HP ProCurve
Switch 2400M and 4000M

Management and Configuration Guide

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Applicable Product

HP ProCurve Switch 4000M (J4121A)
HP ProCurve Switch 2400M (J4122A)

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Preface

Use of This Guide and Other Switch 2400M and Switch 4000M Documentation

This guide describes how to use the browser interface and console interface for the HP ProCurve Switch 2400M and HP ProCurve Switch 4000M (hereafter referred to as the "Switch 2400M and Switch 4000M").

- If you need information on specific parameters in the console interface, refer to the online help provided in the console interface.
- If you need information on specific features in the HP Web Browser Interface (hereafter referred to as the "web browser interface"), use the online help available with the web browser interface. For more information on Help options, refer to "Online Help for the HP Web Browser Interface" on page 3-9.
- If you need further information on Hewlett-Packard switch technology, refer to HP's Network City website at:

  http://www.hp.com/go/network_city

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Selecting a Management Interface

This chapter describes the following:

- Management interfaces for the Switch 4000M and the Switch 2400M
- Advantages of using each interface

Understanding Management Interfaces

Management interfaces enable you to reconfigure the switch and to monitor switch status and performance.

The HP Switch 4000M and the Switch 2400M offer the following interfaces:

- The web browser interface --an interface that is built into the switch and can be accessed using a standard web browser (such as Netscape Navigator or Microsoft Internet Explorer). For specific requirements, see "Web Browser Interface Requirements" on page 3-2.
- The switch console—an ASCII console interface built into the switch
- HP TopTools for Hubs & Switches–an easy-to-use, browser-based network management tool that works with HP proactive networking features built into managed HP hubs and switches (included on a CD with the switch at no extra cost—available Fall 1998)

Note

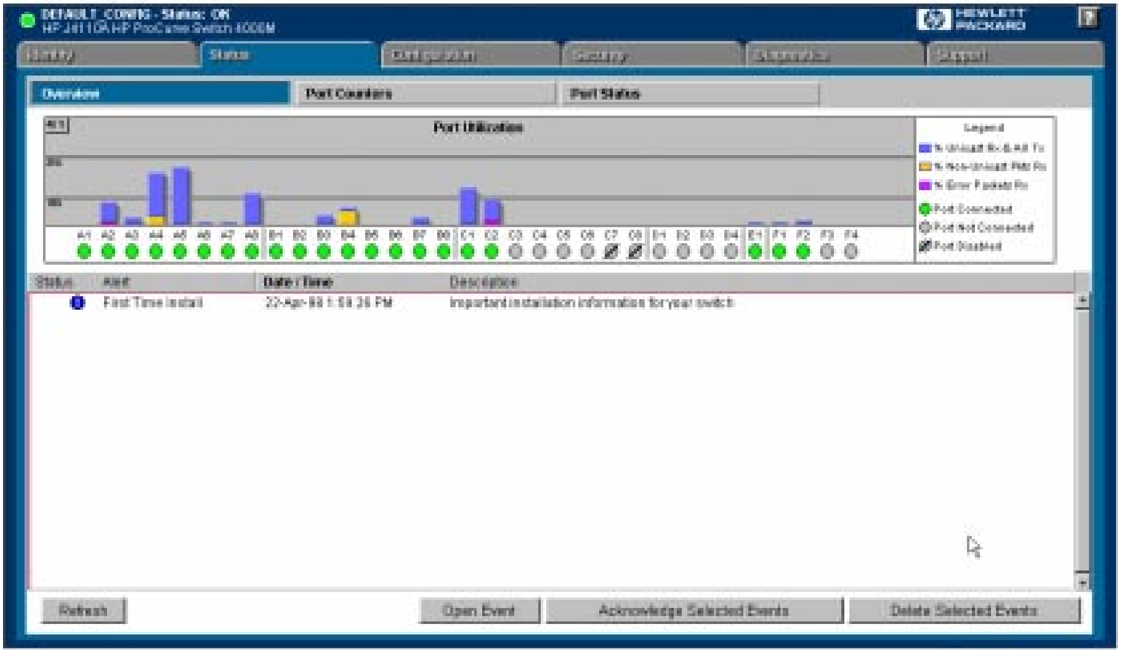
HP TopTools is designed for installation on a network management workstation. For this reason, the HP TopTools system requirements are different from the system requirements for accessing the switch's web browser interface from a non-management PC or workstation. For HP TopTools requirements, refer to the information printed on the sleeve in which the HP TopTools CD is shipped, or to the system requirements information included in the user's guide included on the HP TopTools CD.

Each interface consists of a series of management features, accessed either through a menu-driven screen system or a split Window with tab navigation. Each approach has its advantages that are described in the next sections.

This manual describes how to use the web browser interface (chapter 3) and the switch console (chapter 4), and how to configure the switch using either interface (chapter 6).

To use HP TopTools for Hubs & Switches, refer to the *HP TopTools User's Guide* and the TopTools online help, both of which are available on the CD-ROM shipped with your HP switch. For information on the methods for accessing browser interface Help for the Switch 4000M and Switch 2400M, refer to "Online Help for the Web Browser Interface" on page 3-9.

Advantages of Using the HP Web Browser Interface

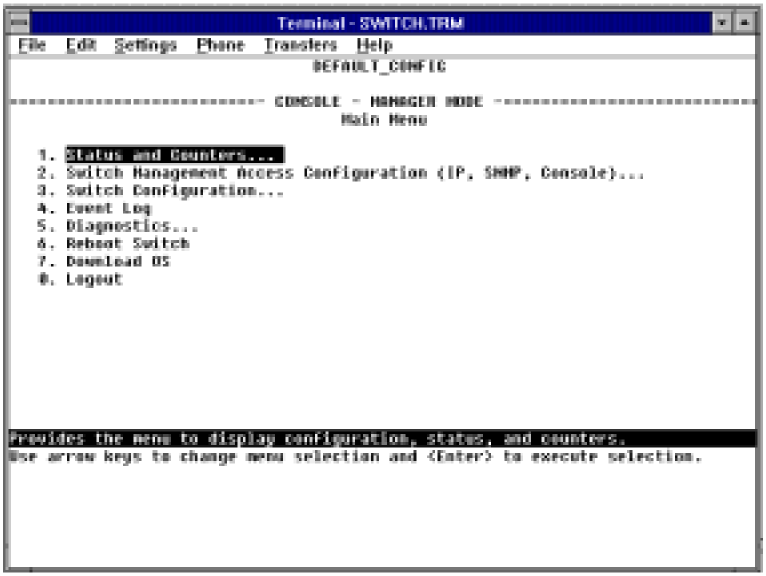


Status	Alert	Date / Time	Description
●	First Time Install	22-Apr-98 1:59:36 PM	Important installation information for your switch

Figure 1-1. Example of the HP Web Browser Interface Display

- **Easy access** to the switch from anywhere on the network
- **Familiar browser interface**--locations of window objects consistent with commonly used browsers
- **Faster configuration**, avoid cycling through a series of screens—requires less keystrokes, uses mouse clicking for navigation; no terminal setup; Telnet access to the switch console
- **Many features have all their fields in one scree**n so you can view all values at once
- **More visual cues**, using colors, status bars, device icons, and other graphical objects to represent values rather than numeric values
- **Display of acceptable ranges of values available** in configuration list boxes

Advantages of Using the Console Interface



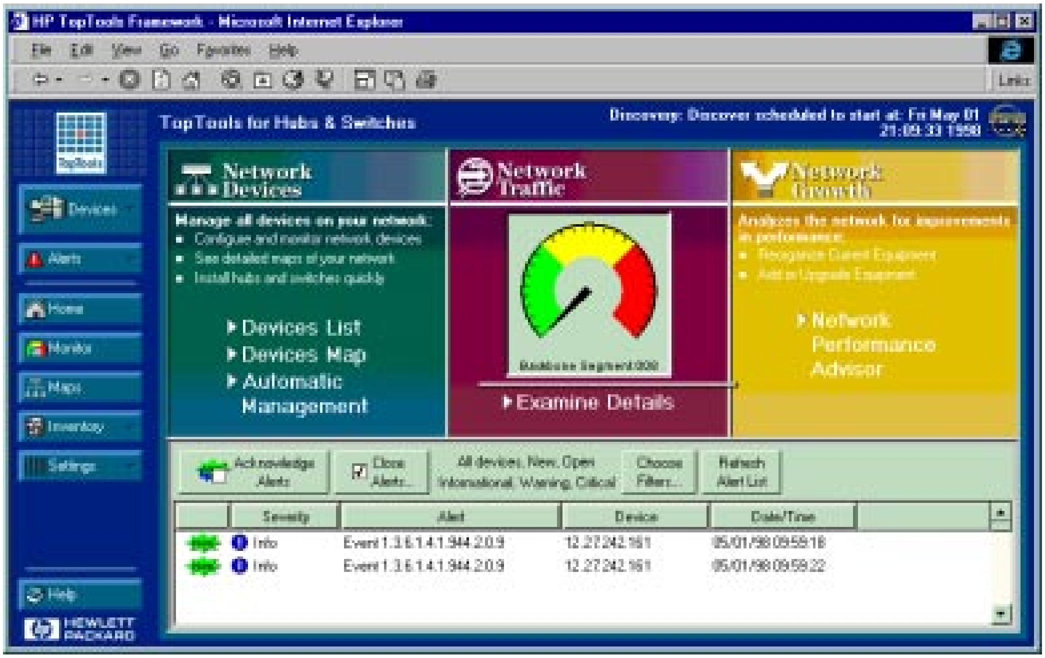
```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                                 Main Menu

   1. Status and Counters...
   2. Switch Management Access Configuration (IP, SNMP, Console)...
   3. Switch Configuration...
   4. Event Log
   5. Diagnostics...
   6. Reboot Switch
   7. Download OS
   0. Logout

Provides the menu to display configuration, status, and counters.
Use arrow keys to change menu selection and <Enter> to execute selection.
```

Figure 1-2. Example of the Console Interface Display

- **Contains a complete set of features and parameters**
- **Out-of-band access** (through RS-232 connection) to switch, so network bottlenecks, crashes, lack of configured or correct IP address, and network downtime do not slow or prevent access
- **Ability to configure management access**, for example, creating an IP address, and setting Community Names and Authorized Managers
- **Telnet access** from a management station or the web browser interface to the full console functionality
- **Faster navigation**, avoiding delays for slower display of graphical objects over a web browser interface
- **More secure**; configuration information and passwords are not seen on the network

HP TopTools for Hubs and Switches

You can operate HP TopTools from a PC on the network to monitor traffic, manage your hubs and switches, and proactively recommend network changes to increase network uptime and optimize performance. Easy to install and use, HP TopTools (formerly HP AdvanceStack Assistant) is the answer to your management challenges.



Discovery: Discover scheduled to start at: Fri May 01 21:09:33 1998

Manage all devices on your network:
- Configure and monitor network devices
- See detailed maps of your network
- Install hubs and switches quickly

Analyzes the network for improvements in performance:
- Recognize Current Equipment
- Add or Upgrade Equipment

☑ All devices, New, Open Informational, Warning, Critical

	Severity	Alert	Device	Date/Time
New	Info	Event 1.3.6.1.4.1.944.2.0.9	12.27.242.161	05/01/98 09:59:18
New	Info	Event 1.3.6.1.4.1.944.2.0.9	12.27.242.161	05/01/98 09:59:22

Figure 1-3. Example of HP TopTools Main Screen

Network Devices:

- Enables fast installation of hubs and switches.
- Quickly finds and notifies you of the location of problems, saving valuable time.
- Notifies you when HP hubs use “self-healing” features to fix or limit common network problems.
- Identifies users by port and lets you assign easy-to-remember names to any network device.
- Enables you to configure and monitor network devices from your PC.

Network Traffic:

- Watches the network for problems.
- Shows traffic and “top talker” nodes on screen.
- Uses traffic monitor diagrams to make bottlenecks easy to see.
- Improves network reliability through real-time fault isolation.
- See your entire network without having to put RMON probes on every segment (up to 1500 segments).

Network Growth:

- Monitors, stores, and analyzes network traffic to determine where upgrades are needed.
- Uses Network Performance Advisor to give clear, easy-to-follow plans detailing the most cost-effective way to upgrade your network.

Configuring an IP Address on the Switch

Configuring an IP (Internet Protocol) address and subnet mask enables the switch to operate as a managed device in your network, giving you in-band (networked) access to the HP web browser interface built into the switch, and to other HP proactive networking features available in the switch or through the HP TopTools for Hubs & Switches network management software (available Fall, 1998). For a listing of switch features available with and without an IP address, refer to “How IP Addressing Affects Switch Operation” on page 6-10.

This chapter helps you to quickly assign an IP address and subnet mask to the switch. (Without an IP address and subnet mask—the factory default configuration—the switch operates as a multi-port transparent bridge, managed only by using the direct RS-232 Console port.)

For more information on this topic, refer to “IP Configuration” on page 6-6.

Methods for Configuring an IP Address and Subnet Mask

If the switch has not already been configured with an IP address and subnet mask compatible with your network, use either of the following two methods to do so:

- **Manually, using the switch's RS-232 console port:** This is the easiest method if you have direct-connect or modem access to a terminal emulator on a PC (such as HyperTerminal in Windows 95 or Windows NT), or a direct connection to a VT-100 ASCII terminal. Refer to "Manually Configuring an IP Address" on the next page.
- **Automatically, using the DHCP/Bootp process:** This method is used to download a configuration from a Bootp or DHCP server (console not needed). To use this method, refer to "DHCP/Bootp Operation" on page 6-10.

An IP address and subnet mask for the switch should be assigned by your network administrator and be compatible with the IP addressing used in your network. The purpose of this section is to help you quickly configure an IP address and subnet mask in the switch. For more information about IP addressing, refer to "IP Configuration" on page 6-6.

If your network is a standalone network, your IP addressing and subnet mask scheme can be set up in any way that meets your local needs. However, if you will be connecting your network to other networks that use globally assigned IP addresses, refer to "Globally Assigned IP Network Addresses" on page 6-14.

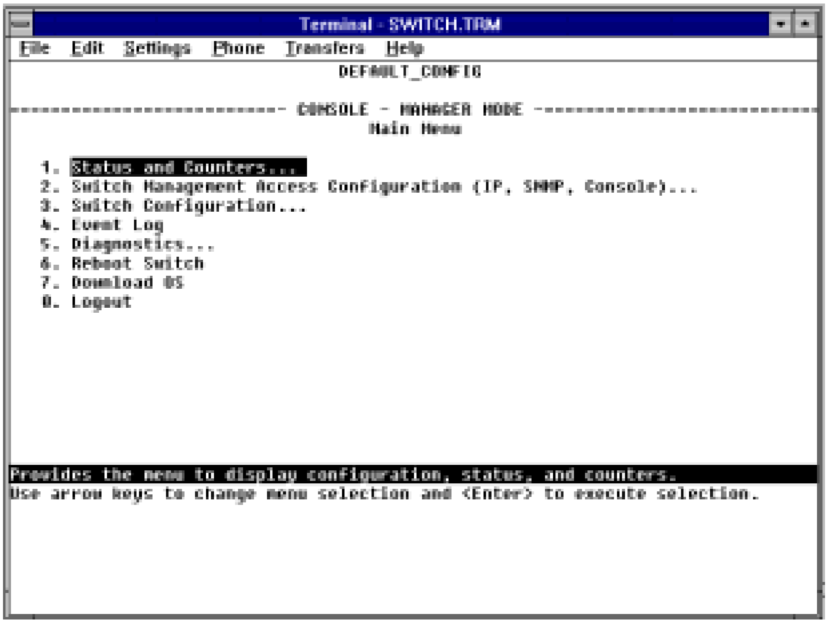
Manually Configuring an IP Address

This section describes how to use the switch console to configure an IP address. The following assumes that no VLANs have been configured on the switch.

Note

In its factory default configuration, all ports on the switch belong to one, default virtual LAN (VLAN), and only one IP address is needed. If you configure the switch with more than one VLAN, each VLAN may have its own IP address. For more on VLANs, refer to “Port-Based Virtual LANs (VLANs)” on page 6-44.

1. Use the instructions in your switch installation manual to connect a PC running a terminal emulator, or a terminal, to the RS-232 Console port on the switch, and display the Main Menu.



```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                                 Main Menu

    1. Status and Counters...
    2. Switch Management Access Configuration (IP, SNMP, Console)...
    3. Switch Configuration...
    4. Event Log
    5. Diagnostics...
    6. Reboot Switch
    7. Download OS
    0. Logout




Provides the menu to display configuration, status, and counters.
Use arrow keys to change menu selection and <Enter> to execute selection.
```

Figure 2-1. The Main Menu

2. From the Main Menu, select

   2. Switch Management Access Configuration

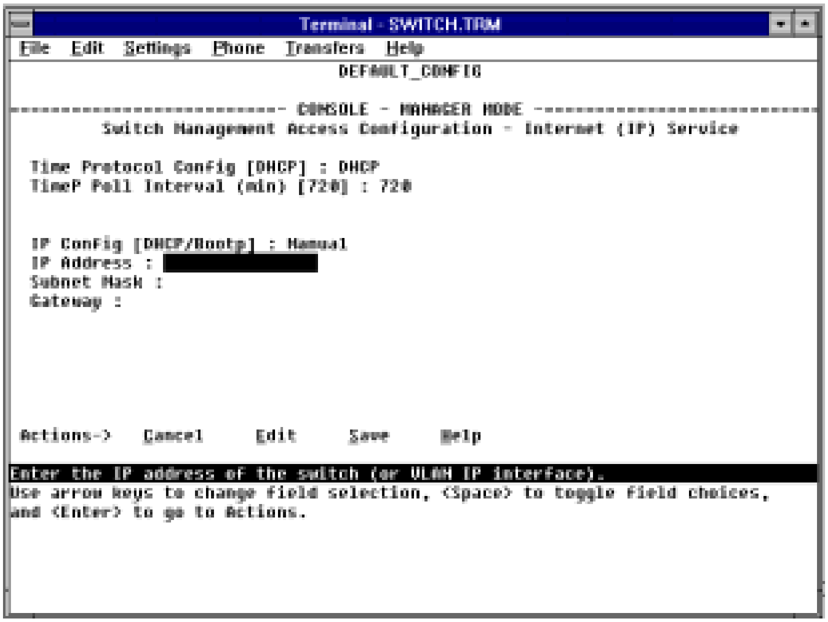
   1. IP Configuration.

