Compaq StorageWorks

SAN Switch Web Management Tools

Reference Guide

First Edition (October 1999)
Part Number EK-P20WW-GA. A01 / 161357-001
Compaq Computer Corporation

Notice

The information in this publication is subject to change without notice.

COMPAQ COMPUTER CORPORATION SHALL NOT BE LIABLE FOR TECHNICAL OR EDITORIAL ERRORS OR OMISSIONS CONTAINED HEREIN, NOR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FURNISHING, PERFORMANCE, OR USE OF THIS MATERIAL. THIS INFORMATION IS PROVIDED "AS IS," AND COMPAQ COMPUTER CORPORATION DISCLAIMS ANY WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY AND EXPRESSLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, GOOD TITLE, AND AGAINST INFRINGEMENT.

The software described in this guide is furnished under a license agreement or nondisclosure agreement. The software may be used or copied only in accordance with the terms of the agreement.

SAN Switch Web Management Tools
First Edition (October 1999)
Part Number EK-P20WW-GA. A01 / 161357-001

Contents

Using Web Management Tools

continued

Index

About This Guide

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

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.
FILENAMES	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in uppercase.
Type	When you are instructed to *type* 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. They have the following meanings.

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.

Getting Help

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

Compaq Technical Support

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

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

Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website at 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

Compaq StorageWorks Command Console

Introduction to SWCC

The Compaq StorageWorks Command Console (SWCC) Fibre Channel Switch software lets you manage your switches, fabric, and storage subsystem from the same window. After the software is installed, you can access, manage, and configure a switch by double-clicking the Fabric Window icon in SWCC's Navigation window.

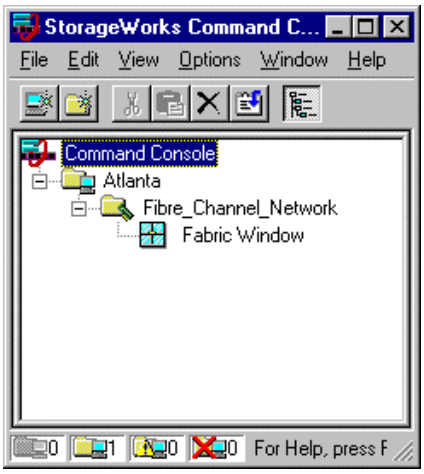

Figure 1-1. Navigation window for a Fibre Channel network

If you want to install and use the Fibre Channel switch software, detailed instructions on how to install, configure, and use SWCC are provided in:

- *Compaq StorageWorks Command Console for the SAN Switch Installation Guide*, xx-AA-RHDAB-TE (included in the SAN Switch software kit)
- *Compaq StorageWorks Command Console V2.1 for RAID Array 8000/ESA12000 User Guide* AA-RFA2D-TE, 387405-004 (included with your Storage Subsystem Platform Kit)
- The Installation Reference Guide included in your storage subsystem kit
- *README.TXT*, *CCCLIENT.TXT*, and *FCSWITCH.TXT* files located on the CD packaged with the switch software kit

SWCC Applet Requirements

To run the SWCC applet on your system, you need:

- A supported Internet browser on your computer
- A TCP/IP compatible network to communicate between your Windows platform and the switch. Two software components are required to communicate over the network: a Client and its companion Agent. The Client runs on Microsoft Windows NT, Windows 95, or Windows 98; the Agent runs only on Windows NT.

Installation Summary

1. Install the SWCC Client, version 2.1 for the storage subsystem, and install the Fibre Channel Switch Client. Installation instructions and the path to the Client's *SETUP.EXE* file are provided in Chapter 4 of the *Compaq StorageWorks Command Console for the SAN Switch Installation Guide* included with your switch software kit.
2. Install the Fibre Channel Switch Agent. Refer to Chapter 6 of the *Compaq StorageWorks Command Console for the SAN Switch Installation Guide* for instructions and the path to the *SETUP.EXE* file.
3. Configure the Fibre Channel Switch Agent. Refer to Chapter 7 of the *Compaq StorageWorks Command Console for the SAN Switch Installation Guide*.

Accessing the SWCC Fabric Window

To create the fabric, add fabric elements, and monitor and manage the switch and fabric, double-click the Fabric Window icon in the Navigation window. The Fabric window displays.

