its own principal switch.

product name

User-configurable identifier assigned to a managed product. Typically, this name is stored on the product itself. For the Director, the product name can also be accessed by an SNMP manager as the system name.

PSP bucket

See preventive service planning bucket.

R_A_TOV

See resource allocation time-out value.

redundancy

Performance characteristic of a system or product whose integral components are backed up by identical components to which operations will automatically failover in the event of a component failure. Redundancy is a vital characteristic of virtually all high-availability (24 hr./7 days per week) computer systems and networks.

remote access link

Connection to a device or program on a computer network via a (geographically) remote workstation.

remote notification

A process by which a system is able to inform remote users and/or workstations of certain classes of events that occur on the system. E-mail notification and the configuration of SNMP trap recipients are two examples of remote notification programs that can be implemented on Director-class switches.

remote user workstation

Workstation, such as a PC, running SDCM Software that can access the SDCM Server over a LAN connection.

resource allocation time-out value

R_A_TOV is a value used to time out operations that depend on the maximum possible time that a frame could be delayed in a fabric and still be delivered.

SAN

See storage area network.

SBAR

See serial crossbar assembly.

SC

Subscriber connectors.

SDCM

SAN Director Connectivity Manager

segmented E_Port

E_Port that has ceased to function as an E_Port within a multi-switch fabric due to an incompatibility between the fabrics that it joins. See also expansion port.

SEL

System error light.

serial crossbar assembly

The serial crossbar assembly (SBAR) is responsible for Fibre Channel frame transmission from any Director port to any other Director port. Connections are established without software intervention.

SNMP

Simple network management protocol. Specifies a mechanism for network management that is complete, yet simple. Information is exchanged between agents, which are the devices on the network being managed, and managers, which are the devices on the network through which the management is done.

SNMP community

Also known as SNMP community string. SNMP community is a cluster of managed products (in SNMP terminology, hosts) to which the server or managed product running the SNMP agent belongs.

SNMP community name

The name assigned to a given SNMP community. Queries from an SNMP management station to a device running an SNMP agent will only elicit a response if those queries are addressed with the correct SNMP community name.

SSP

See system services processor.

storage area network

A high-performance data communications environment that interconnects computing and storage resources so that the resources can be effectively shared and consolidated.

subnet mask

Used by a computer to determine whether another computer with which it needs to communicate is located on a local or remote network. The network mask depends upon the class of networks to which the computer is connecting. The mask indicates which digits to look at in a longer network address and allows the router to avoid handling the entire address.

switchover

Changing a backup FRU to the Active state, and the active FRU to the Backup state.

switch priority

Value configured into each switch in a fabric that determines its relative likelihood of becoming the fabric's principal switch.

system services processor

Controls the RS-232 maintenance port, the Ethernet port, and the operator panel of a Fibre Channel Director.

topology

Logical and/or physical arrangement of stations on a network.

trap

Unsolicited notification of an event originating from a SNMP managed device and directed to an SNMP network management station.

trap host

SNMP management workstation that is configured to receive traps.

trunk cable

Cable consisting of multiple fiber pairs that do not directly attach to an active device. This cable usually exists between distribution panels. *Contrast with* jumper cable.

unblocked port

Devices attached to an unblocked port can login to the Director and communicate with devices attached to any other unblocked port assuming that this is supported by the current zoning configuration.

unicast

Communication between a single sender and a single receiver over a network. Compare to *multicast* and *anycast* (communication between any sender and the nearest of a group of receivers).

vital product data

System-level data stored by the backplane in the electrically erasable programmable read-only memory. This data includes serial numbers and identifies the manufacturer.

VPD

See vital product data.

warning message

Indication that a possible error has been detected. *See also* error message and information message.

wrap plug

See loopback plug.

world wide name

Eight byte address that uniquely identifies a switch, or a node (end device), even on global networks.

WWN

See world wide name.

zone

Set of devices that can access one another. All connected devices may be configured into one or more zones. Devices in the same zone can see each other. Those devices that occupy different zones cannot.

zone member

Specification of a device to be included in a zone. A zone member can be identified by the port number of the Director to which it is attached or by its world wide name. In multi-switch fabrics, identification of end-devices/nodes by world wide name is preferable.

zone set

See zone.

zoning

Grouping of several devices by function or by location. All devices connected to a connectivity product, such as the Director, may be configured into one or more zones. *See also zone.*

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