3. Press [E] to select **Edit**, then use the downarrow key ([↓]) to select **IP Config [DHCP/BOOTP]**.

4. Use the Space bar to display **Manual** at the **IP Config** parameter.

5. Press the downarrow key ([↓]) to display these three parameters and select the **IP Address** field:

   IP Address:
   Subnet Mask:
   Gateway:



```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
        Switch Management Access Configuration - Internet (IP) Service

  Time Protocol Config [DHCP] : DHCP
  TimeP Poll Interval (min) [720] : 720


  IP Config [DHCP/Bootp] : Manual
  IP Address :
  Subnet Mask :
  Gateway :







 Actions->    Cancel     Edit     Save     Help

Enter the IP address of the switch (or VLAN IP interface).
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

Figure 2-2. The Internet (IP) Service Screen

6. Enter the IP address you want to assign to the switch.

7. Select the **Subnet Mask** field and enter the subnet mask for your network.

8. If you want to reach off-subnet destinations, select the **Gateway** field and enter the address of the gateway router for your subnet.

9. Press [Enter], then [S] (for **Save**).

10. Press [0] to return to the Main Menu.
11. Do the following to reboot the switch:
    a. Press [6] to select **Reboot Switch**.
    b. When prompted, press [Y] for "Yes" and press [Enter].

Where To Go From Here

The above procedure configures your switch with an IP address and subnet mask. With the proper network connections, you can now manage the switch from a network management station or from a PC equipped with a web browser.

- To access the switch using a web browser, refer to chapter 3, "Using the HP Web Browser Interface".
- To continue to use the console interface, refer to chapter 4, "Using the Switch Console Interface".
- To access the switch using a network management tool, refer to chapter 5, "Using HP TopTools or Other SNMP Tools to Monitor and Manage the Switch".
- Inbound telnet access to the switch is enabled in the factory default.
  - To change the current Telnet access parameter, turn to "Using the Switch Console To Configure the Console/Serial Link" on page 6-22.
  - To use Telnet to access the switch console from the web browser interface, click on the **Configuration** tab in the web browser interface, then click on **telnet session to the switch console**. If you need information on how to access the switch via the web browser interface, refer to chapter 3, "Using the HP Web Browser Interface".
- For problems or error indications, refer to chapter 8, "Troubleshooting".

Using the HP Web Browser Interface

Overview

The HP web browser interface built into the switch lets you easily access the switch from a browser-based PC on your network. This lets you do the following:

- Optimize your network uptime by using the Alert Log and other diagnostic tools
- Make configuration changes to the switch
- Maintain security by configuring usernames and passwords

Using the web browser interface to configure the switch is covered in chapter 6, “Configuring the Switch”. This chapter covers the following:

- System requirements for using the web browser interface (page 3-2)
- Starting a web browser interface session (page 3-3)
- Tasks for your first web browser interface session (page 3-5)
  - Creating usernames and passwords in the web browser interface (page 3-7)
  - Selecting the fault detection configuration for the Alert Log operation (page 3-23)
  - Getting access to online help for the web browser interface (page 3-9)
- Description of the web browser interface:
  - Overview window and tabs (page 3-11)
  - Port Utilization and Status displays (page 3-12)
  - Alert Log and Alert types (page 3-14)
  - Setting the Fault Detection Policy (page 3-23)

Note

If you want security beyond that achieved with user names and passwords, you can disable access to the web browser interface. This is done by changing the **Web Agent Enabled** parameter setting in the Serial Link configuration screen in the switch console. See “Console/Serial Link” on page 6-21.

Web Browser Interface Requirements

You can use equipment meeting the following requirements to access the web browser interface on your intranet.

Table 3-1. System Requirements for Accessing the HP Web Browser Interface

Platform Entity and OS Version	**Minimum**	**Recommended**
PC Platform	90 MHz Pentium	120 MHz Pentium
HP-UX Platform (9.x or 10.x)	100 MHz	120 MHz
RAM	16 Mbytes	32 Mbytes
Screen Resolution	800 X 600	1,024 x 768
Color Count	256	65,536
Internet Browser[*] (English-language browser only)	**PCs:** • Netscape® Communicator 4.x • Microsoft® Internet Explorer 4.x **UNIX:** Netscape Navigator 3.1 or later	**PCs:** Netscape Communicator 4.03 or later **UNIX:** Netscape Navigator 3.1 or later
PC Operating System	Microsoft Windows® 95 and Windows NT	
UNIX® Operating System	Standard UNIX® OS	

[*] For notes on using Netscape and Microsoft web browsers, go to HP's Network City web site, http://www.hp.com/go/network_city.

Starting an HP Web Browser Interface Session with the Switch

You can start a web browser session in the following ways:

- Using a standalone web browser on a network connection from a PC or UNIX workstation:
  - Directly connected to your network
  - Connected through remote access to your network
- Using a management station running HP TopTools for Hubs & Switches on your network.

Note

HP TopTools is designed for installation on a network management workstation. For this reason, the HP TopTools system requirements are different from the system requirements for accessing the switch's web browser interface from a non-management PC or workstation. For HP TopTools requirements, refer to the information printed on the sleeve in which the HP TopTools CD is shipped, or to the system requirements information in the user's guide included on the HP TopTools CD.

Using a Standalone Web Browser in a PC or UNIX Workstation

This procedure assumes that you have a supported web browser (page 3-2) installed on your PC or workstation, and that an IP address has been configured on the switch. (For more on assigning an IP address, refer to chapter 2, "Configuring an IP Address on the Switch".)

1. Make sure the Java^{TM} applets are enabled for your browser. If they are not, do one of the following:
   - In Netscape 4.03, click on **Edit, Preferences..., Advanced**, then select **Enable Java** and **Enable JavaScript** options.
   - In Microsoft Internet Explorer 4.x, click on **View**, **Internet Options**, **Security**, **Custom**, [Settings] and scroll to the **Java Permissions**. Then refer to the online Help for specific information on enabling the Java applets.
2. Type the IP address (or DNS name) of the switch in the browser **Location or Address** field and press [Enter]. (It is not necessary to include **http://**.)

switch4000 [Enter] (example of a DNS-type name)

10.11.12.195 [Enter] (example of an IP address)

If you are using a Domain Name Server (DNS), your device may have a name associated with it (for example, **switch4000**) that you can type in the **Location or Address** field instead of the IP address. Using DNS names typically improves browser performance. See your network administrator for any name associated with the switch.

The web browser interface automatically starts with the Status Overview window displayed for the selected device as shown in figure 3-1 on page 3-5.

Using HP TopTools for Hubs & Switches

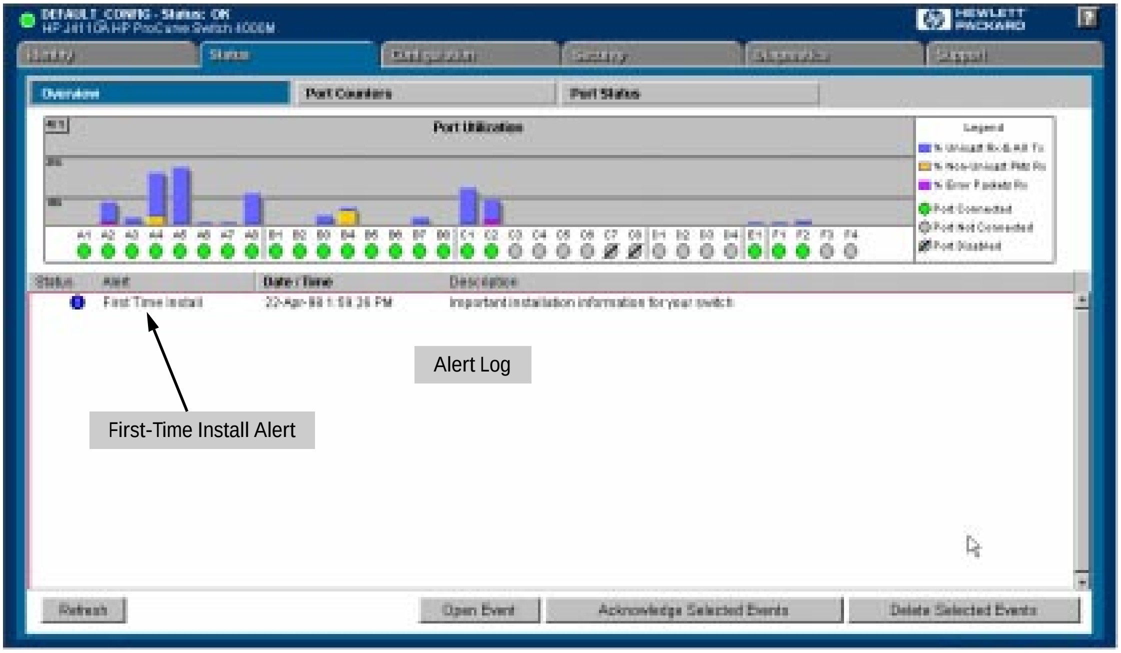
For information on HP TopTools web browser and system requirements, refer to the information printed on the sleeve in which the HP TopTools CD is shipped, or to the system requirements information in the user's guide included on the HP TopTools CD.

This procedure assumes that:

- You have installed the web browser recommended for HP TopTools on a PC or workstation that serves as your network management station.
- The networked device you want to access has been assigned an IP address and (optionally) a DNS name and has been discovered by HP TopTools. (For more on assigning an IP address, refer to chapter 2, "Configuring an IP Address on the Switch".)

To establish a web browser session with HP TopTools running, do the following on the network management station:

1. Make sure the Java^{TM} applets are enabled for your web browser. If they are not, refer to the web browser online Help for specific information on enabling the Java applets.
2. Do *one* of the following tasks:
   - On the HP TopTools Maps view, double-click on the symbol for the networking device that you want to access.
   - In HP TopTools, in the Topology Information dialog box, in the device list, double-click on the entry for the device you want to access (IP address or DNS name).
3. The web browser interface automatically starts with the Status Overview window displayed for the selected device, as shown in figure 3-1 on page 3-5.



Status	Alert	Date / Time	Description
●	First Time Install	22-Apr-99 1:58:36 PM	Important installation information for your switch

Figure 3-1. Status Overview Screen

Tasks for Your First HP Web Browser Interface Session

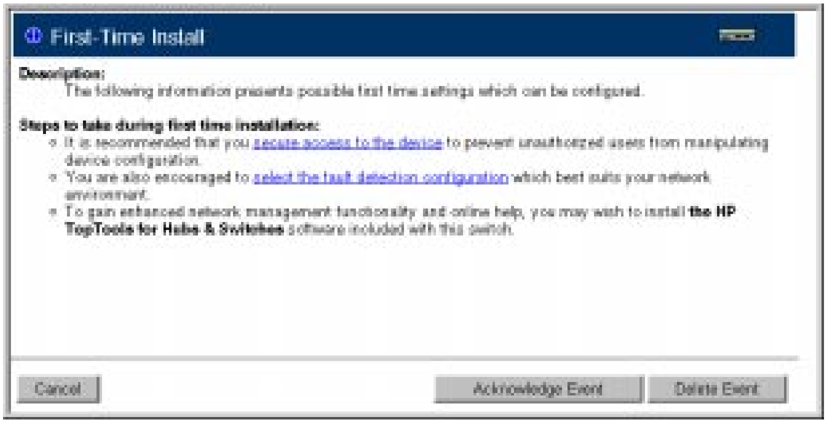
The first time you access the web browser interface, there are three tasks that you should perform:

- Review the "First Time Install" window
- Set Manager and Operator passwords
- Set access to the web browser interface online help

Viewing the "First Time Install" Window

When you access the switch's web browser interface for the first time, the Alert log contains a "First Time Install" alert, as shown in figure 3-1. This gives you information about first time installations, and provides an immediate opportunity to set passwords for security and to specify a Fault Detection policy, which determines the types of messages that will be displayed in the Alert Log.

Double click on **First Time Install** in the Alert log (see above). The web browser interface then displays the "First Time Install" window, as shown in figure 3-2.



First-Time Install

Description:
The following information presents possible first time settings which can be configured.

Steps to take during first time installation:

- It is recommended that you secure access to the device to prevent unauthorized users from manipulating device configuration.
- You are also encouraged to select the fault detection configuration which best suits your network environment.
- To gain enhanced network management functionality and online help, you may wish to install **the HP TopTools for Hubs & Switches** software included with this switch.

Figure 3-2. First-Time Install Window

This window is the launching point for the basic configuration you need to perform to set web browser interface passwords to maintain security and Fault Detection policy, which determines the types of messages that will be displayed in the Alert Log.

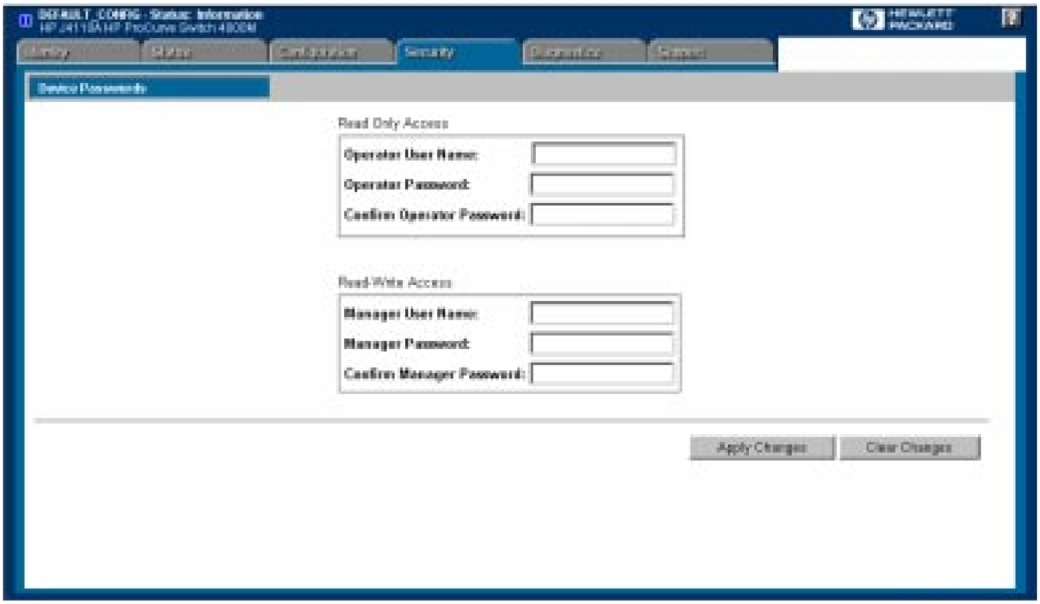
To set web browser interface passwords, click on the jump string **secure access to the device** to display the Device Passwords screen, and then go to the next page. You can also access the password screen by clicking on the Security tab.

To set Fault Detection policy, click on the jump string **select the fault detection configuration** in the second bullet in the window and go to the section, "Setting Fault Detection Policy" on page 3-23.

Creating Usernames and Passwords in the Browser Interface

You may want to create both a username and password to create access security for your switch. There are two levels of access to the interface that can be controlled by setting user names and passwords:

- **Operator.** An Operator-level user name and password allows read-only access to most of the web browser interface, but prevents access to the Security window.
- **Manager.** A Manager-level user name and password allows full read/write access to the web browser interface.



Read Only Access

Operator User Name:

Operator Password:

Confirm Operator Password:

Read-Write Access

Manager User Name:

Manager Password:

Confirm Manager Password:

Figure 3-3. The Device Passwords Window

To set the passwords:

1. Access the Device Passwords screen by one of the following methods:
   - If the Alert Log includes a "First Time Install" event entry, double click on this event, then, in the resulting display, click on the **secure access to the device** link.
   - Select the Security tab.

2. Click in the appropriate box in the Device Passwords window and enter user names and passwords. You will be required to repeat the password strings in the confirmation boxes.

   Both the user names and passwords can be up to 16 printable ASCII characters.

3. Click on [Apply Changes] to activate the user names and passwords.

Note Strings you assign in the web browser interface will overwrite previous access strings assigned in either the web browser interface or the switch console.

Using the Passwords

The manager and operator passwords are used to control access to both the web browser interface and the switch console. Once set, you will be challenged to supply the password every time you try to access either the web browser interface or switch console. The password you enter determines the capability you have during that session:

- Entering the manager password gives you full read/write capabilities
- Entering the operator password gives you read and limited write capabilities.

Using the User Names

If you also set user names in the web browser interface screen, you must supply the correct user name for web browser interface access, but switch console access requires only the password. If a user name has not been set, you must leave the User Name field in the web browser interface access popup blank.

The switch console uses only the passwords and does not prompt you for the User Names.

If You Lose a Password

If you lose the passwords, you can clear them by pressing the Clear button on the front of the switch. This action deletes all password and user name protection for both the web browser interface and the switch console.

The Clear button is provided for your convenience, but its presence means that if you are concerned with the security of the switch configuration and operation, you should make sure the switch is installed in a secure location, such as a locked wiring closet.