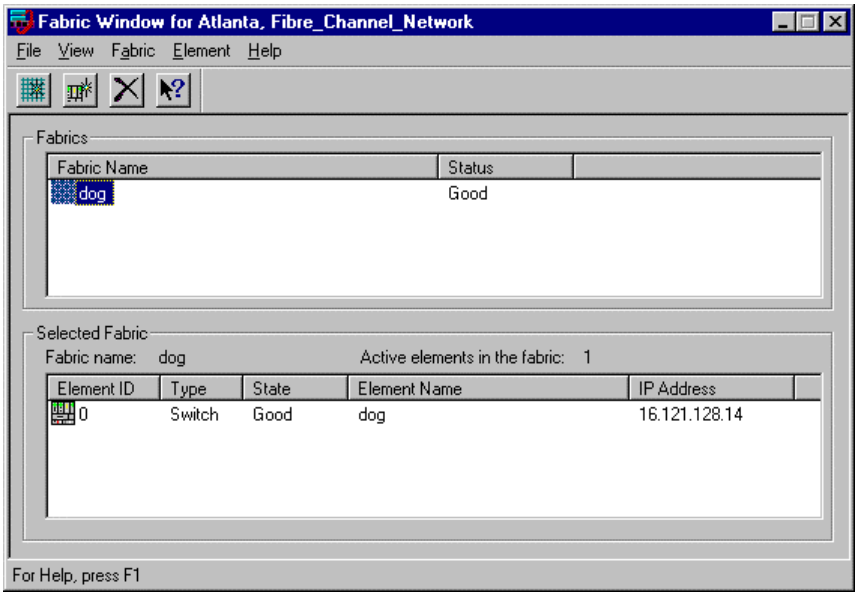

Figure 1-2. Fabric window

Accessing Web Management Tools

From the SWCC Fabric window, you can access Web Management Tools. To display the Web Management Tools:

1. Click the Fabric icon in the Fabrics area of the Fabric window to display a list of connected switches. The switches in the fabric display as icons in the Selected Fabric area of the window.
2. Double-click a switch icon to access Web Management Tools. The General Switch View page for the selected switch displays.

Chapter 2

Overview of Web Management Tools

Web Management Tools let you manage and monitor a Storage Area Network (SAN) composed of Compaq StorageWorks Fibre Channel and SAN Switches.

Web Management Tools

Web Management Tools let you interact dynamically with any switch in the SAN to monitor status and performance. To manage the switch over the Web, launch SWCC as described in Chapter 1, or log on to a switch from a host with a Java-enabled Web browser by means of the Internet or Intranet. Web Management Tools display information you can use to make overall topology decisions and provide a means to make administrative changes. Security is enforced by a username and encrypted password.

Remote Management Features

Web Management Tools provide and feature:

NOTE: The HotJava browser is not supported.

- Switch identification in the network
- Fabric topology and routing information
- Switch and port configuration information
- Real-time graphical switch and port status and statistics report

- Graphical representation of port performance (polled up to every 2.5 seconds depending on the operating system and browser used)
- Four minutes of aggregate bandwidth throughput shown graphically, scaled dynamically, and based on activity (polled up to every 2.5 seconds depending on the operating system and browser used)
- Secured management through the graphical user interface (GUI) or through a Telnet session
- Five screens for monitoring information
- Two screens for administrative interfaces
- Help functions including glossary help, online HTML help, and popup help for error conditions
- Out-of-band interface through a 10/100BaseT Ethernet connection
- In-band interface over a Fibre Channel link

Graphical User Interface

The Web Management Tools GUI provides seven screens you can use to monitor and manage switch information. Table 2-1 summarizes the screens, which are described in more detail in Chapter 3.

Table 2-1
Graphical User Interface Screens

Screen	Description
Fabric View	Displays the number of network switches and confirms World Wide Names (WWNs), domain IDs, and switch names
Fabric Topology View	Displays the physical configuration including active domains, paths, and routing information
General Switch View	Displays switch enclosure information, confirms general switch information, and includes GUI buttons for quick access to the Administrative Interface, Telnet Interface, and Performance View
Performance View	Displays real-time data throughput for each port and switch bandwidth utilization

continued

Table 2-1
Graphical User Interface Screens *continued*

Screen	Description
Port Detail View	Displays statistics and general information for all ports, including LED status
Administrative Interface	Lets you perform routine functions such as enabling and disabling ports and upgrading firmware
Telnet Interface	Lets you use Telnet commands for switch management, diagnostics, and troubleshooting

Operational Concepts

When using Web Management Tools, note the following:

- Fields that can be modified are highlighted.
- Hints display in the bottom left of your browser when you position your mouse over highlighted areas.
- When making changes in the Admin page, the Response Page shows whether each individual configuration change was committed or rejected.
- Java is disabled in some versions of Netscape Navigator and must be enabled by selecting both the Enable Java and the Enable Java Script options in the Preferences/Advanced menu.
- Java applications can hang Netscape Navigator and Microsoft Internet Explorer (IE) on Windows NT after Service Pack 3 due to the True Color graphics-specific mode. To work around this problem, either change the Windows NT display settings to other than True Color, or download Microsoft's hotfix to modify *WIN32K.SYS*. The hotfix is available from Microsoft Technical Support.

Chapter **3**

Using Web Management Tools

This section contains general information and examples on managing and monitoring a Compaq StorageWorks SAN Switch using Web Management Tools.

Supported Web Browsers

Web Management Tools run on the following browsers:

- Microsoft Internet Explorer 4.0 (or later) or Netscape 4.0 (or later) on systems with Windows NT or Windows 95
- Netscape 4.0 or later on systems with Solaris 2.5

Logging on to a Switch through the Web

To log on to a switch through the Web:

1. Launch a Web browser.
2. Connect to a switch by entering the URL for the switch name or the Ethernet IP address. For example:

   http:\\switchname

   http:\\IPAddress
3. To access the administration screens, click the Admin button on the General Switch View screen. Enter your username and password at the prompt.

Fabric View Page

The Fabric View page is a global page that shows all switches in the fabric. This page can show up to 32 switches in a grid and uses IP addresses or switch names to connect to individual switches. Each switch must have a unique name that matches the correct IP address by the name resolution protocol in use by the Web client. If a switch name is not recognized by the name resolution protocol, the switch can be accessed by typing its IP address. To enter an IP address, double-click the switch image while pressing down the **Shift** key, then enter the IP address or host name into the dialog box that displays.

The lines between switches represent known fabric connectivity, but they do not indicate how the switch is connected to the fabric. The Fabric View page displays the front panel of each switch. Double-click a switch's image to display the General Switch View page for that switch. Click the Fabric Topology button at the bottom of the Fabric View page to display the Fabric Topology View page.

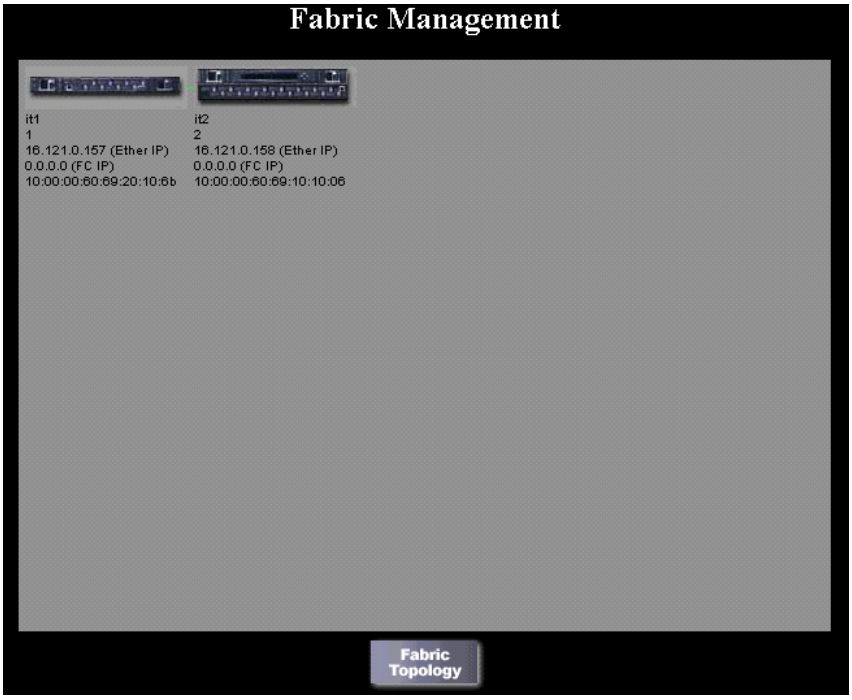

Figure 3-1. Fabric View page

Fabric Topology View Page

The Fabric Topology View page displays when you click the Fabric Topology button on the Fabric View page. The Fabric Topology View page shows physical configuration information, including active domains and paths, and routing information.

The following figure shows the Fabric Topology View page. The fabric topology is viewed from the host domain (or host switch) that is initially requested from the Web browser.