Online Help for the HP Web Browser Interface

Online Help is available for the web browser interface. You can use it by clicking on the question mark in the upper right corner of any of the web browser interface screens. Context-sensitive help is provided for the screen you are on.

Providing Online Help. *The Help files are automatically available if you install HP TopTools for Hubs & Switches on your network or if you already have Internet access to the World Wide Web*. (The Help files are included with HP TopTools for Hubs & Switches, and are also automatically available from HP via the World Wide Web.) Retrieval of the Help files as described above is controlled by automatic entries to the **Management Server URL** field on the **Configuration / Support URLs** screen, shown in figure 3-4. That is, the switch is shipped with the URL needed to retrieve online Help through the World Wide Web. However, if HP TopTools is installed on your network and discovers the switch, the Management Server URL is automatically changed to retrieve the Help from your TopTools management station.

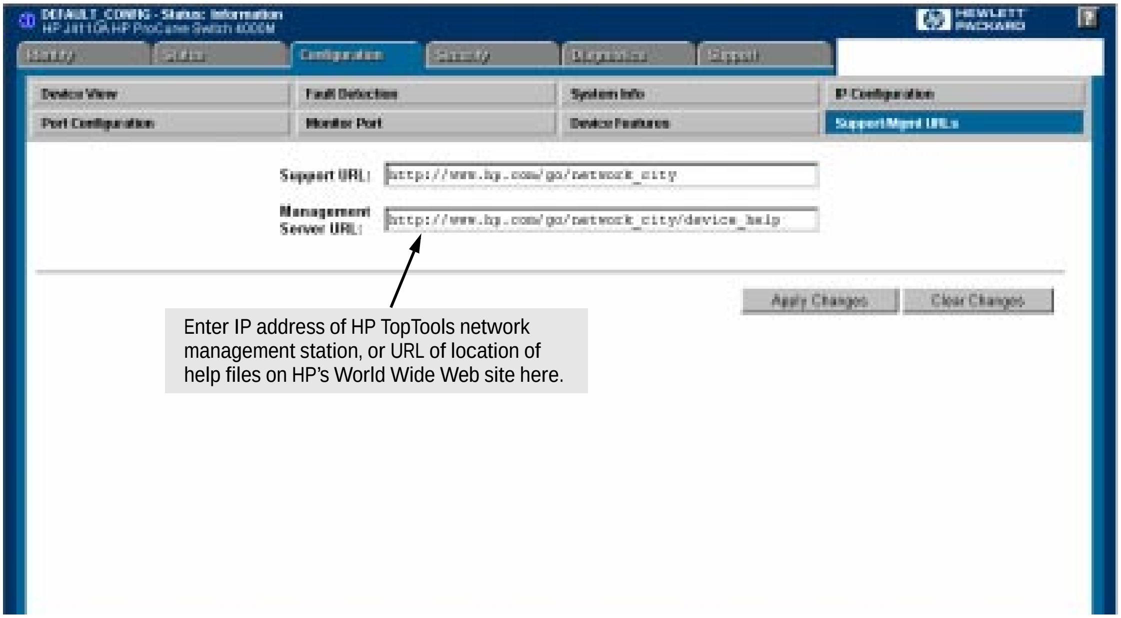
If Online Help Fails To Operate. Do one of the following:

- If HP TopTools for Hubs & Switches is installed and running on your network, enter the IP address or DNS name of the network management station in the Management Server URL field shown in figure 3-4 on page 3-10.
- If you have World Wide Web access from your PC or workstation, and do not have HP TopTools installed on your network, enter the following URL in the Management Server URL field shown in figure 3-4 on page 3-10:

  http://www.hp.com/rnd/device_help

If you do not have HP TopTools for Hubs and Switches installed on your network and do not have an active connection to the World Wide Web, then Online help for the web browser interface will not be available.

See also “Support URLs Feature” on page 6-4.



Support URL: http://www.hp.com/go/network_city

Management Server URL: http://www.hp.com/go/network_city/device_help

Enter IP address of HP TopTools network management station, or URL of location of help files on HP's World Wide Web site here.

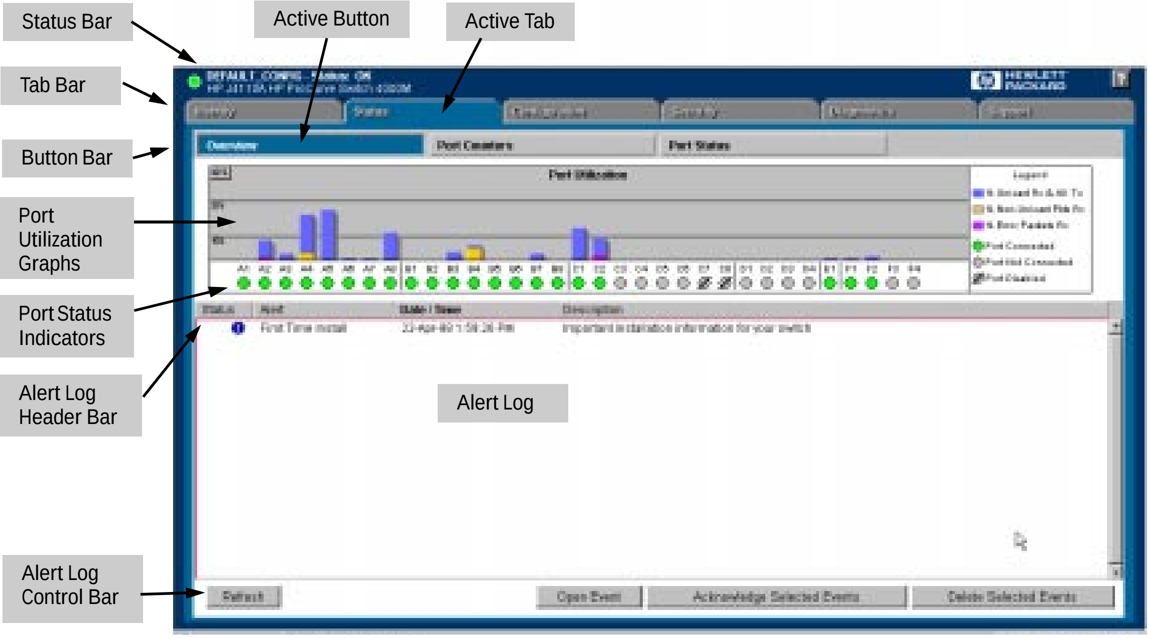
Figure 3-4. How To Access Web Browser Interface Online Help

The Web Browser Interface Screen Layout

This section describes the elements of the web browser interface screen layout starting with the first screen you see, the Status, Overview window.

The Overview Window

The Overview Window is the home screen for any entry into the web browser interface.The following figure identifies the various parts.



Status | Alert | Date / Time | Description

First Time Install | Important installation information for your switch

Figure 3-5. The Overview Window

The areas and fields in the web browser interface Overview Window are described on the next page.

- **Tab Bar.** The row of tabs displaying all the top level menus for the web browser interface.
- **Active Tab.** The current tab selected. The tab is darkened and all the buttons under the tab are displayed.
- **Status Bar.** The region above the Tab Bar that displays status and device name information.
- **Port Utilization and Status Displays.** The region containing graphs that indicate network traffic on each switch port and symbols indicating the status of each port.
- **Button Bar.** The row of buttons that are contained within the Active Tab.
- **Active Button.** The current button selected. The button is darkened and the window associated with the button is displayed.
- **Alert Log.** A list of all events, or alerts, that can be retrieved from the switch's firmware at the current time. Information associated with the alerts is displayed, including Status, Alert Name, the date and time the Alert was reported by the switch, and a short description of the alert. You can double click on any of the entries in the log and get a detailed description. See "The Alert Log" on page 3-14.
- **Alert Log Header Bar.** The row of column heads running across the top of the Alert Log.
- **Alert Log Control Bar.** The region at the bottom of the Alert Log containing buttons that enable you to refresh the Alert Log to display all alerts that have been reported since you first displayed the log. Also available in the bar are a button to acknowledge new alerts and a button to delete alerts.

The Port Utilization and Status Displays

The Port Utilization and Status displays show an overview of the status of the switch and the amount of network activity on each port. The following figure shows a sample reading of the Port Utilization and Port Status.

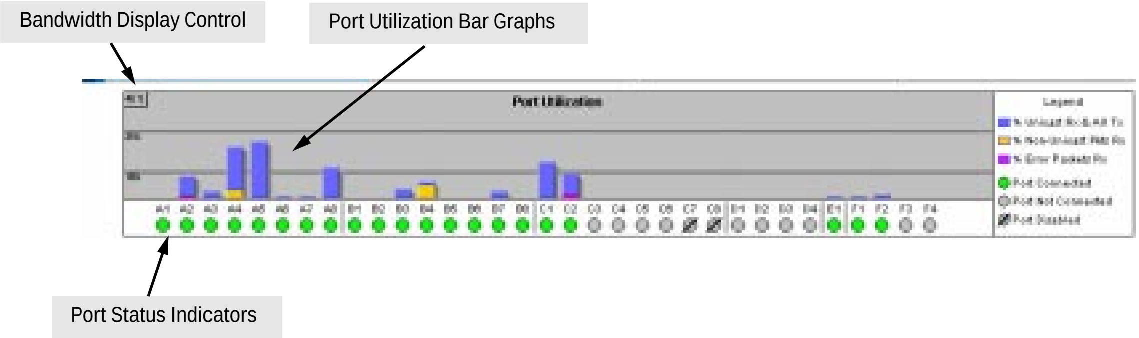

Bandwidth Display Control
Port Utilization Bar Graphs
Port Utilization
Legend
% Unicast Rx & All Tx
% Non-Unicast Pkts Rx
% Error Packets Rx
Port Connected
Port Not Connected
Port Disabled
A1 A2 A3 A4 A5 A6 A7 A8 B1 B2 B3 B4 B5 B6 B7 B8 C1 C2 C3 C4 C5 C6 C7 C8 D1 D2 D3 D4 E1 F1 F2 F3 F4
Port Status Indicators

Figure 3-6. The Graphs Area

Port Utilization

The Port Utilization bar graphs show the network traffic on the port with a breakdown of the packet types that have been detected (unicast packets, non-unicast packets, and error packets). The Legend identifies traffic types and their associated colors on the bar graph:

- **% Unicast Rx & All Tx:** This is all unicast traffic received and all transmitted traffic of any type. This indicator (a blue color on many systems) can signify either transmitted or received traffic.
- **% Non-Unicast Pkts Rx:** All multicast and broadcast traffic received by the port. This indicator (a gold color on many systems) enables you to know "at-a-glance" the source of any non-unicast traffic that is causing high utilization of the switch. For example, if one port is receiving heavy broadcast or multicast traffic, all ports will become highly utilized. By color-coding the received broadcast and multicast utilization, the bar graph quickly and easily identifies the offending port. This makes it faster and easier to discover the exact source of the heavy traffic because you don't have to examine port counter data from several ports.
- **% Error Pkts Rx**: All error packets received by the port. (This indicator is a reddish color on many systems.) Although errors received on a port are not propagated to the rest of the network, a consistently high number of errors on a specific port may indicate a problem on the device or network segment connected to the indicated port.

A network utilization of 40% is considered the maximum that a typical Ethernet-type network can experience before encountering performance difficulties. If you observe utilization that is consistently higher than 40% on any port, click on the Port Counters button to get a detailed set of counters for the port.

To change the amount of bandwidth the Port Utilization bar graph shows. Click on the bandwidth display control button in the upper left corner of the graph. (The button shows the current scale setting, such as 40%.) In the resulting menu, select the bandwidth scale you want the graph to show (3%, 10%, 25%, 40%, 75%, or 100%). Note that when viewing activity on a gigabit port, you may want to select a lower value (such as 3% or 10%). This is because the bandwidth utilization of current network applications on gigabit links is typically minimal, and may not appear on the graph if the scale is set to show high bandwidth utilization.

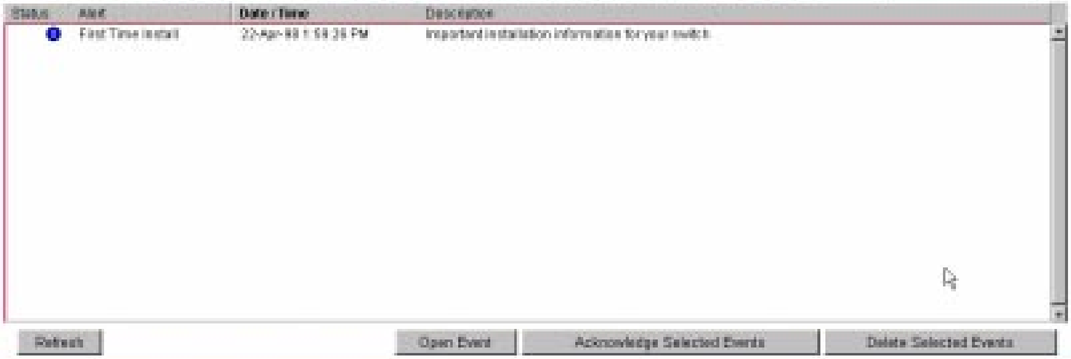
Port Status

The Port Status indicators show a symbol for each port that indicates the general status of the port. There are four possible statuses:

- **Port Connected** – the port is enabled and is properly connected to an active network device.
- **Port Not Connected** – the port is enabled but is not connected to an active network device. A cable may not be connected to the port, or the device at the other end may be powered off or inoperable, or the cable or connected device could be faulty.
- **Port Disabled** – the port has been configured as disabled through the web browser interface, the switch console, or SNMP network management.
- **Port Fault-Disabled** – a fault condition has occurred on the port that has caused it to be auto-disabled. Note that the Port Fault-Disabled symbol will be displayed in the legend only if one or more of the ports is in that status. See chapter 7, “Monitoring and Analyzing Switch Operation” for more information.

The Alert Log

The web browser interface Alert Log, shown in the lower half of the screen, shows a list of network occurrences, or *alerts*, that were detected by the switch. Typical alerts are, **Broadcast Storm**, indicating an excessive number of broadcasts received on a port, and **Problem Cable**, indicating a faulty cable. A full list of alerts is shown in the table on page 3-16.



Status	Alert	Date / Time	Description
●	First Time install	22-Apr-98 1:59:26 PM	Important installation information for your switch

Figure 3-7. The Alert Log

Each alert has the following fields of information:

- **Status** – The level of severity of the event generated. Severity levels can be Information, Normal, Warning, and Critical. If the alert is new (has not yet been acknowledged), the New symbol is also in the Status column.
- **Alert** – The specific event identification.
- **Date/Time** – The date and time the event was received by the web browser interface. This value is shown in the format: ***DD-MM-YY HH:MM:SS*** **AM/PM**, for example, **12-Sep-97 3:57:20 PM**.
- **Description** – A short narrative statement that describes the event. For example, **Lost connection to multiple devices on port 1**.

Sorting the Alert Log Entries

The alerts are sorted, by default, by the Date/Time field with the most recent alert listed at the top of the list. The second most recent alert is displayed below the top alert and so on. If alerts occurred at the same time, the simultaneous alerts are sorted by order in which they appear in the MIB.

The alert field that is being used to sort the alert log is indicated by which column heading is in bold. You can sort by any of the other columns by clicking on the column heading. The Alert and Description columns are sorted alphabetically, while the Status column is sorted by severity type, with more critical severity indicators appearing above less critical indicators.

Alert Types

The following table lists the types of alerts that can be generated.

Table 3-2. Alert Strings and Descriptions

Alert String	Alert Description
First Time Install	Important installation information for your switch.
Problem Driver or NIC	Problem software driver or LAN adapter detected on port.
Problem XCVR or NIC	Problem transceiver or LAN adapter card detected on port.
Problem Cable	Problem cable or duplex mismatch (full-duplex configured on one end of the link, half-duplex configured on the other) detected on port.
Cable Length/Repeater Hops	• Problem cable detected on port. • Packet loss detected, which could be due to excessive number of gateways to traverse or to duplex mismatch (full-duplex configured on one end of the link, half-duplex configured on the other).
Over Bandwidth	Excessive network traffic on port.
Broadcast Storm	Excessive broadcasts detected on port.
Fault-Disabled Port	The port has been automatically disabled due to a detected fault condition, for example, an incorrect transceiver installed in a transceiver slot.
Polarity Reversal	Miswired cable detected on port.
Network Loop	Network loop detected by switch. Network loop detected on port.
Loss of Link	Lost connection to multiple devices on port.

Note

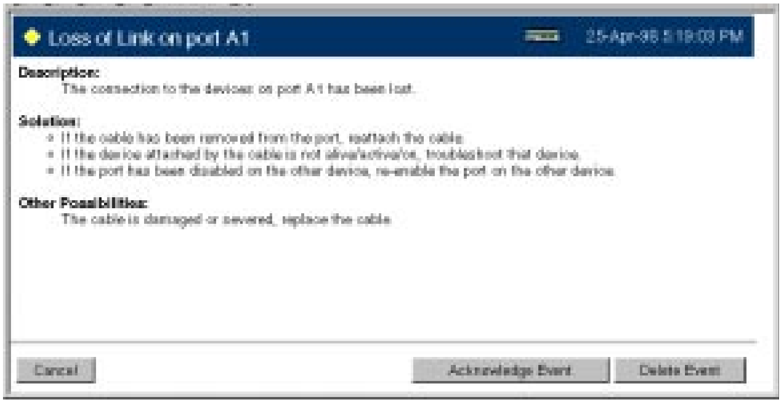
When troubleshooting the sources of alerts, it may be helpful to check the switch’s Port Status and Port Counter windows (page 7-7 and page 7-9) and the Event Log in the console interface (page 8-8).

Viewing Detail Views of Alert Log Entries

By double clicking on Alert Entries, the web browser interface displays a Detail View or separate window detailing information about the events. The Detail View contains a description of the problem and a possible solution. It also provides four management buttons:

- **Acknowledge Event** – removes the New symbol from the log entry
- **Delete Event** – removes the alert from the Alert Log
- **Retest Button** – polls the switch again to determine whether or not the alert can be regenerated.
- **Cancel Button** – closes the detail view with no change to the status of the alert and returns you to the Overview screen.

A sample Detail View describing a Loss of Link alert is shown here.



Loss of Link on port A1 25-Apr-98 5:19:03 PM

Description:
The connection to the devices on port A1 has been lost.

Solution:
- If the cable has been removed from the port, reattach the cable.
- If the device attached by the cable is not alive/active/on, troubleshoot that device.
- If the port has been disabled on the other device, re-enable the port on the other device.

Other Possibilities:
The cable is damaged or severed, replace the cable.

Figure 3-8. Detail View

The Alert Control Bar

The Alert Control Bar appears at the bottom of the Alert Log and contains buttons that enable you to manage the Overview Window.

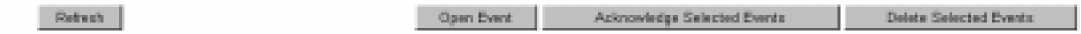


Figure 3-9. The Alert Control Bar

The buttons in the control bar are:

- **Refresh** – redraws the Alert Log screen and displays new alerts that have occurred since you opened or last refreshed this window.
- **Open Event** – displays the detailed view of the highlighted alert; the same as double-clicking on the alert.
- **Acknowledge Selected Events** – removes the New symbol from the entry. This feature is useful if you have more than one system administrator working on a problem. It shows that someone has looked at it.

  If an alert has not been acknowledged, the **New** label continues to appear in the Status column to the left of the Status Indicator. Once the alert has been acknowledged from either the Alert Log screen or the Detailed View screen, the New label is removed.
- **Delete Selected Events** – removes an alert from the Alert Log.

The Tab Bar

The Tab bar in the web browser interface contains six tabs, four of which launch button bars which launch specific functional windows. One tab, Identity, launches a dedicated functional window with no buttons. Another tab, Support, launches a separate web page with support information.

To navigate through the different features of the web browser interface, click on the appropriate tab in the Tab Bar. The tabs are as follows:

Identity Tab

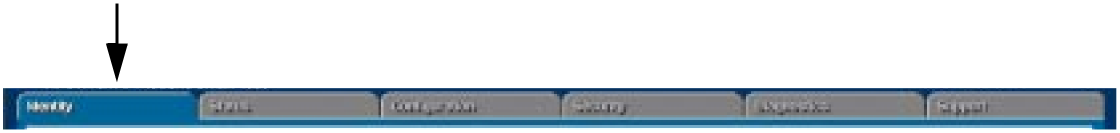


Figure 3-10. The Identity Tab

This tab displays the Identity Window which is a source of quick information about the switch.

- **Editable Information (System Name, Location, and Contact)** – is maintained in the Administration dialog box.
- **Read-Only Information** – The **System Up Time** shows the elapsed time since the switch was last rebooted. **Product** is the switch product name. **Version** is the software (operating system) version currently running in the switch. **IP Address** is the IP address assigned to the switch. **Management Server** is the currently assigned Management Server URL (page 6-4).

Status Tab

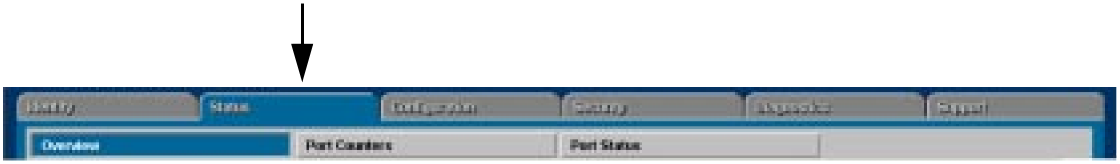


Figure 3-11. The Status Tab and Buttons

This tab displays the Status Button bar which contains buttons that display switch settings and statistics that represent recent switch behavior. The buttons are:

- **Overview** – the home position for the web browser interface. Displays the screen shown in figure 3-5.

- **Port Counters** – displays a summary of the network activity statistics for all the switch ports, with access to detailed port-level statistics
- **Port Status** – displays a summary table of the operational status of all the switch ports

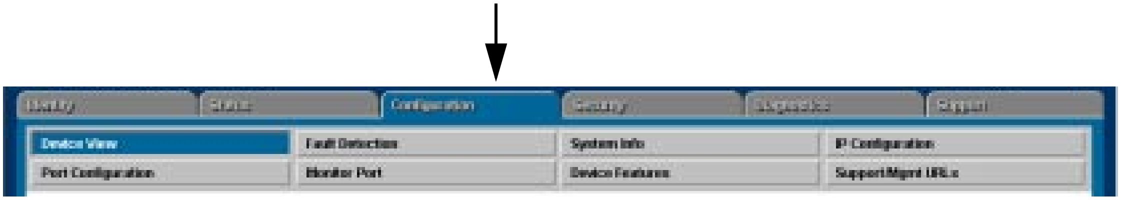

Configuration Tab

Figure 3-12. The Configuration Tab and Buttons

This tab displays the Configuration Button bar which contains buttons that launch screens for setting or changing some of the switch configuration. The buttons are:

- **Device View.** Displays a graphical representation of the front panel of the device, allowing you enable and disable ports on the device by clicking on port graphics and an enable or disable port button. This view also lets you Telnet to the switch console. See the online Help for this view.
- **Fault Detection.** Controls the alert log sensitivity, and port disabling.
- **System Information.** Enables you to view and set system information for a selected device.
- **IP Configuration.** Lets you view or change the existing value for an IP address, subnet mask, and the gateway address for the switch. (Note that changing the IP address from the web browser interface will cause you to lose the current connection to the switch.)
- **Port Configuration.** Lets you enable and disable ports in addition to viewing the security and source address information.
- **Device Features.** Lets you enable or disable Spanning Tree Protocol (STP), and IP Multicast (IGMP).
- **Monitor Port.** Lets you designate a port for monitoring traffic on one or more other ports or on a VLAN configured on the switch.
- **Support/Mgmt URLs.** Specifies the URL of the web site that will be automatically accessed when you open the Support tab, and the URL for the source of online Help for the web browser interface (page 6-5). The Support URL is configured to automatically access HP's Network City website on the World Wide Web. However, if you have an internal support structure, you may wish to change the Support URL to access that structure.

Security Tab

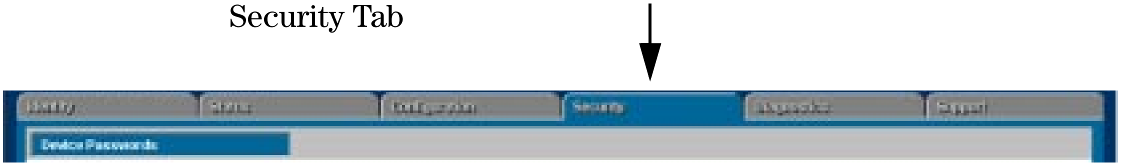


Figure 3-13. The Security Tab and Buttons

This tab displays the Security Button bar which contains the button that enables you view and set operator names and passwords to restrict access to your switch. The button displayed is:

- **Device Passwords.** Enables you to set operator and manager-level user names and passwords for the switch.

Diagnostics Tab

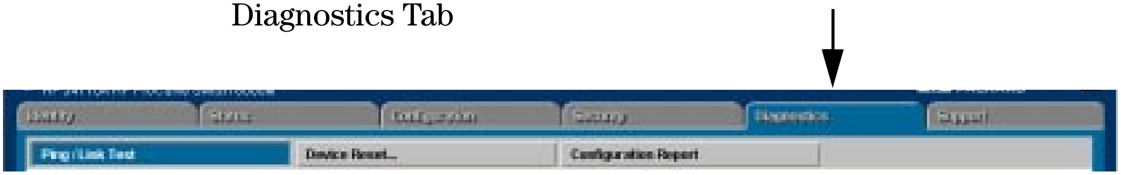
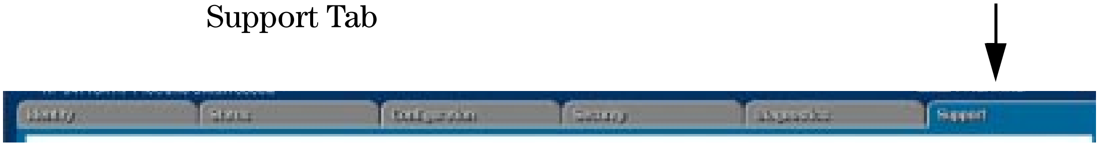


Figure 3-14. The Diagnostics Tab and Buttons

This tab displays the Diagnostics Button bar which contains buttons that enable you to perform troubleshooting tasks for your switch. The buttons are:

- **Ping/Link Test.** Enables you to send test packets to devices connected to a port, using both the IP address (Ping) and the MAC address (Link) as criteria for a valid connection.
- **Device Reset.** Causes the switch to reset its state as though it were powered on and off.
- **Configuration Report**. Displays a master list of various settings for the switch, including information about port status, authorized managers, community names, backup links, IP addresses, security configuration, and general system information.

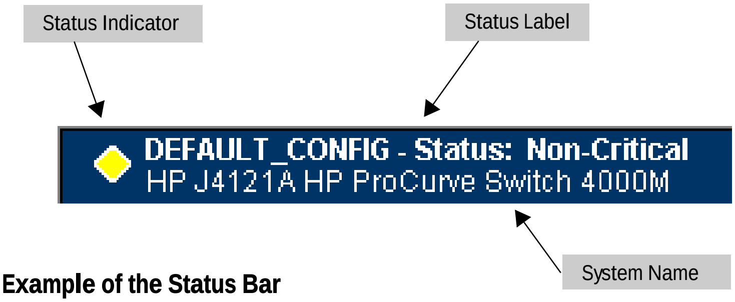
Support Tab



The URL for this window is set in the **Configuration | Support/Mgmt URLs** option. By default, it is set to Hewlett-Packard's Network City web site, but you can change it to the URL for another location, such as an internal support resource. See also page 3-9 and “Support URLs Feature” on page 6-4.

The Status Bar

The Status Bar is displayed in the upper left corner of the web browser interface screen. Figure 3-15 shows an expanded view of the status bar.



DEFAULT_CONFIG - Status: Non-Critical
HP J4121A HP ProCurve Switch 4000M

Figure 3-15. Example of the Status Bar

The Status bar consists of four objects:

- **Status Indicator.** Indicates, by icon, the severity of the most critical alert in the current display of the Alert Log. This indicator can be one of three shapes and colors as shown in the following table.

Table 3-3. Status Indicator Key

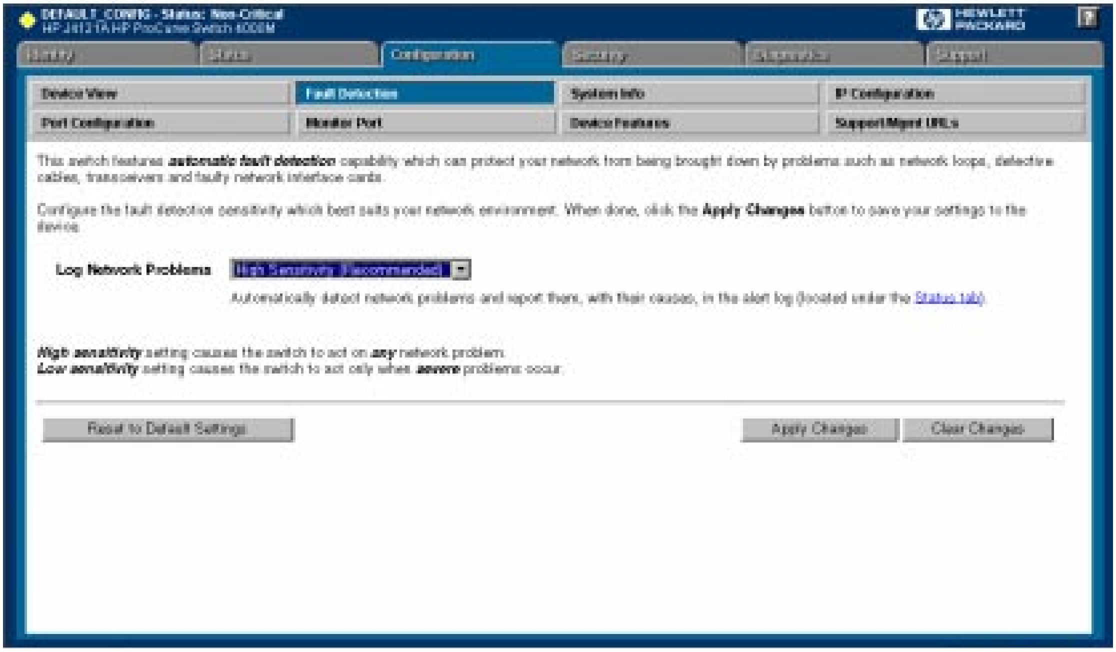
Color	Gauge Severity Region	Status Indicator Shape
Green	Normal Activity	●
Yellow	Warning	◆
Red	Critical	⚠

- **System Name.** Indicates the product name of the switch for which you have created your current web browser interface session.
- **Status Label.** Indicates, by test string, the severity of the most critical alert in the current display of the Alert Log.
- **Most Critical Alert Description.** A short narrative description of the earliest, unacknowledged alert with the current highest severity in the Alert Log, appearing in the right portion of the Status Bar. In instances where multiple critical alerts have the same severity level, only the earliest unacknowledged alert is deployed in the Status bar.

Setting Fault Detection Policy

One of the powerful features in the web browser interface is the Fault Detection facility. For your switch, this feature controls the types of alerts reported to the Alert Log based on their level of severity.

Set this policy in the Fault Detection window (figure 3-16).



This switch features **automatic fault detection** capability which can protect your network from being brought down by problems such as network loops, defective cables, transceivers and faulty network interface cards.

Configure the fault detection sensitivity which best suits your network environment. When done, click the **Apply Changes** button to save your settings to the device.

Log Network Problems: High Sensitivity (Recommended)

Automatically detect network problems and report them, with their causes, in the alert log (located under the Status tab).

High sensitivity setting causes the switch to act on ***any*** network problem.
Low sensitivity setting causes the switch to act only when ***severe*** problems occur.

Figure 3-16. The Fault Detection Window

Working With Fault Detection

The Fault Detection screen contains a list box for setting fault detection and response policy. You set the sensitivity level at which a network problem should generate an alert and send it to the Alert Log.

To provide the most information on network problems in the Alert Log, the recommended sensitivity level for **Log Network Problems** is **High Sensitivity**. The Fault Detection settings are:

- **High Sensitivity.** This policy directs the switch to send all alerts to the Alert Log. This setting is most effective on networks that have none or few problems.

- **Medium Sensitivity.** This policy directs the switch to send alerts related to network problems to the Alert Log. If you want to be notified of problems which cause a noticeable slowdown on the network, use this setting.
- **Low Sensitivity.** This policy directs the switch to send only the most severe alerts to the Alert Log. This policy is most effective on a network that normally has a lot of problems and you want to be informed of only the most severe ones.
- **Never.** Disables the Alert Log and transmission of alerts (traps) to the management server (in cases where a network management tool such as HP TopTools for Hubs & Switches is in use). Use this option when you don't want to use the Alert Log.

The Fault Detection Window also contains three Change Control Buttons:

- **Apply Changes.** This button stores the settings you have selected for all future sessions with the web browser interface until you decide to change them.
- **Clear Changes.** This button removes your settings and returns the settings for the list box to the level it was at in the last saved detection-setting session.
- **Reset to Default Settings.** This button reverts the policy setting to Medium Sensitivity for Log Network Problems.

Using the Switch Console Interface

This chapter describes the following features:

- Overview of the switch console (page 4-1)
- Starting and ending a console session (page 4-2)
- The Main Menu (page 4-4)
- Screen structure and navigation (page 4-5)
- Using password security (page 4-9)
- Rebooting the switch (page 4-13)
- Using the command prompt (page 4-15)

Overview

About the Switch Console. The switch console enables you to do the following:

- Modify the switch's configuration (see chapter 6)
- Configure the switch with an IP address that allows you to manage the switch from an SNMP-based network management station (chapter 2), through the switch's web browser interface (chapter 3), or through Telnet access to the console. (See "How To Start a Console Session" on page 4-2.)
- Monitor the switch and its port status (chapter 7)
- Monitor the network activity through the switch (page 6-29)
- Control console security by configuring passwords. (See "Using Password Security" on page 4-9.)
- Download new software to the switch (appendix A.)

You can access the switch console interface using either:

- The Console RS-232 port, as described in the installation guide you received with the switch.

- Via Telnet from a networked PC running a Telnet application or running the web browser interface. (Telnet access to the switch is available from the web browser interface.) Telnet requires that an IP address and subnet mask have already been configured on the switch—see chapter 2.

Configuration changes made through the console overwrite previous changes made through the web browser interface. Similarly, configuration changes made through the web browser interface overwrite any prior changes made through the console. The console gives you access to all switch configuration parameters (except for control of the Alert Log in the web browser interface). The web browser interface gives you access to a subset of switch configuration parameters, plus easy-to-use status and alert information. Refer to chapter 3, “Using the HP Web Browser Interface” and chapter 6, “Configuring the Switch”.

Starting and Ending a Console Session

Note

This section assumes that either a terminal device is already configured and connected to your switch (as described in chapter 1, “Installation” of the *HP ProCurve Switch 4000M and 2400M Installation Guide*) or that you have already configured an IP address on the switch so you can start a Telnet session with the switch.

How To Start a Console Session:

1. Start your PC terminal emulator or terminal, or Telnet to the switch from a remote terminal device or from the web browser interface. (For web browser access, see “Starting an HP Web Browser Session with the Switch” on page 3-3.)
2. Do one of the following:
   - If you are using Telnet, go to step 3.
   - If you are using a PC terminal emulator or a terminal, press Enter twice.
3. The screen briefly displays a message indicating the baud rate at which the serial interface is operating, followed by the copyright screen. Do one of the following:

- If a password has been set, the Password prompt appears. Type the password and press [Enter] to display the Main Menu (figure 4-1). Figure 4-1 shows the Main Menu for manager-level access. If you enter the operator password to start the console session, the Main Menu has a subset of these items.
- If no password has been set, you will see this prompt:

  Press any key to continue.

  Press any key to display the Main Menu (figure 4-1).

If there is any system-down information to report, the switch displays it in this step and in the Event Log.

For a description of Main Menu features, refer to "Main Menu Features" on page 4-4.

How To End a Console Session:

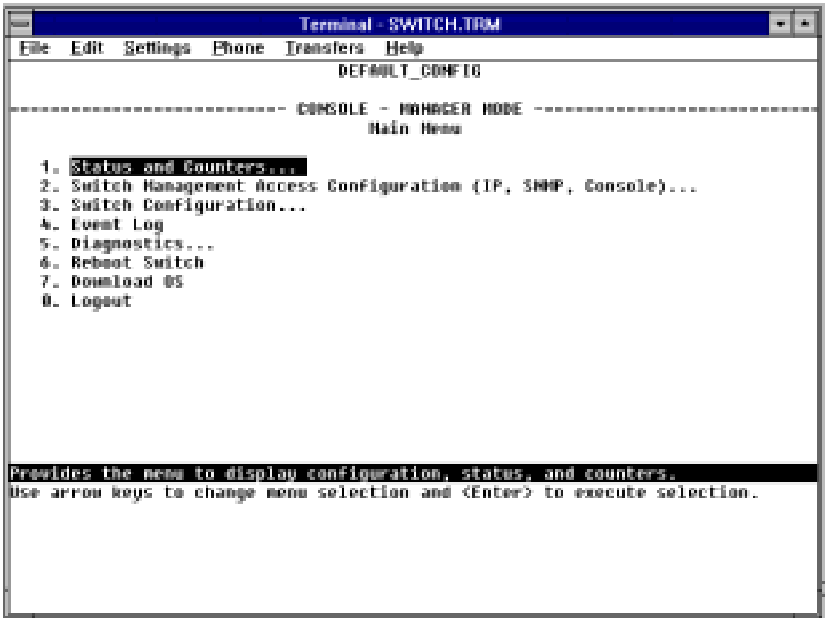
The process of ending the console session depends on whether, during the console session, you have made any changes to the switch configuration that requires a reboot of the switch to activate. Configuration changes requiring a reboot of the switch are indicated by an asterisk (*) next to the configured item in the Configuration menu and also next to the Switch Configuration item in the Main Menu.

1. If you have *not* made configuration changes in the current session that require a switch reboot to activate, return to the Main Menu, and press [0] to log out. Then just exit from the terminal program, turn off the terminal, or quit from the Telnet session.
2. If you *have* made configuration changes that require a switch reboot:
   a. Return to the Main Menu.
   b. Press [6] to select **Reboot Switch** and follow the instructions on the reboot screen.

   Rebooting the switch terminates the console session, and, if you are using Telnet, disconnects the Telnet session.

   (See "Rebooting To Activate Configuration Changes" on page 4-14.)
3. Exit from the terminal program, turn off the terminal, or close the Telnet application program.

Main Menu Features