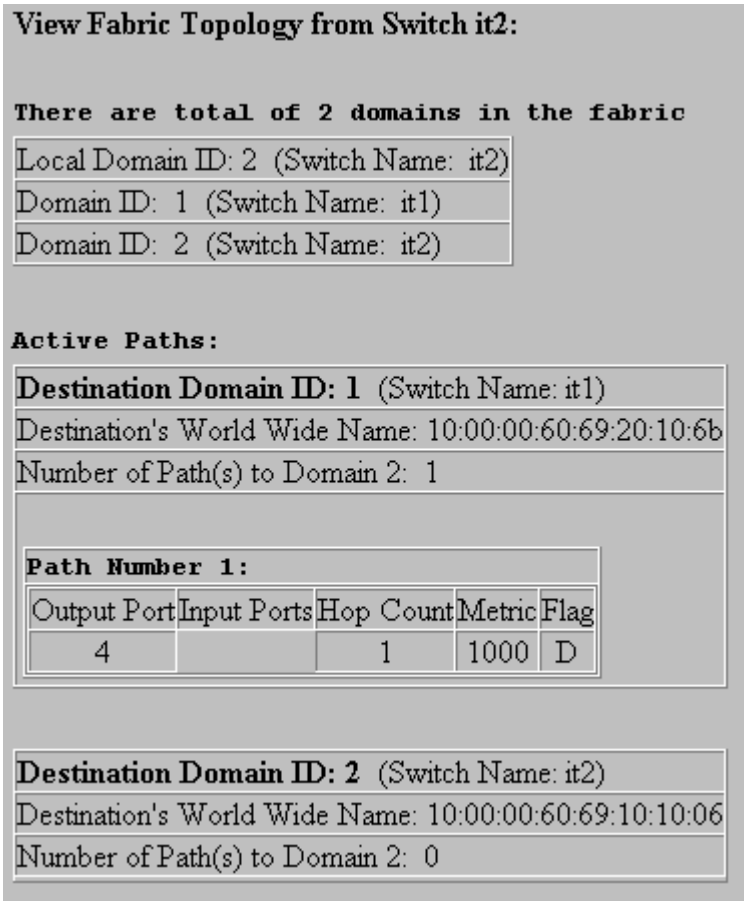

Figure 3-2. Fabric Topology View page

Table 3-1
Fabric Topology View Page Components

Field	Description
Active domains	Displays the number of active domains in the fabric including switch names and switch domain IDs
Active paths (by domain)	Displays active paths from the local domain to all remote domains in the fabric, and includes the domain ID associated with the switch name, WWN, and total number of paths to the domain. Each path is displayed including: ■ Local switch output port number ■ Destination switch input port numbers ■ Hop count ■ Metric ■ Flag

General Switch View Page

Access the General Switch View page for a switch by double-clicking on that switch's icon on the Fabric View page. The General Switch View page shows a graphic representation of the front panel of each connected switch. Normal long-term monitoring is conducted from this page, which provides a real-time view of each switch's overall health and status in the fabric. Switch status is updated every 1 to 2.5 seconds, depending on the operating system and Web browser used.

The upper half of the screen shows port and LED indicator status, while the lower half displays general switch information. The following two figures show the image that displays with the SAN Switch 8 and the SAN Switch 16. Table 3-2 summarizes the General Switch View page's components. Right-click a component on the General Switch View page to display a corresponding Help dialog box.

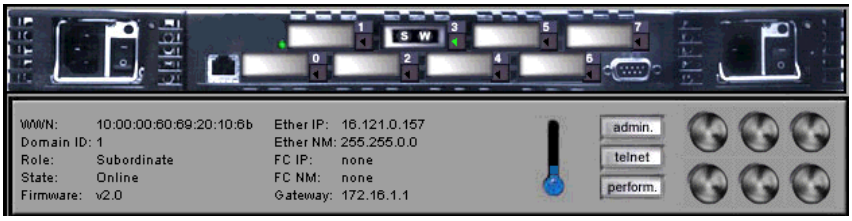

Figure 3-3. General Switch View—Compaq StorageWorks SAN Switch 8

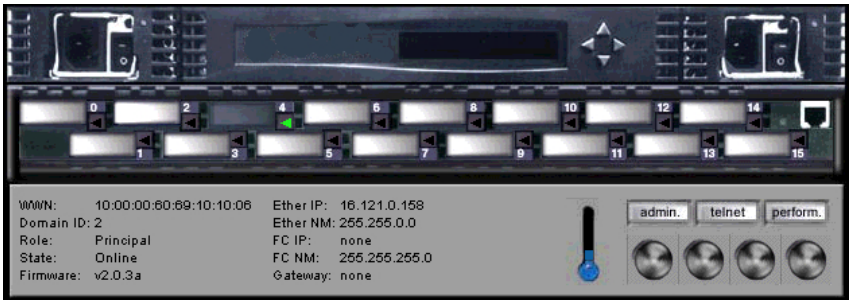

Figure 3-4. General Switch View—Compaq StorageWorks SAN Switch 16

Table 3-2
General Switch View Page Components

Component	Description
Port modules	Link to the Port Detail View page
admin button	Links to the system administration pages
perform button	Links to the Performance View page
telnet button	Launches a Telnet session
Thermometer	Indicates the highest temperature from the last data sample. Click the thermometer to display the temperature readings from five switch sensors.
Fans	Indicates the status of the switch's fans
WWN	Unique numeric identifier for each switch

continued

Table 3-2
General Switch View Page Components *continued*

Component	Description
Domain ID	A number from 0 to 239 that uniquely identifies each switch in a fabric
Role	The switch's role: ■ Principal—The switch is the principal switch. ■ Subordinate—The switch is enabled, but it is not the principal switch. ■ Disabled—The switch is disabled.
State	The switch state: Online, Offline, Testing, or Faulty
Firmware	The firmware version
EtherIP	The switch's Ethernet IP address
Ether NM	The Ethernet subnetmask
FC IP	The Fibre Channel IP address
FC NM	The Fibre Channel subnetmask
Gateway	The gateway address