```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                                 Main Menu

   1. Status and Counters...
   2. Switch Management Access Configuration (IP, SNMP, Console)...
   3. Switch Configuration...
   4. Event Log
   5. Diagnostics...
   6. Reboot Switch
   7. Download OS
   0. Logout










Provides the menu to display configuration, status, and counters.
Use arrow keys to change menu selection and <Enter> to execute selection.
```

Figure 4-1. The Main Menu

The Main Menu gives you access to these console interface features:

- **Status and Counters:** Provides access to display screens providing information on switch and port status, network activity, the address tables, and spanning tree operation. (Refer to chapter 7, "Monitoring and Analyzing Switch Operation".)
- **Switch Management Access Configuration:** Provides access to configuration screens that control interaction between the switch and network management, including IP address, SNMP community names and trap receivers, console/serial link parameters, and console passwords.
- **Switch Configuration:** Provides access to configuration screens that enable you to display the current configuration settings and to customize the configuration of the switch features. (Refer to chapter 6, "Configuring the Switch".)

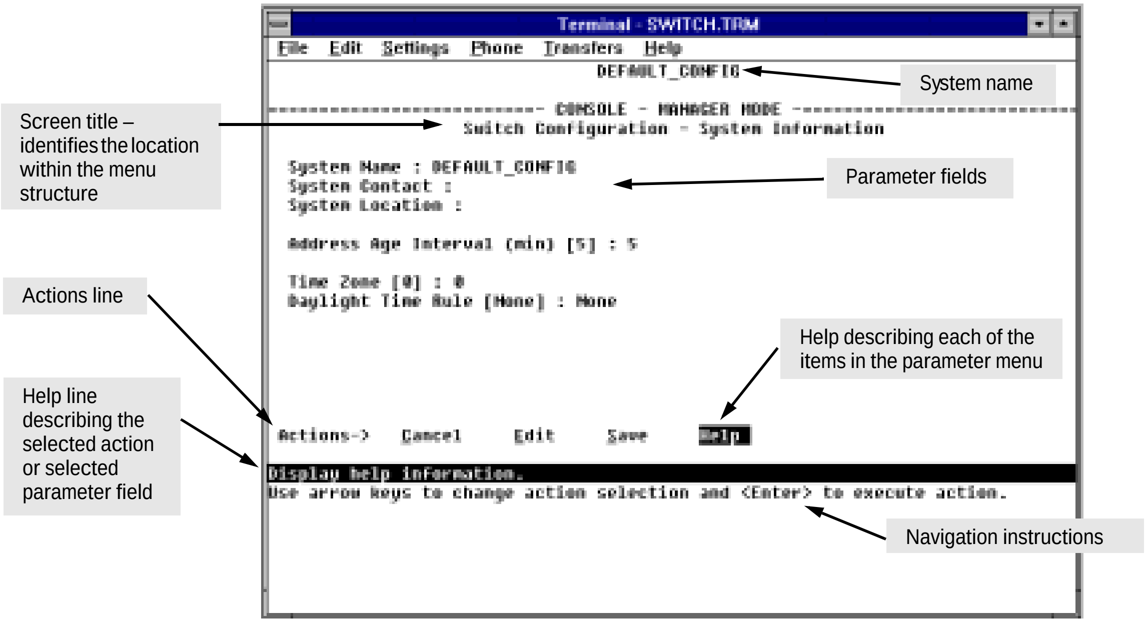
- **Event Log:** Enables you to read progress and error messages that are useful for checking and troubleshooting switch operation. (Refer to “Using the Event Log To Identify Problem Sources” in chapter 8, “Troubleshooting”.)
- **Diagnostics:** Provides access to screens for doing Link and Ping connectivity testing, listing the current switch configuration, and to a command prompt for executing system management, monitoring, and troubleshooting commands. (Refer to “Diagnostics” in chapter 8, “Troubleshooting”.)
- **Reboot Switch:** Performs a “soft” reboot, which is the minimum required (in some cases) to activate configuration changes that have been made. (Refer to “Rebooting To Activate Configuration Changes” on page 4-14.) Using this option, the reboot cycle is sightly faster because, instead of running a new self-test, it accepts the self-test results from the most recent “hard” reboot caused by cycling the power or pressing the Reset button.
- **Download OS:** Enables you to download a new
- software version to the switch. (Refer to appendix A, “File Transfers”.)
- **LOGOUT:**
- Terminates the console session and disconnects Telnet access to the switch. (Refer to “How To End a Console Session” on page 4-3.)

Screen Structure and Navigation

Console screens include these three elements:

- Parameter fields and/or read-only information such as statistics
- Navigation and configuration actions, such as Save, Edit, and Cancel
- Help line to describe navigation options, individual parameters, and read-only data

For example, in the System Information screen on the next page:



```
                                DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                    Switch Configuration - System Information

  System Name : DEFAULT_CONFIG
  System Contact :
  System Location :

  Address Age Interval (min) [5] : 5

  Time Zone [0] : 0
  Daylight Time Rule [None] : None




 Actions->   Cancel     Edit     Save     Help

Display help information.
Use arrow keys to change action selection and <Enter> to execute action.
```

System name

Screen title – identifies the location within the menu structure

Parameter fields

Actions line

Help describing each of the items in the parameter menu

Help line describing the selected action or selected parameter field

Navigation instructions

Figure 4-2. Elements of the Screen Structure

“Forms” Design. The configuration screens, in particular, operate similarly to a number of PC applications that use forms for data entry. When you first enter these screens, you see the current configuration for the item you have selected. To change the configuration, the basic operation is to:

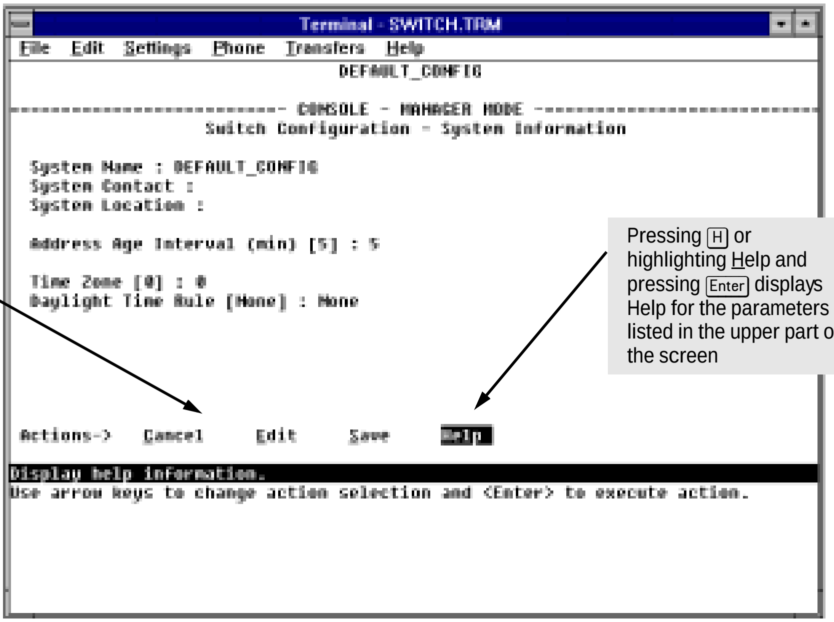
1. Press [E] to select the **Edit** action.
2. Navigate through the screen making ALL the necessary configuration changes. (See Table 4-1 on the next page.)
3. Press [Enter] to return to the **Actions** line. From there you can save the configuration changes or cancel the changes. Cancel returns the configuration to the values you saw when you first entered the screen.

The next page provides specific instructions on using the console screens.

Table 4-1. How To Navigate in the Console

Task:	**Actions:**
Execute an action from an "Actions –[>] list at the bottom of the screen:	Use either of the following methods: • Use the arrow keys (← ,or →) to highlight the action you want to execute, then press Enter. • Press the key corresponding to the capital letter in the action name. For example, in a configuration menu, press E to select Edit and begin editing parameter values.
Reconfigure (edit) a parameter setting or a field:	1. Select a configuration item, such as **System Name**. (See figure 4-2.) 2. Press E (for **Edit** on the Actions line). 3. Use Tab or the arrow keys (←, →, ↑, or ↓) to highlight the item or field. 4. Do one of the following: – If the parameter has preconfigured values, either use the Space bar to select a new option or type the first part of your selection and the rest of the selection appears automatically. (The help line instructs you to "Select" a value.) – If there are no preconfigured values, type in a value (the Help line instructs you to "Enter" a value). 5. If you want to change another parameter value, return to step 3. 6. If you are finished editing parameters in the displayed screen, press Enter to return to the Actions line and do one of the following: – To save any configuration changes you have made, press S (for the **Save** action). – To exit from the screen without saving any changes that you have made (or if you have not made changes), press C (for the **Cancel** action). ***Note:*** Most parameter changes are activated when you execute Save, and it is therefore not necessary to reboot the switch after making these changes. But if an asterisk appears next to any menu item you reconfigure, it is necessary to reboot the switch to implement the change. In this case, rebooting should be done after you have made all desired changes and then returned to the Main Menu. 7. When you are finished editing parameters, return to the Main Menu. 8. If necessary, reboot the switch by highlighting Reboot Switch in the Main Menu and pressing Enter. (Refer to the ***Note***, above.)
Exit from a read-only screen.	Press B (for the **Back** action).

To get Help on individual parameter descriptions. In all screens except the Command Prompt screen there is a **Help** option in the **Actions** line. Whenever any of the items in the **Actions** line is highlighted, press H, and a separate help screen is displayed. For example:



```
                                DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                  Switch Configuration - System Information

  System Name : DEFAULT_CONFIG
  System Contact :
  System Location :

  Address Age Interval (min) [5] : 5

  Time Zone [0] : 0
  Daylight Time Rule [None] : None




 Actions->   Cancel     Edit     Save     Help

Display help information.
Use arrow keys to change action selection and <Enter> to execute action.
```

Highlight on any item in the Actions line indicates that the Actions line is active.

The Help line describes the purpose of the currently highlighted item in the Actions line.

Pressing H or highlighting Help and pressing Enter displays Help for the parameters listed in the upper part of the screen

Figure 4-3. Example Showing How To Display Help

To get Help on the actions or data fields in each screen: Use the arrow keys (←, →, ↑, or ↓) to select an action or data field. The help line under the **Actions** items describes the currently selected action or data field. (For guidance on how to navigate in a configuration screen, see the instructions provided at the bottom of the screen, or refer to “Screen Structure and Navigation” on page 4-5.)

Using Password Security

There are two levels of console access: Manager and Operator. For security, you can set a password on each of these levels.

Level	Actions Permitted
Manager:	Access to all console interface areas. *This is the default level.* That is, if a Manager password has *not* been set prior to starting the current console session, then anyone having access to the console can access any area of the console interface.
Operator:	Access to the Status and Counters menu, the Event Log, and the Diagnostics menu, but no Configuration capabilities. On the Operator level, the configuration menus, Download OS, and Reboot Switch options in the Main Menu, and the Command Prompt option in the Diagnostics menu are not available.

To use password security:

1. Set a Manager password (and an Operator password, if applicable for your system) as described on page 4-10.
2. Exit from the current console session. A Manager password will now be needed for full access to the console.

If you do steps 1 and 2, above, then the next time a console session is started, the console interface will prompt for a password. Assuming that both a Manager password and an Operator password have been set, the level of access to the console interface will be determined by which password is entered in response to the prompt.

If you set a Manager password, you may also want to configure the **Connection Inactivity Time** parameter in the Console/Serial Link configuration screen that is under the **Switch Management Access Configuration** menu (see page 6-22). This causes the console session to end after the specified period of inactivity, thus giving you added security against unauthorized console access.

Note

The manager and operator passwords control access to both the web browser interface and the switch console interface.

Note

If there is only a Manager password set (with no Operator password), and the Manager password is not entered correctly when the console session begins, the switch operates on the Operator level.

If there are both a Manager password and an Operator password, but neither is entered correctly, access to the console will be denied.

If a Manager password is not set, anyone having access to the console interface can operate the console with full manager privileges, regardless of whether an Operator password is set, by simply pressing [Enter] *at the password prompt.*

Passwords are case-sensitive.

The rest of this section covers how to:

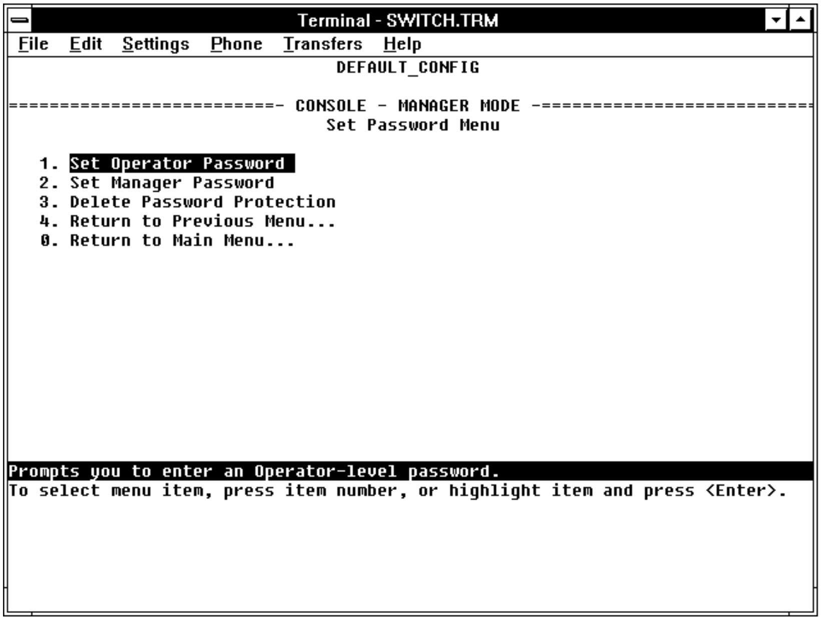
- Set Passwords
- Delete Passwords
- Recover from a Lost Password

To set Manager and Operator passwords:

1. From the Main Menu select:

   2. Switch Management Access Configuration

      5. Console Passwords



```
                                DEFAULT_CONFIG

===========================- CONSOLE - MANAGER MODE -===========================
                               Set Password Menu

   1. Set Operator Password
   2. Set Manager Password
   3. Delete Password Protection
   4. Return to Previous Menu...
   0. Return to Main Menu...

Prompts you to enter an Operator-level password.
To select menu item, press item number, or highlight item and press <Enter>.
```

Figure 4-4. The Set Password Screen

2. To set a new password:
   a. Select **Set Manager Password** or **Set Operator Password**. You will then be prompted with **Enter new password**.
   b. Type a password of up to 16 ASCII characters with no spaces and press [Enter]. (Remember that passwords are case-sensitive.)
   c. When prompted with **Enter new password again**, retype the new password and press [Enter].
3. When you have finished all password configuration, select **Return to Main Menu** to return to the Main menu, or **Return to the Previous Menu** to return to the Switch Management Access Configuration menu.

After a password is set, if you subsequently start a new console session, you will be prompted to enter the password.

To Delete Password Protection (Including Recovery from a Lost Password): This procedure deletes *both* passwords (Manager and Operator). If you have physical access to the switch, press the Clear button on the front of the switch to clear all password protection, then enter new passwords as described earlier in this chapter. If you do not have physical access to the switch, you will need the Manager password:

1. Enter the console at the Manager level.
2. Go to the **Console Passwords** screen as described above.
3. Select **Delete Password Protection**. You will then see the following prompt:

   Continue Deletion of password protection?

4. Press the Space bar to select **Yes**, then press [Enter].
5. Press [Enter] to clear the Password Protection message.
6. Select **Return to Main Menu** to return to the Main menu, or **Return to the Previous Menu** to return to the **Switch Management Access Configuration** menu.

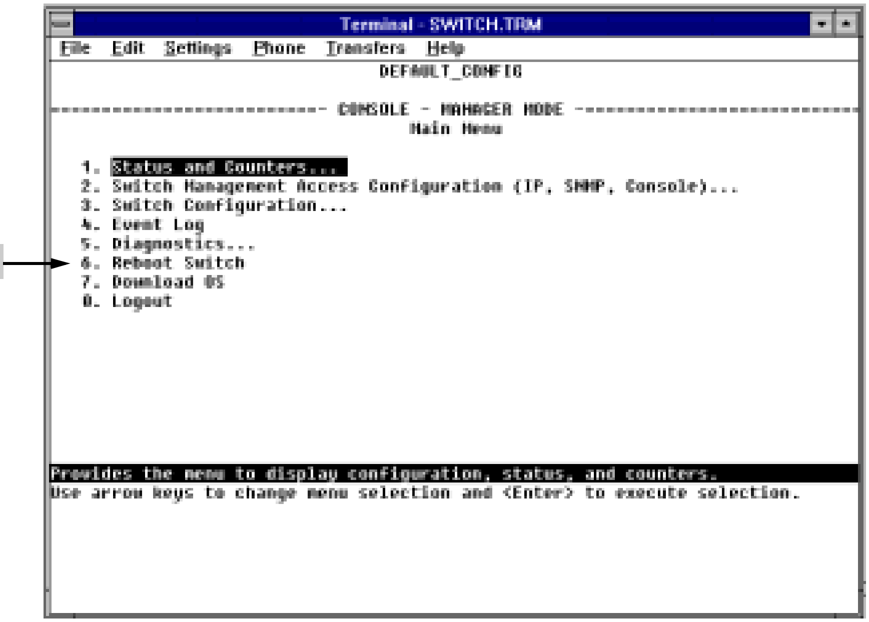
To Recover from a Lost Manager Password:

If you cannot start a console session at the manager level because of a lost Manager password, you can clear the password by getting physical access to the switch and pressing the Clear button. This action deletes all passwords and user names (Manager and Operator) used by both the console and the web browser interface.

Rebooting the Switch

Rebooting the switch terminates the current console session and performs a reset of the operating system. Rebooting the switch also activates certain configuration changes that require a reboot and resets statistical counters to zero. (Note that statistical counters can be reset to zero without rebooting the switch. See “Displaying Port Counters from the Console Interface” on page 7-11.)

To Reboot the switch, use the **Reboot Switch** option in the Main Menu. (Note that the Reboot Switch option is not available if you log on in Operator mode; that is, if you enter an Operator password instead of a manager password at the password prompt.)



```
                                DEFAULT_CONFIG

-------------------------- CONSOLE - MANAGER MODE --------------------------
                                   Main Menu

   1. Status and Counters...
   2. Switch Management Access Configuration (IP, SNMP, Console)...
   3. Switch Configuration...
   4. Event Log
   5. Diagnostics...
   6. Reboot Switch
   7. Download OS
   0. Logout

Provides the menu to display configuration, status, and counters.
Use arrow keys to change menu selection and <Enter> to execute selection.
```

Reboot Switch option

Figure 4-5. The Reboot Switch Option in the Main Menu

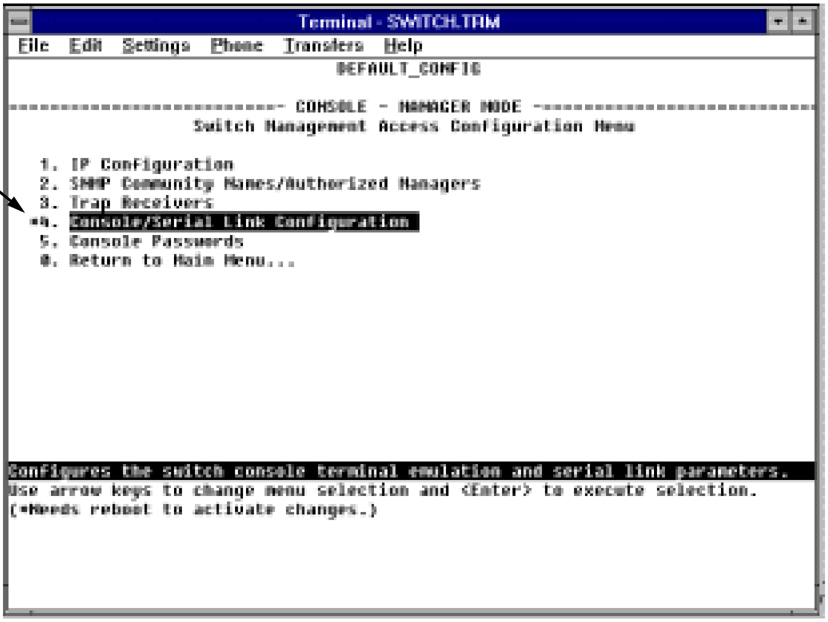
Rebooting To Activate Configuration Changes. Configuration changes for some parameters become effective as soon as you save them. However, you must reboot the switch in order to implement any changes to any parameters in the following areas:

- Console/Serial Link (under **2. Switch Management Access Configuration** menu)
- VLAN Names (under **3. Switch Configuration** | **5. Advanced Feature** | **4. VLAN Menu**)

If configuration changes requiring a reboot have been made, the switch displays an asterisk (*****) next to the menu item in which the change has been made. For example, if you change and save parameter values for the switch's Console/Serial Link configuration, the need for rebooting the switch would be indicated by an asterisk appearing next to the item **Console/Serial Link** in the **Switch Management Access Configuration** menu, and in the Main Menu as shown in figure 4-6:

Asterisk indicates a configuration change that requires a reboot in order to take effect.

Reminder to reboot the switch to activate configuration changes.



```
                                DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                 Switch Management Access Configuration Menu

   1. IP Configuration
   2. SNMP Community Names/Authorized Managers
   3. Trap Receivers
  *4. Console/Serial Link Configuration
   5. Console Passwords
   0. Return to Main Menu...