Warning Messages

A warning message automatically displays in a popup window if a problem occurs in the switch. For example, if the switch's temperature exceeds maximum value, a fan stops rotating, or a port state becomes problematic, a warning displays. Buttons located at the bottom of the warning message popup window can be used to launch a new browser window that displays basic troubleshooting procedures.

Port Status

Each port includes the port number, an LED indicator, and port detail information. If no GBIC module is present, a silver rectangle displays and the port status is indicated as "No_Module." If the port contains a GBIC, one of the following displays:

- For shortwave fiber GBIC modules, a graphical representation of a GBIC module with the letters "S" and "W"
- For longwave fiber GBIC modules, a graphical representation of a GBIC module with the letters "L" and "W"

The color and flash speed of each LED indicator on the switch's front panel show port status. A failed port is outlined in amber on the screen. LED indicator states are defined in the following table.

Table 3-3
Port LED Indicator States

LED Indicators	Definition
No light showing	No light or signal carrier (no GBIC module or cable installed) for media interface LEDs
Steady amber	Receiving light or signal carrier, but not yet online
Slow amber	Disabled, flashes every 2 seconds
Fast amber	Error or fault with port, flashes every ½ second
Steady green	Online (connected with device over cable)
Slow green	Online but cannot make a proper fabric connection (loopback cable installed, fabric is segmented, or switch is connected to an incompatible switch), flashes every 2 seconds
Fast green	Internal loopback (diagnostic), flashes every ½ second
Flickering green	The port is active and transferring data and frame traffic

Port Detail View Page

Access the Port Detail View page by double-clicking a port module on the General Switch View page. The Port Detail View page provides statistics for each port. This page has one tab for each port. Clicking on a tab brings the corresponding port window to the front. Each port window displays general port information, such as the port's number, type (E-Port, G-Port), status, and WWN name, as well as more detailed port statistics. Table 3-4 describes the fields.