Configures the switch console terminal emulation and serial link parameters.
Use arrow keys to change menu selection and <Enter> to execute selection.
(*Needs reboot to activate changes.)
```

Figure 4-6. Example of a Configuration Change Requiring a Reboot

The Command Prompt

In addition to the menu-based part of the console interface, under the Diagnostics Menu, a command-line based interface is available. The commands are primarily for the expert user and for diagnostics purposes. For more information, refer to “Using the Command Prompt” on page 8-18.

Using HP TopTools or Other SNMP Tools To Monitor and Manage the Switch

You can manage the switch via SNMP from a network management station. Included with your switch is a CD-ROM containing a copy of HP TopTools for Hubs & Switches, an easy-to-install and use network management application that runs on your Windows NT- or Windows 95-based PC.

HP TopTools for Hubs & Switches provides control of your switch through its graphical interface. In addition, it makes use of the RMON agent and statistical sampling software that is included in the switch to provide powerful, but easy-to-use traffic monitoring and network activity analysis tools.

This chapter provides:

- An overview of SNMP management for the switch
- An overview of the configuration process for supporting SNMP management of the switch. (For the configuration procedures for specific features, refer to chapter 6, “Configuring the Switch”.)
- Information on advanced management through RMON and HP Extended RMON Support

To implement SNMP management, you must either configure the switch with the appropriate IP address or, if you are using DHCP/Bootp to configure the switch, ensure that the DHCP or Bootp process provides the IP address. (The IPX address is automatically learned.) If multiple VLANs are configured, each VLAN interface should have its own IP or IPX network address.

SNMP Management Features

SNMP management features on the switch include:

- Security via configuration of SNMP communities
- Event reporting via SNMP traps and RMON
- Managing the switch with a network management tool such as HP TopTools for Hubs & Switches
- Monitoring data normally associated with the SNMP agent (“Get” operations). Supported *Standard* MIBs include:

- Bridge MIB (RFC 1493)

  dot1dBase, dot1dTp, dot1dStp
- Ethernet MAU MIB (RFC 1515)

  dot3IfMauBasicGroup
- Interfaces Evolution MIB (RFC 1573)

  ifGeneralGroup, ifRcvAddressGroup, ifStackGroup
- RMON MIB (RFC 1757)

  etherstats, events, alarms, and history
- SNMP MIB-II (RFC 1213)

  system, interfaces, at, ip, icmp, tcp, udp, snmp
- Entity MIB (RFC 2037)

HP Proprietary MIBs include:

- Statistics for message and packet buffers, tcp, telnet, and timep (netswtst.mib)
- Port counters, forwarding table, and CPU statistics (stat.mib)
- tftp download (downld.mib)
- Integrated Communications Facility Authentication Manager and SNMP communities (icf.mib)
- HP ProCurve Switch 4000 M and Switch 2400M configuration (config.mib)
- HP VLAN configuration information (vlan.mib) supporting hpVlanGeneralGroup
- HP Extended RMON MIB version 4 to allow statistical sampling
- HP Entity MIB (entity.mib)

The switch SNMP agent also uses certain variables that are included in a Hewlett-Packard proprietary MIB file you can add to the SNMP database in your network management tool. You can copy the MIB file from the HP TopTools for Hubs & Switches CD shipped with the switch, or from following World Wide Web site:

http://www.hp.com/go/network_city

For more information, refer to Customer Support/Warranty booklet included with your switch.

SNMP Configuration Process

This requires that you configure the switch with the appropriate IP address. (Refer to chapter 2, "Configure an IP Address on the Switch". If you are using DHCP/Bootp to configure the switch, ensure that the DHCP/Bootp process provides the IP address. (Refer to "DHCP/Bootp Operation" on page 6-10.)

The general steps to configuring for SNMP access to the preceding features are:

1. From the Main menu, select

   2. Switch Management Access Configuration

   1. IP Configuration

2. Use either of the following methods to configure a network address for the switch, including any necessary gateway:
   - Use DHCP/Boot, which is enabled by default, to acquire an IP address. Make sure the DHCP/Bootp server is configured to support the switch. (Refer to "DHCP/Bootp Operation" on page 6-10.)
   - Manually configure an IP address. (Refer to chapter 2, "Configuring an IP Address on the Switch".)
3. Configure the appropriate SNMP communities. (The "public" community exists by default and is used by HP's network management applications.) (For more on configuring SNMP communities, refer to "SNMP Communities" on page 6-16.)
4. Configure the appropriate trap receivers. (For more on configuring trap receivers, refer to "Trap Receivers" on page 6-19.)

In many networks, manager addresses are not used. In this case, all management stations using the correct community name may access this device with the View and Access levels that have been set for that community. If you want to restrict access to one or more specific nodes, you can enter up to ten IP addresses of such nodes into the Manager Address field. *Configuring one or more IP addresses in the Manager Address field means that only the network management stations at those addresses are authorized to use the community name to access the switch.*

Caution

Deleting the community named “public” disables many network management functions (such as auto-discovery, traffic monitoring, and threshold setting). If security for network management is a concern, it is recommended that you change the write access for the “public” community to “Restricted”.

Note

SNMP community and trap receiver configurations are activated when saved. Rebooting the switch is not necessary unless you have also configured other parameters that require rebooting in order to be activated. (For more on when it is necessary to reboot, refer to “Rebooting the Switch” on page 4-13.)

Advanced Management: RMON and HP Extended RMON Support

The switch supports RMON (Remote Monitoring) and HP Extended RMON on all connected network segments. This allows for troubleshooting and optimizing your network.

RMON

The following RMON groups are supported:

- Ethernet Statistics (except the numbers of packets of different frame sizes)
- Alarm
- History (of the supported Ethernet statistics)
- Event

You can access the Ethernet statistics, Alarm, and Event groups from the HP TopTools for Hubs & Switches network management software included with your switch.

Extended RMON

Extended RMON provides network monitoring and troubleshooting information that analyzes traffic from a network-wide perspective. Extended RMON notifies you about network problems and identifies the end node at fault. That information can be used to set up RMON to study the problem more closely, if desired. Because it is based on detailed statistical sampling, Extended RMON lessens the load on devices and network bandwidth.

Configuring the Switch

Overview

This chapter describes the switch configuration features available in both the switch console and the HP web browser interface. If you need information on how to operate either the web browser interface or the console, refer to:

- Chapter 3, “Using the HP Web Browser Interface”
- Chapter 4, “Using the Console Interface”

Why Reconfigure? In its factory default configuration, the switch operates as a multiport learning bridge with network connectivity provided by the particular modules you have installed. However, to enable specific management features and to “fine-tune” your switch for the specific performance and security needs in your network, you will most likely want to reconfigure individual switch parameters.

How To Find Configuration Information. Each section in this chapter is organized as follows:

- **Introductory feature information:** Provides an overview of the feature.
- **“How-To” Configuration steps:** Describes the step-by-step process used to actually configure the feature. It also includes examples of the web browser interface and console interface screens.
- **Detailed feature information:** Provides a more in-depth description of the feature, along with notes on interoperation with other features.

To find a specific feature, see the table in the next section.

Configuration Features

Table 6-1. Configurable Feature Comparison

Feature	Switch Console	Web Browser Interface	Page
Time Protocol	Yes	—	6-8
IP Configuration	Yes	Yes	6-6
SNMP Communities	Yes	—	6-16
Authentication Traps Trap Receivers	Yes	—	6-19
Fault Detection	No	Yes	3-14
Console/Serial Link			6-21
• Enable Inbound Telnet to Console	Yes	—	6-22
• Enable web browser interface Access	Yes	—	6-22
• Terminal settings	Yes	—	6-22
Operator and Manager Usernames	—	Yes	3-7
Operator and Manager Passwords	Yes	Yes	3-7, 4-9
System Information	Yes	Yes	6-23
Address Age Interval	Yes	—	
System Time	Yes	—	
Port Settings	Yes	Yes	6-25
Network Monitoring Port	Yes	Yes	6-29
Spanning Tree Enable/Disable	Yes	Yes	6-34
Spanning Tree Parameters	Yes	—	
Traffic/Security Filters	Yes	—	6-39
Enable/Disable VLANs	Yes	—	6-44
VLAN Names and Port Assignment	Yes	—	
Load Balancing: Port Trunking	Yes	—	6-63
IP Multicast (IGMP) Enable/Disable	Yes	Yes	6-71
IGMP Priority and Port Settings	Yes	—	

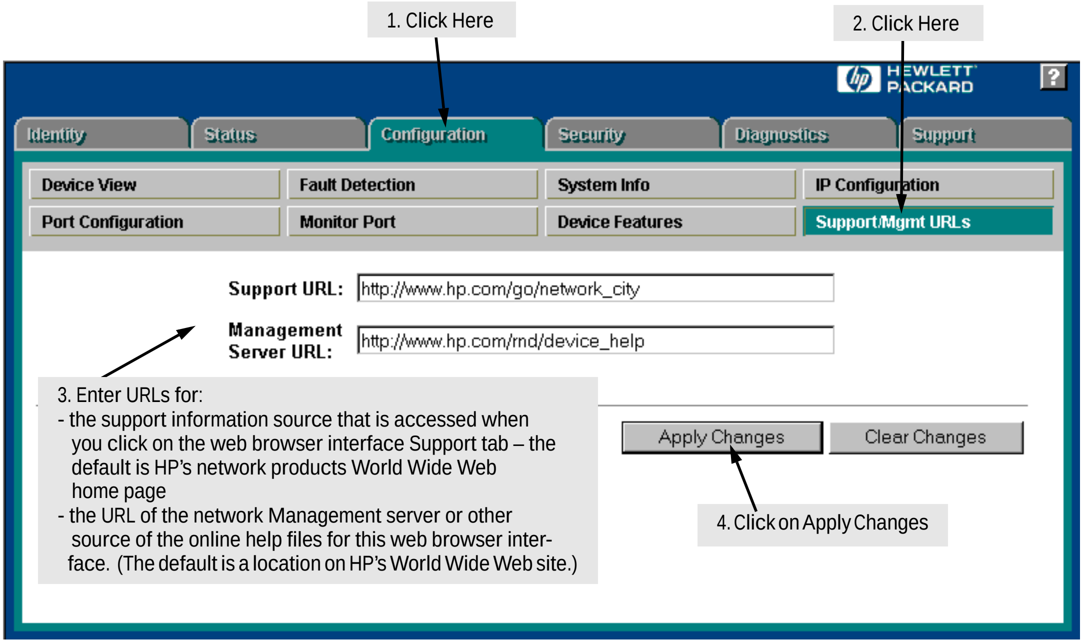
Note

In the factory default configuration, the Spanning Tree Protocol (STP—which automatically blocks redundant links) is disabled. Generally, you should enable STP to prevent broadcast storms if there are redundant links in your network. However, due to the requirements of the 802.1Q VLAN standard, STP blocks redundant physical links even if they are in separate VLANs. This could result in blocking links unnecessarily. For more information, refer to "Spanning Tree Protocol" on page 6-34.

Support URLs Feature

The Support/Mgmt URLs window enables you to change the World Wide Web Universal Resource Locator (URL) for two functions:

- **Support URL** – a support information site for your switch
- **Management Server URL** – the site for online help for the web browser interface, and, if set up, the URL of a network management station running HP TopTools for Hubs & Switches.



1. Click Here

2. Click Here

Support URL: http://www.hp.com/go/network_city

Management Server URL: http://www.hp.com/rnd/device_help

3. Enter URLs for:
- the support information source that is accessed when you click on the web browser interface Support tab – the default is HP's network products World Wide Web home page
- the URL of the network Management server or other source of the online help files for this web browser interface. (The default is a location on HP's World Wide Web site.)

4. Click on Apply Changes

Figure 6-1. The Default Support/Mgmt URLs Window

Support URL

This is the site that will be accessed when you click on the **Support** tab on the web browser interface. The default URL is:

http://www.hp.com/go/network_city

which is the World

Wide Web site for Hewlett-Packard's networking products. Click on the Support button on that page and you can get to support information regarding your switch, including white papers, operating system (OS) updates, and more.

You could instead enter the URL for a local site that you use for entering reports about network performance, or whatever other function you would like to be able to easily access by clicking on the **Support** tab.

Management Server URL

This field specifies which of the following two locations the switch will use to find online Help for the web browser interface:

- The URL of online Help provided by HP on the world wide web
- The URL of a network management station running HP TopTools for Hubs & Switches

The default URL is:

http://www.hp.com/rnd/device_help

which is the location on HP's World Wide Web site of the help files for the web browser interface. To use this site, you must have a modem link or other access to the World Wide Web operating when you run the web browser interface. Then, when you click on the [?] button on any of the web browser interface screens, the context sensitive help for that screen will be retrieved from HP.

Alternatively, if you install HP TopTools for Hubs & Switches on your network and TopTools discovers your switch, it automatically overwrites the Management Server URL field with the address or name of the TopTools management station. In this case, online help will automatically be provided from the network management station. Refer to "Online Help for the HP Web Browser Interface" on page 3-9. (HP Top Tools for Hubs & Switches has the capability to perform network-wide policy management and configuration of your switch. For more information, refer to the documentation provided on the HP TopTools CD shipped with the switch—available Fall, 1998.)

IP Configuration

Enables you to configure:

- IP address, subnet mask, and (optionally) the gateway address for the switch so that it can be managed in an IP network
- The time server information (used if you want the switch to get its time information from another device operating as a Timep server)

If VLANs are not configured, then enable IP once for the entire switch. If VLANs are configured, then enable IP on a "per VLAN" basis. This is because each VLAN is a separate network and requires a unique IP address, plus a subnet mask. A gateway (IP) address is optional. For more on VLANs, refer to "Virtual LANs (VLANs)" on page 6-44.

The switch can receive IP addressing from a DHCP/Bootp server or manually using the web browser interface or console interface. A third option is to disable the IP configuration. (Refer "DHCP/Bootp Operation" on page 6-10 for information on setting up automatic configuration from a server.)

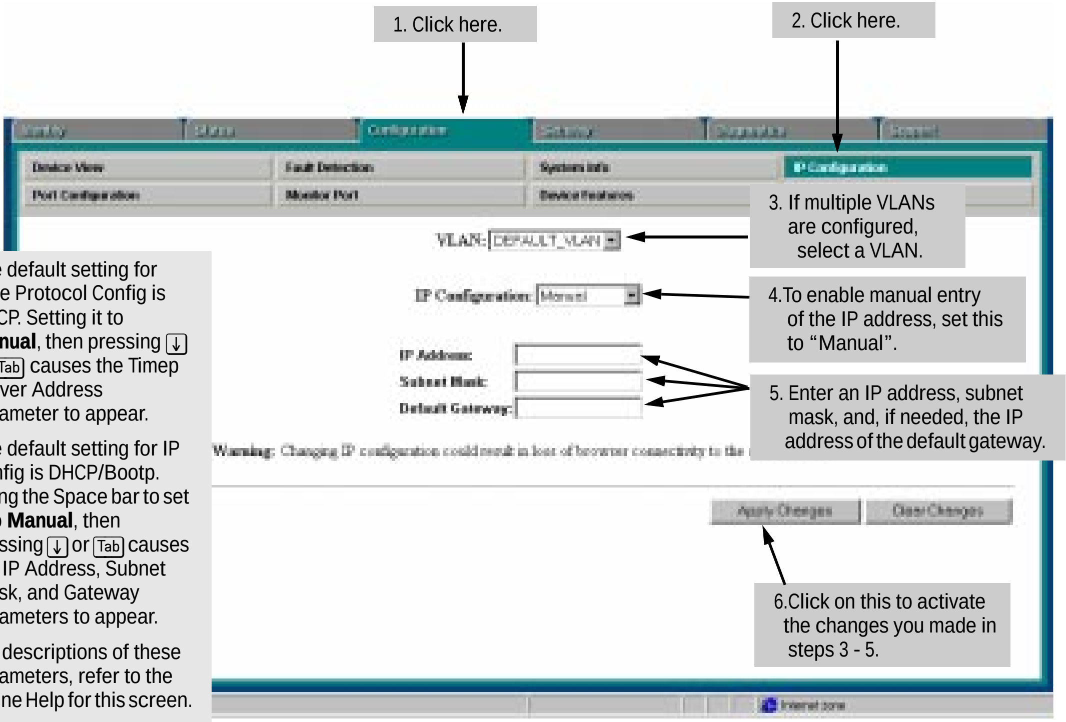
The IP addressing used in the switch should be compatible with your network. (The IP address must be unique; the subnet mask must be the same for all devices on the same IP network.)

Note

If you plan to connect to other networks that use globally administered IP addressing, refer to "Globally Assigned IP Network Addresses" on page 6-14.

For information on how IP addressing affects switch performance, refer to "How IP Addressing Affects Switch Operation" on page 6-10.

Configuring IP Addressing Parameters from the Web Browser Interface



VLAN: DEFAULT_VLAN

IP Configuration: Manual

IP Address:

Subnet Mask:

Default Gateway:

Warning: Changing IP configuration could result in loss of browser connectivity to the

1. Click here.

2. Click here.

3. If multiple VLANs are configured, select a VLAN.

4. To enable manual entry of the IP address, set this to "Manual".

5. Enter an IP address, subnet mask, and, if needed, the IP address of the default gateway.

6. Click on this to activate the changes you made in steps 3 - 5.

The default setting for Time Protocol Config is DHCP. Setting it to **Manual**, then pressing ↓ or Tab causes the Timep Server Address parameter to appear.

The default setting for IP Config is DHCP/Bootp. Using the Space bar to set it to **Manual**, then pressing ↓ or Tab causes the IP Address, Subnet Mask, and Gateway parameters to appear.

For descriptions of these parameters, refer to the online Help for this screen.

Before using the DHCP/Bootp option, refer to DHCP/Bootp Operation on page 6-10.

Figure 6-2. Configuring IP Addressing on the Web Browser Interface

HP-WBI Parameter	Description
VLAN	If you have configured multiple VLANs, then use this parameter to select the VLAN to which you want to assign an IP address. Otherwise, leave it set to the default.
IP Configuration	The method the switch uses to acquire its IP service configuration. • DHCP/Bootp: The switch attempts to get its IP configuration or its complete configuration from a DHCP or Bootp server. • Manual: Enables you to manually enter the IP configuration into the next three fields. • Disabled: Network management access to the switch over IP is disabled.

HP-WBI Parameter	Description
IP Address	IP address for the switch (or VLAN) IP interface. If DHCP/Bootp is selected for IP Configuration, this is a read-only field displaying the value received from a DHCP or Bootp server.
Subnet Mask	The same subnet mask that is used by all devices in the IP subnet being configured. If DHCP/Bootp is selected for IP Configuration, this is a read-only field displaying the value received from a DHCP or Bootp server.
Gateway	The IP address of the next-hop gateway node for reaching off-subnet destinations. Used as the default gateway if the requested destination address is not on the local subnet. If DHCP/Bootp is selected for IP Configuration, this is a read-only field displaying the value received from a DHCP or Bootp server.

Configuring IP Addressing Parameters from the Switch Console

You can use the console to manually configure an IP address, subnet mask, and a Gateway IP address (if needed). Or, you can use DHCP/Bootp to configure IP from a DHCP or Bootp server. (To use the DHCP/Bootp option, you must also configure the DHCP or Bootp server accordingly.)

Do one of the following:

- To use the console, set the **IP Config** parameter to **Manual** and then manually enter the IP address and subnet mask you want for the switch.
- If you plan to use DHCP or Bootp, use the console to ensure that the **IP Config** parameter is set to **DHCP/Bootp**, then refer to “DHCP/Bootp Operation” on page 6-10.

To Access IP Addressing:

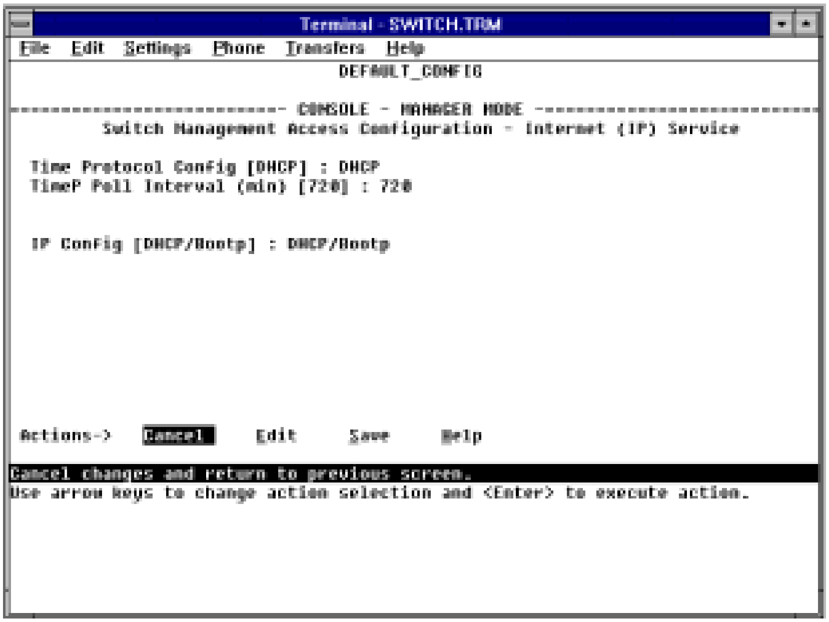
1. From the Console Main Menu, Select...

   2. Switch Management Access Configuration (IP, SNMP, Console)...

   1. IP Configuration

Note

If multiple VLANs are configured, a screen showing all VLANs appears instead of the following screen.



```
                              DEFAULT_CONFIG

=========================- CONSOLE - MANAGER MODE -=========================
        Switch Management Access Configuration - Internet (IP) Service

  Time Protocol Config [DHCP] : DHCP
  TimeP Poll Interval (min) [720] : 720


  IP Config [DHCP/Bootp] : DHCP/Bootp









 Actions->   Cancel     Edit     Save     Help

Cancel changes and return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 6-3. Example of the IP Service Configuration Screen

2. Press [E] (for **Edit**).
3. Select the **IP Config** field and use the Space bar to select **Manual**.
4. Select the **IP Address** field and enter the IP address for the switch.
5. Select the **Subnet Mask** field and enter the subnet mask for the IP address.
6. If you want to reach off-subnet destinations, select the **Gateway** field and enter the IP address of the gateway router.
7. Press [Enter], then [S] (for **Save**).
8. Return to the Main Menu.

How IP Addressing Affects Switch Operation

Without an IP address and subnet mask compatible with your network, the switch operates as a multiport transparent bridge and can be managed only through a direct terminal device connection to the Console RS-232 port. In this state, the switch simply learns which nodes are on which ports and forwards or blocks traffic accordingly. You can use direct-connect console access to take advantage of features that do not depend on IP addressing. However, to realize the full performance capabilities HP proactive networking offers through the switch, configure the switch with an IP address and subnet mask compatible with your network. The following table lists the general features available with and without a network-compatible IP address configured.

Features Available Without an IP Address	Additional HP Proactive Networking Features Available with an IP Address and Subnet Mask
• Direct-connect console access • Bootp or DHCP support for automatic IP address configuration • Spanning Tree Protocol • Port trunking • Traffic filtering • Console-based status and counters information for monitoring switch operation and diagnosing problems. • VLANs • Serial downloads of operating system (OS) updates and configuration files (Xmodem)	• HP web browser interface access, with configuration, security, and diagnostic tools, plus the Alert Log for discovering problems detected in the switch along with suggested solutions • SNMP network management access such as HP TopTools network configuration, monitoring, problem-finding and reporting, analysis, and recommendations for changes to increase control and uptime • Telnet console access • IGMP • DHCP time serve configuration • TFTP download of configurations and OS updates • Ping test

DHCP/Bootp Operation

Overview

DHCP/Bootp is used to download configuration data from a DHCP or Bootp server respectively to the switch or to a VLAN configured on the switch. With DHCP you can have the switch automatically retrieve the IP address with no configuration required on either the switch or the DHCP server. A Bootp server requires some configuration, but you can additionally identify a file to be downloaded to the switch containing a full switch configuration.

Note

The Switch 4000M and Switch 2400M are compatible with both DHCP and Bootp servers.

The DHCP/Bootp Process

Whenever the **IP Config** parameter in the switch or in an individual VLAN in the switch is configured to **DHCP/Bootp** (the default), or when the switch is rebooted with this configuration:

1. DHCP/Bootp requests are automatically broadcast on the local network. (The switch sends one type of request which either a DHCP or Bootp server can process.)
2. When a DHCP or Bootp server receives the request, it replies with an automatically generated IP address and subnet mask for the switch. The switch also receives an IP Gateway address if the server has been configured to provide one. In the case of Bootp, the server must first be configured with an entry that has the MAC address of the switch. (The switch properly handles replies from either type of server. If multiple replies are returned, the switch tries to use the first DHCP reply.)

If the switch is initially configured for DHCP/Bootp operation (the default), or if it is rebooted with this configuration, it immediately begins sending request packets on the network. If the switch does not receive a reply to its DHCP/Bootp requests, it continues to periodically send request packets, but with decreasing frequency. Thus, if a DHCP or Bootp server is not available or accessible to the switch when DHCP/Bootp is first configured, the switch may not immediately receive the desired configuration. After verifying that the server has become accessible to the switch, reboot the switch to re-start the process.

DHCP Operation. A significant difference between a DHCP configuration and a Bootp configuration is that an IP address assignment from a DHCP server is automatic, requiring no configuration of the DHCP server. Using that automatic feature, though, the address is temporarily leased. Periodically the switch may be required to renew its lease of the IP configuration. Thus, the IP addressing provided by the server may be different each time the switch reboots or renews its configuration from the server. However, you can fix the address assignment for the switch by doing either of the following:

- Configure the server to issue an “infinite” lease.
- Using the switch’s MAC address as an identifier, configure the server with a “Reservation” so that it will always assign the same IP address to the switch. (For MAC address information, refer to appendix B, “MAC Address Management”.)

For more information on either of these procedures, refer to the documentation provided with the DHCP server.

Bootp Operation. When a Bootp server receives a request it searches its Bootp database for a record entry that matches the MAC address in the Bootp request from the switch. If a match is found, the configuration data in the associated database record is returned to the switch. For most Unix systems, the Bootp database is contained in the **/etc/bootptab** file. In contrast to DHCP operation, Bootp configurations are always the same for each receiving device. That is, the Bootp server replies to a request with a configuration previously stored in the server and designated for the requesting device.