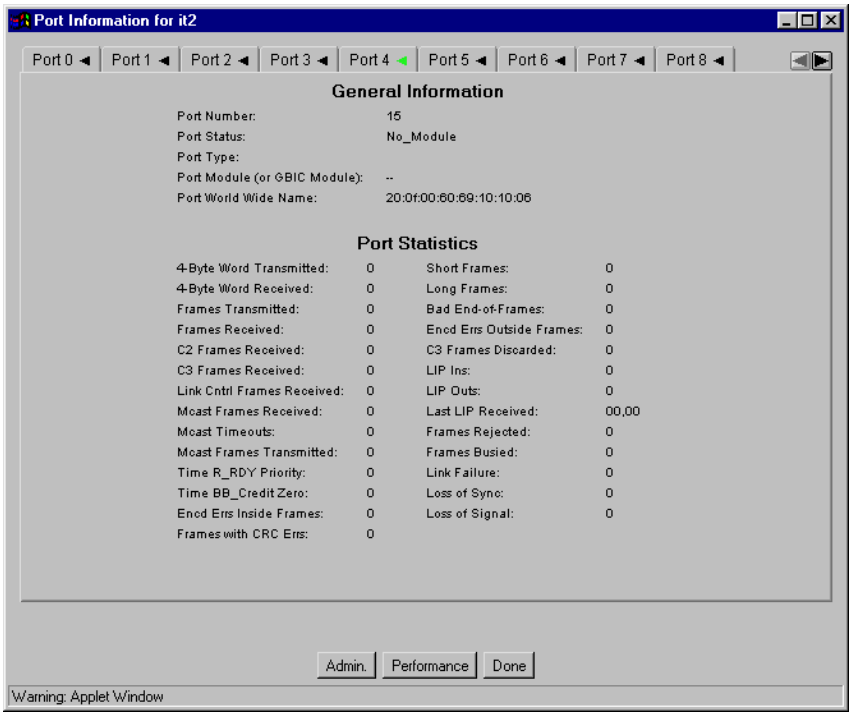

Figure 3-5. Port Detail View page

Table 3-4
Port Detail View Page Components

Field	Description
Port Number	The port number
Port Status	The port state follows the GBIC type. The possible port states include: ■ No_Module—No GBIC module in this port ■ No_Light—The module is not receiving light ■ No_Sync—The module is receiving light but is out of sync ■ In_Sync—The module is receiving light and is in sync ■ Laser_Flt—The module is signaling a laser fault (defective GBIC) ■ Port_Flt—The port has been marked as faulty (defective GBIC, cable, or device) ■ Diag_Flt—The port failed diagnostics (defective G_Port or FL_Port card or motherboard) ■ Online—The port is up and running ■ Lock_Ref—The port is locking to the reference signal
Port Type	The port type (E_Port, G_Port, U_Port, F_Port, or FL_Port)
Port Module (or GBIC Module)	The GBIC type follows the port number. The three GBIC types include: ■ -- —No GBIC present ■ sw—Shortwave GBIC ■ lw—Longwave GBIC
Port World Wide Name	The World Wide Name for this port
4-Byte Word Transmitted	The number of four-byte words transmitted
4-Byte Word Received	The number of four-byte words received
Frames Transmitted	The number of frames transmitted
C2 Frames Received	The number of class 2 frames received

continued

Table 3-4
Port Detail View Page Components *continued*

Field	Description
C3 Frames Received	The number of class 3 frames received
Link Control Frames Received	The number of link control frames received
Mcast Frames Received	The number of multicast frames received
Mcast Timeouts	The number of multicast timeouts
Mcast Frames Transmitted	The number of multicast frames transmitted
Time R_RDY Priority	The number of times R_RDY has priority over frames to be sent
Time BB_CreditZero	The number of times BB_Credit went to zero
Encd Errs Inside Frames	The number of encoding errors inside frames
Frames with CRC Errs	The number of frames with CRC errors
Short Frames	The number of frames shorter than minimum
Long Frames	The number of frames longer than maximum
Bad End-of-Frames	The number of frames with bad end-of-frames
Encd Errs Outside Frames	The number of frames with encoding errors outside frames
C3 Frames Discarded	The number of class 3 frames discarded
LIP Ins	The number of LIPs received
LIP Outs	The number of times the loop was initialized by an FL_Port
Last LIP Received	The last LIP received: AL_PD, AL_PS
Frames Rejected	The number of F_RJTs sent
Frames Busied	The number of F_BSYs sent
Link Failure	The number of times NOS received and sent
Loss of Sync	The number of times a loss of sync occurred
Loss of Signal	The number of times a loss of signal occurred

Performance View Page

Access the Performance View page by double-clicking the Perform button on the General Switch View page. The Performance View page displays port and switch throughput in bytes per second. Each port is numbered and throughput for the entire switch displays under the individual port readings.

The horizontal axis represents time elapsed. The port throughput graphs hold up to 60 seconds of performance data, and the switch throughput graph holds up to 4 minutes of performance data. The vertical axis in each graph shows throughput (in bytes per second). The graphs are automatically scaled depending on the switch activity.

The total throughput value is the throughput sum for all ports. The throughput number represents the number of bytes received plus the number of bytes transmitted each second. Since the switch also transmits all data it receives, the total throughput for the switch can be stated as one-half of the throughput sum of all ports.

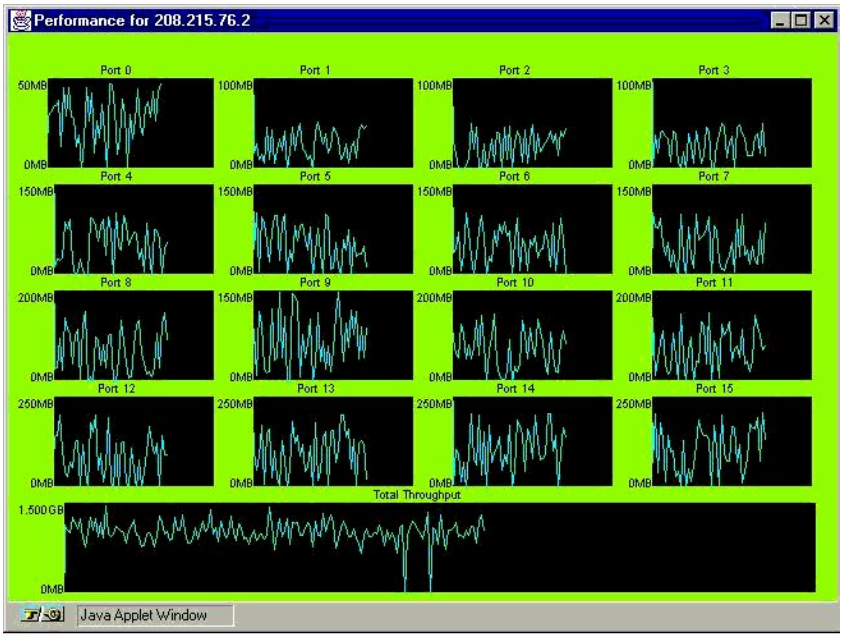

Figure 3-6. Performance View page

Administrative Interface Page

The Administrative Interface page is used to enable or disable the switch or ports, download firmware, reboot a switch, and change the switch name, date and time, IP addresses, user name, and password. Only users with admin privileges can access this page. Any changes made through this page can fundamentally change the switch and port status and their role in the fabric.

Checkboxes and text boxes are provided on the Administrative Interface page for you to make changes. Submit buttons are used to apply the changes.

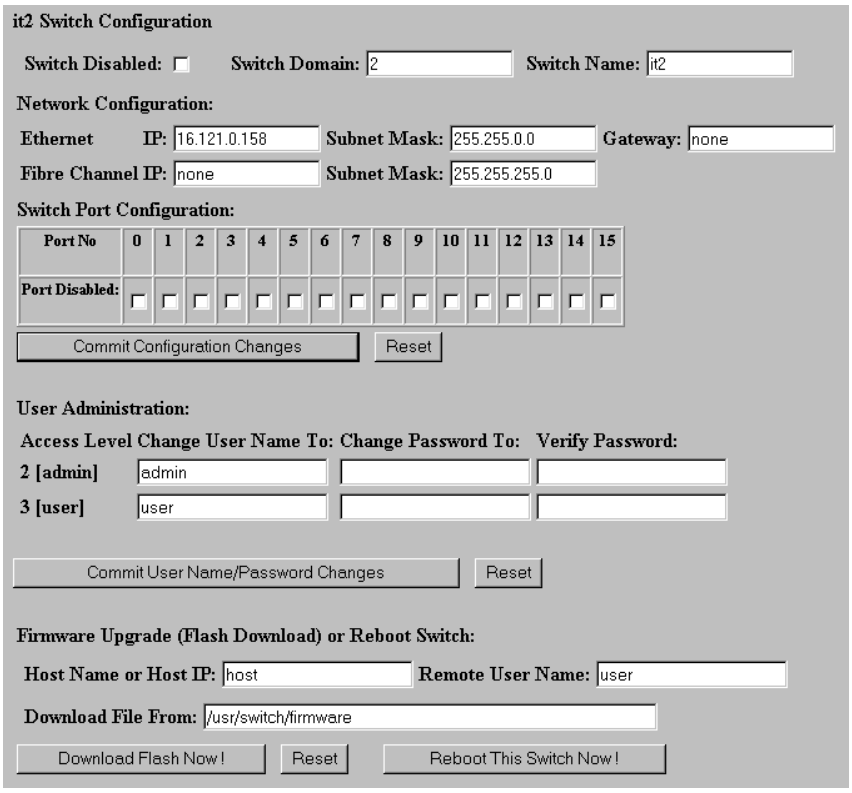

Figure 3-7. Administrative Interface page

Table 3-5
Administrative Interface Page Components

Category	Field	Description
Switch Administration	Switch Disabled	If the box is checked, the switch is disabled. Enable the switch after firmware upgrades, maintenance, and diagnostic tests. To enable the switch, click the check box to remove the check and select the Commit Configuration Changes button.
	Switch Domain	The Switch Domain text box displays or sets the switch domain. To update the switch domain, enter the new domain and select the Commit Configuration Changes button.
	Switch Name	The Switch Name text box displays or sets the switch's name. To update the switch name, enter the new name and select the Commit Configuration Changes button.
Network Administration	Ethernet IP	This area displays the IP address for the Ethernet connection to the switch. The default IP address is 10.77.77.77. See your network administrator for the appropriate IP address.
	Ethernet Subnetmask	The default subnetmask value is none. See your network administrator for the appropriate subnet mask value.
	Gateway	This area displays the gateway address. See your network administrator for the appropriate gateway address value.
	Fibre Channel IP	This area displays the Fibre Channel IP address. The default IP address is none. See your network administrator for the appropriate IP address.
	Fibre Channel Subnetmask	The default subnetmask value is none. See your network administrator for the appropriate subnet mask value.

continued

Table 3-5
Administrative Interface Page Components *continued*

Category	Field	Description
Switch Port Configuration	Port Number	The port number on a particular switch
	Port Disabled	If the box is checked, the port is disabled. It may need to be enabled after maintenance and diagnostic tests. To enable the port, click the check box and select the Commit Configuration Changes button.
Commit Configuration Changes		Applies administrative changes
Switch User Administration	Change User Name	Only users with admin level can change the username for admin and user
	Change Password	To change passwords, enter a new password in this text box.
	Verify Password	For new passwords, re-enter the password in this text box for verification.
Commit Username and Password Changes		Applies administrative changes
Reset		Resets the display to previous defaults
Firmware Upgrade (Flash Download)	Host Name or Host IP	The host name or host IP address
	Remote User Name	The remote user name
	Download File From	The absolute directory path from the source host where the binary firmware file resides. Use UNIX style forward slashes (/) when downloading firmware from a Windows NT system. No path is needed on Windows NT if you are using the RSHD utility and the firmware is in the same folder as the *RSHD.EXE* file. Only the file name is required.
	Download Flash Now	Downloads firmware into flash memory
	Reboot This Switch Now	Pressing this button causes the switch to immediately exit all current processes and states.

Telnet Interface Page

The Telnet Interface lets you launch a Telnet session directly from your Web browser. Only users with admin or user privilege can access this page. To launch a Telnet session, click the Telnet button in the General Switch View page. Refer to the Management Guide that came with your switch for Telnet commands.

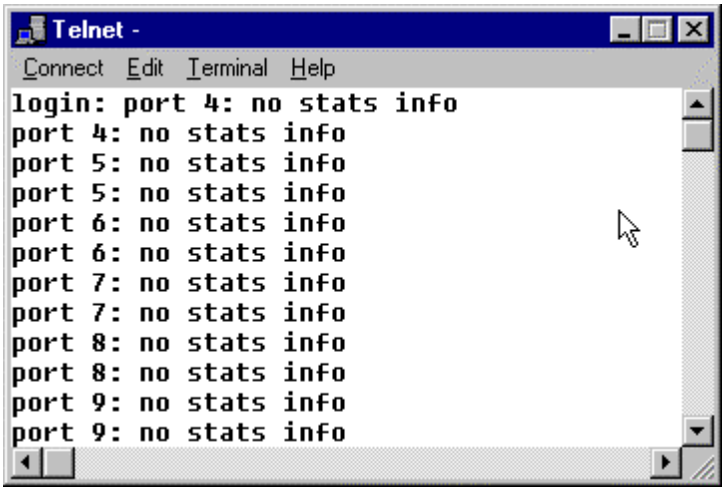

Figure 3-8. Telnet Interface page

NOTE: Users with user or admin privileges can access admin pages. The user level is more restrictive and cannot perform configuration commands. The administrative page can only be accessed from the admin level, and all other attempts to access the page are rejected. HotJava browsers do not support Telnet commands.

Popup Help Dialog Box

The popup Help dialog box displays all glossary help and warning messages. This popup dialog box can contain up to 100 entries, each with a time stamp. Items are deleted from the top in order to display a new message when more than 100 entries are recorded. A single click on each item brings up a separate browser displaying glossary help or troubleshooting information. The history is maintained upon browser Reload/Refresh. The history is cleared when you close the browser.

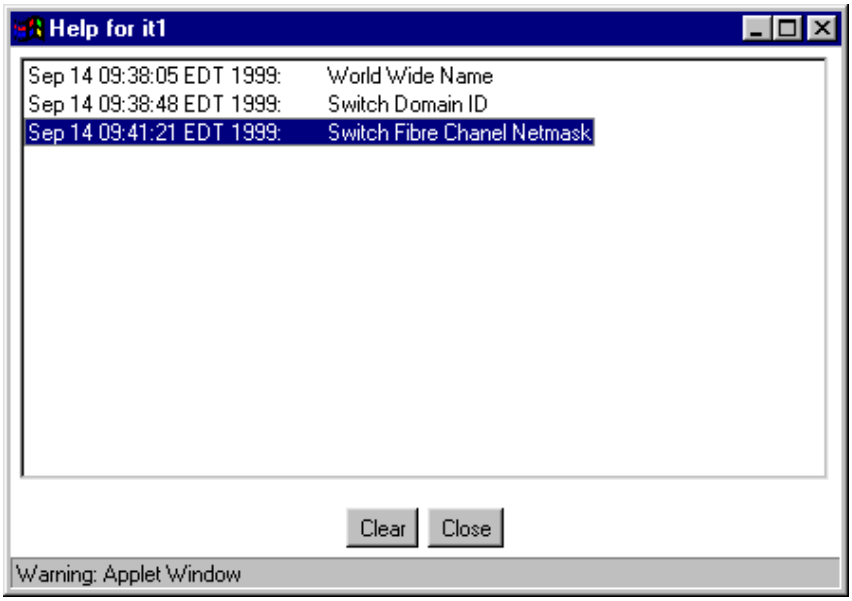

Figure 3-9. Popup Help dialog box

Index

R

S

T

U

V

W