Bootp Database Record Entries. A minimal entry in the Bootp table file **/etc/bootptab** to update an IP address and subnet mask to the switch or a VLAN configured in the switch would be similar to this entry:

```
j4121switch:\
    ht=ether:\
    ha=040009123456:\
    sm=255.255.248.0:\
    gw=55.66.77.1:\
    lg=11.22.33.44:\
    hn:\
    ip=55.66.77.88:\
    vm=rfc1048:\
```

An entry in the Bootp table file **/etc/bootptab** to tell the switch or VLAN where to obtain a configuration file download would be similar to this entry:

```
j4121switch:\
    ht=ether:\
    ha=040009123456:\
    sm=255.255.248.0:\
    gw=55.66.77.1:\
    lg=11.22.33.44:\
    hn:\
    ip=55.66.77.88:\
    T144=”switch.cfg”:\
    vm=rfc1048
```

where:

j4121switch   is a user-defined symbolic name to help you find the correct section of the bootptab file. If you have multiple switches that will be using Bootp to get their IP configuration, you should use a unique symbolic name for each switch.

ht	is the “hardware type”. For the Switch 4000M and Switch 2400M, set this to **ether** (for Ethernet). *This tag must precede the* ha *tag.*
ha	is the “hardware address” . Use the switch's (or VLAN's) 12-digit MAC address.
sm	is the subnet mask of the subnet in which the switch (or VLAN) is installed.
lg	TFTP server address (source of final configuration file)
hn	send nodename (boolean flag, no “=value” needed)
ip	is the IP address to be assigned to the switch (or VLAN).
T144	is the vendor-specific “tag” identifying the configuration file to download.
vm	is a required entry that specifies the Bootp report format. For the Switch 4000M and Switch 2400M, set this parameter to **rfc1048**.
ts	is the IP address of the time server.

Note

The above Bootp table entry is a sample that will work for the Switch 4000M and Switch 2400M when the appropriate addresses and file names are used. There are other features and parameters that can be implemented with Bootp. See the documentation for your Bootp server for more information.

Configuring DHCP/Bootp

In its default configuration, the switch is configured for DHCP/Bootp operation. However, if an IP address has previously been configured or if the **IP Config** parameter has been set to **Disabled**, then you will need to use this procedure to reconfigure the parameter to enable DHCP/Bootp operation.

This procedure assumes that, for Bootp operation:

- A Bootp database record has already been entered into an appropriate Bootp server.
- The necessary network connections are in place
- The Bootp server is accessible from the switch

and, for DHCP operation:

- The necessary network connections are in place
- A DHCP server is accessible from the switch

To configure the switch or a VLAN for DHCP/Bootp:

1. From the Main Menu, select

   2. Switch Management Access Configuration (IP, SNMP, Console)

   1. IP Configuration

2. Press [E] (for Edit mode), then use [↓] to move the cursor to the **IP Config** parameter field.
3. Use the Space bar to select the **DHCP/Bootp** option for the **IP Config** parameter. (This disables access to the IP Address, Subnet Mask, and Gateway parameters.)
4. Press [Enter] to exit from edit mode, then press [S] to save the configuration change.

When you press [S] to save the configuration change or reboot the switch with DHCP/Bootp enabled in a network providing DHCP/Bootp service, it will do the following:

- Receive an IP address and subnet mask and, if configured in the server, a gateway IP address and the address of a Timep server.
- For Bootp operation, if the reply provides information for downloading a configuration file, the switch then uses TFTP to download the file from the designated source, then reboots itself. (This assumes that the switch or VLAN has connectivity to the TFTP file server specified in the Bootp database configuration record and that the Bootp database record is correctly configured.)

Globally Assigned IP Network Addresses

If you intend to connect your network to other networks that use globally administered IP addresses, Hewlett-Packard strongly recommends that you use IP addresses that have a network address assigned to you. There is a formal process for assigning unique IP addresses to networks worldwide. Contact one of the following companies:

Country	Phone Number/E-Mail/URL	Company Name/Address
United States/ Countries not in Europe or Asia/Pacific	1-703-742-4777 questions@internic.net http://rs.internic.net	Network Solutions, Inc. Attn: InterNIC Registration Service 505 Huntmar Park Drive Herndon, VA 22070
Europe	+31 20 592 5065 ncc@ripe.net http://www.ripe.net	RIPE NCC Kruislaan 409NL-1098 SJ Amsterdam, The Netherlands

Asia/Pacific	domreg@apnic.net http://www.apnic.net	Attention: IN-ADDR.ARPA Registration Asia Pacific Network Information Center c/o Internet Initiative Japan, Inc. Sanbancho Annex Bldg. 1-4 Sanban-cho Chiyoda-ku Tokyo 102, Japan

For more information, refer to *Internetworking with TCP/IP: Principles, Protocols and Architecture* by Douglas E. Comer (Prentice-Hall, Inc., publisher).

SNMP Communities

Enables you to add, edit, or delete SNMP communities. Use this feature to restrict access to the switch by SNMP management stations. You can configure up to five SNMP communities, each with either an operator-level or a manager-level view, and either restricted or unrestricted write access.

In the default configuration, no Manager addresses are configured, and all management stations using the correct community name may access the switch with the corresponding View and Access levels specified for those communities. For any community name, if you want to restrict access to one or more specific nodes, you can enter up to ten IP addresses of such nodes into the Manager Address field. Entering one or more IP addresses in the Manager Address field restricts access with that community to only those addresses.

For more on this topic, refer to chapter 5, "Using HP TopTools or Other SNMP Tools To Monitor and Manage Your Network", and to the online Help.

Configuring SNMP Communities from the Switch Console

Before you begin, ensure that the switch has been configured for IP.

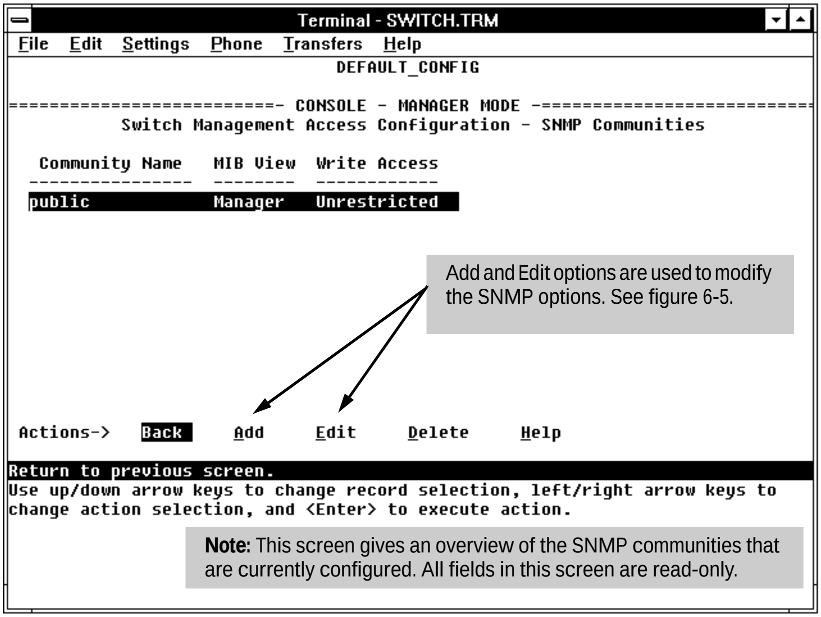
Caution

Deleting or changing the community named "public" prevents network management applications (such as auto-discovery, traffic monitoring, and threshold setting) from operating in the switch. (Changing or deleting the "public" name also generates an Event Log message.) If security for network management is a concern, it is recommended that you change the write access for the "public" community to "Restricted".

To View, Edit, or Add SNMP Communities:

1. From the Console Main Menu, Select:

   2. Switch Management Access Configuration (IP, SNMP, Console)...
   2. SNMP Community Names/Authorized Managers



```
                              DEFAULT_CONFIG

=========================- CONSOLE - MANAGER MODE -=========================
          Switch Management Access Configuration - SNMP Communities

   Community Name   MIB View   Write Access
  ----------------  --------   ------------
  public            Manager    Unrestricted






 Actions->    Back     Add     Edit     Delete     Help

Return to previous screen.
Use up/down arrow keys to change record selection, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Add and Edit options are used to modify the SNMP options. See figure 6-5.

Note: This screen gives an overview of the SNMP communities that are currently configured. All fields in this screen are read-only.

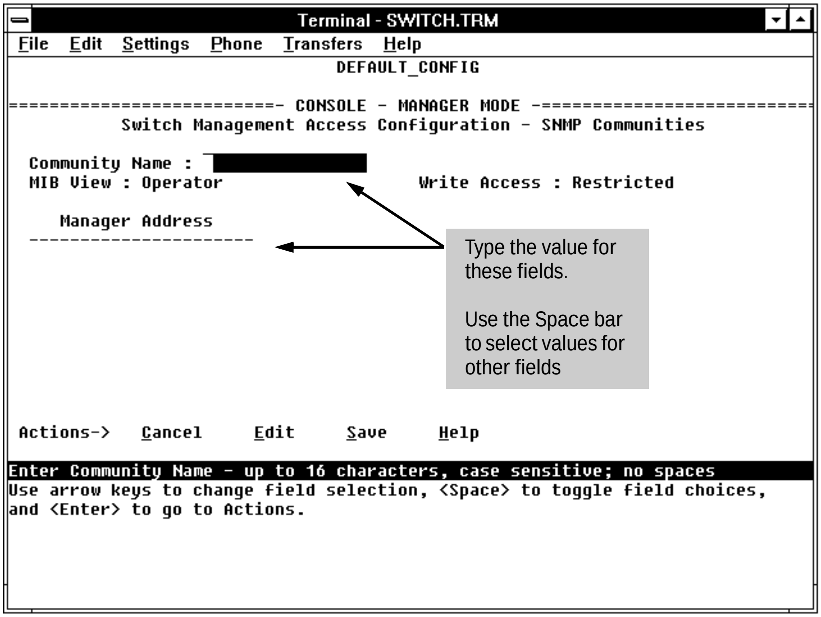
Figure 6-4. The SNMP Communities Screen (Default Values)

2. From the Configuration screen, select SNMP Communities to display a screen similar to the one above.

3. Press [A] (for **Add**) to display the following screen:

If you are adding a community, the fields in this screen are blank.

If you are editing an existing community, the values for the currently selected Community appear in the fields.



```
                                DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -===========================
           Switch Management Access Configuration - SNMP Communities

  Community Name :
  MIB View : Operator                    Write Access : Restricted

     Manager Address
  ----------------------



 Actions->   Cancel     Edit     Save     Help

Enter Community Name - up to 16 characters, case sensitive; no spaces
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

Type the value for these fields.

Use the Space bar to select values for other fields

Figure 6-5. The SNMP Add or Edit Screen

Note

In the default configuration, no manager addresses are configured. In this case, all management stations using the correct community name may access the switch with the corresponding View and Access levels. If you want to restrict access to one or more specific nodes, you can enter up to ten IP addresses of such nodes into the Manager Address field. Entering one or more IP addresses in the Manager Address field limits access to only those addresses.

4. Enter the appropriate value in each of the above fields (use the [Tab] key to move from one field to the next).

5. Press [Enter], then [S] (for **Save**).

Trap Receivers

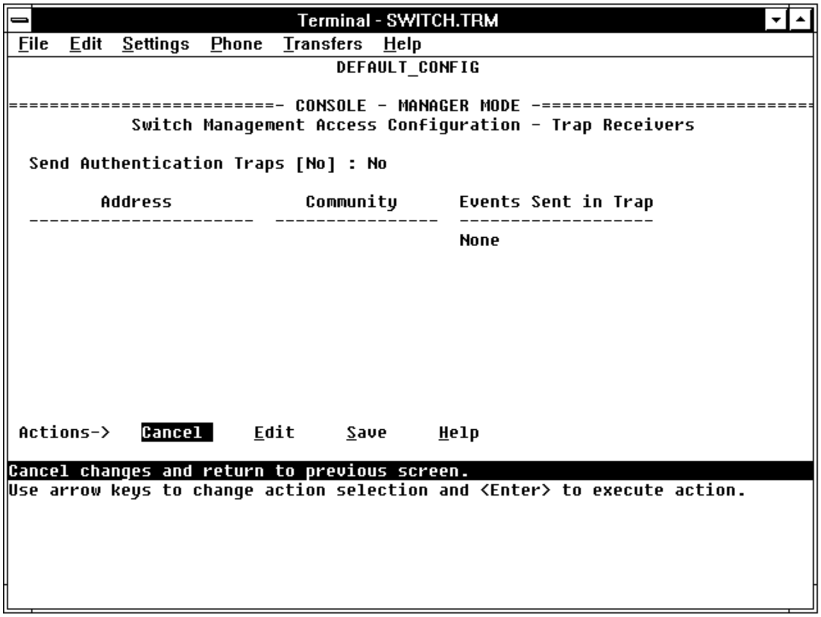
Enables you to configure up to ten IP management stations (*trap receivers*) to receive SNMP trap packets sent from the switch. Trap packets describe specific event types. (These events are the same as the log messages displayed in the event log.) The Address and Community define which management stations receive the traps. An authentication trap is sent if a management station attempts an unauthorized access. Check the event log in the console interface to help determine why the authentication trap was sent. (Refer to "Using the Event Log To Identify Problem Sources" on page 8-8.)

Configuring SNMP Communities from the Console

To Access Trap Receivers:

1. From the Console Main Menu, select

   2. Switch Management Access Configuration (IP, SNMP, Console)...
   3. Trap Receivers



```
                              DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -===========================
           Switch Management Access Configuration - Trap Receivers

  Send Authentication Traps [No] : No

         Address              Community       Events Sent in Trap
  ----------------------  ----------------  --------------------
                                              None








 Actions->   Cancel     Edit     Save     Help

Cancel changes and return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 6-6. The Trap Receivers Configuration Screen (Default Values)

2. Press E (for Edit). The cursor moves to the **Send Authentication Traps** field.
3. Press the Space bar to enable (Yes) or disable (No) sending authentication traps, then press Tab to move the cursor to the Address field.
4. Type in the IP address of a network management station to which you want the switch to send SNMP trap packets, then press Tab to move the cursor to the Community field.
5. Type in the name of the SNMP community to which the network management station belongs, then press Tab to move the cursor to the Events field.
6. Use the Space bar to select the level of internal switch events that cause trap packets to be sent:

Event Level	Description
None (default)	Send no log messages.
All	Send all log messages.
Not INFO	Send the log messages that are not information-only.
Critical	Send critical-level log messages.
Debug	Reserved for HP-internal use.

7. Press Enter, then press S (for **Save**) and return to the Main Menu.

Console/Serial Link

This screen configures console terminal emulation and communication with the switch in the following ways:

- Enable or disable inbound Telnet access (default: enabled)
- Enable or disable HP web browser interface access (default: enabled)
- Specify:
  - Terminal type (default: VT100)
  - Console screen refresh interval for statistics screens (the frequency with which statistics are updated on the screen—default: 3 seconds)
  - The types of events displayed in the console event log (default: all)
- Customize the Console configuration for the PC or terminal you are using for console access.
  - Baud Rate (default: Speed Sense)
  - Flow Control (default: XON/XOFF)
  - Connection Inactivity Time (default: 0—off)

In most cases, the default configuration is acceptable for standard operation. If you need to change any of the above parameters, use the switch console.

Note

If you change the Baud Rate or Flow Control settings for the switch, you should make the corresponding changes in your console access device. Otherwise, you may lose connectivity between the switch and your terminal emulator due to differences between the terminal and switch settings for these two parameters.

Using the Switch Console To Configure the Console/ Serial Link

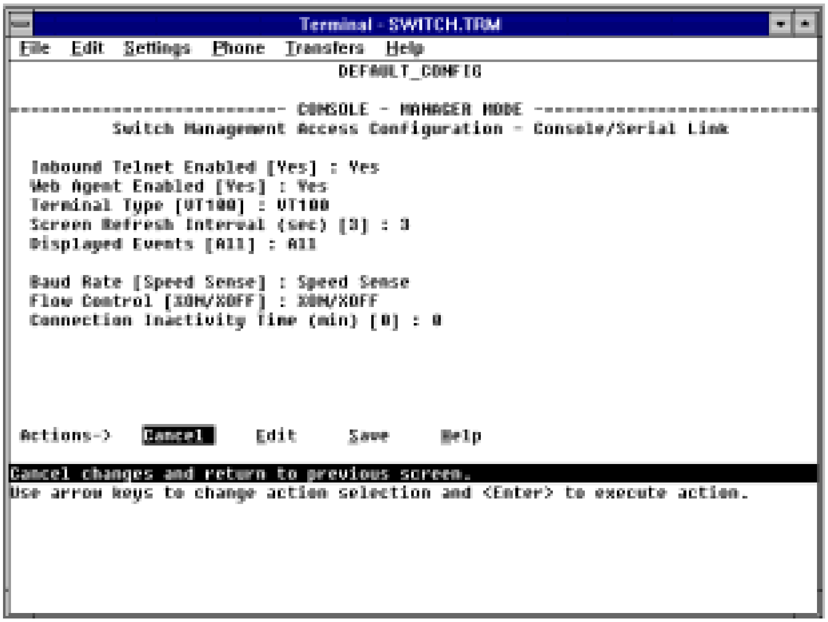
This screen allows you to:

- Enable or disable inbound Telnet and web browser interface access
- Determine which log events will be displayed
- Modify console and serial link parameters

To Access Console/Serial Link Features

1. From the Console Main Menu, Select...

   2. Switch Management Access Configuration (IP, SNMP, Console)...
   4. Console/Serial Link Configuration



```
                                DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
         Switch Management Access Configuration - Console/Serial Link

  Inbound Telnet Enabled [Yes] : Yes
  Web Agent Enabled [Yes] : Yes
  Terminal Type [VT100] : VT100
  Screen Refresh Interval (sec) [3] : 3
  Displayed Events [All] : All

  Baud Rate [Speed Sense] : Speed Sense
  Flow Control [XON/XOFF] : XON/XOFF
  Connection Inactivity Time (min) [0] : 0




 Actions->   Cancel     Edit     Save     Help

Cancel changes and return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 6-7. The Console/Serial Link Configuration Screen (Default Values)

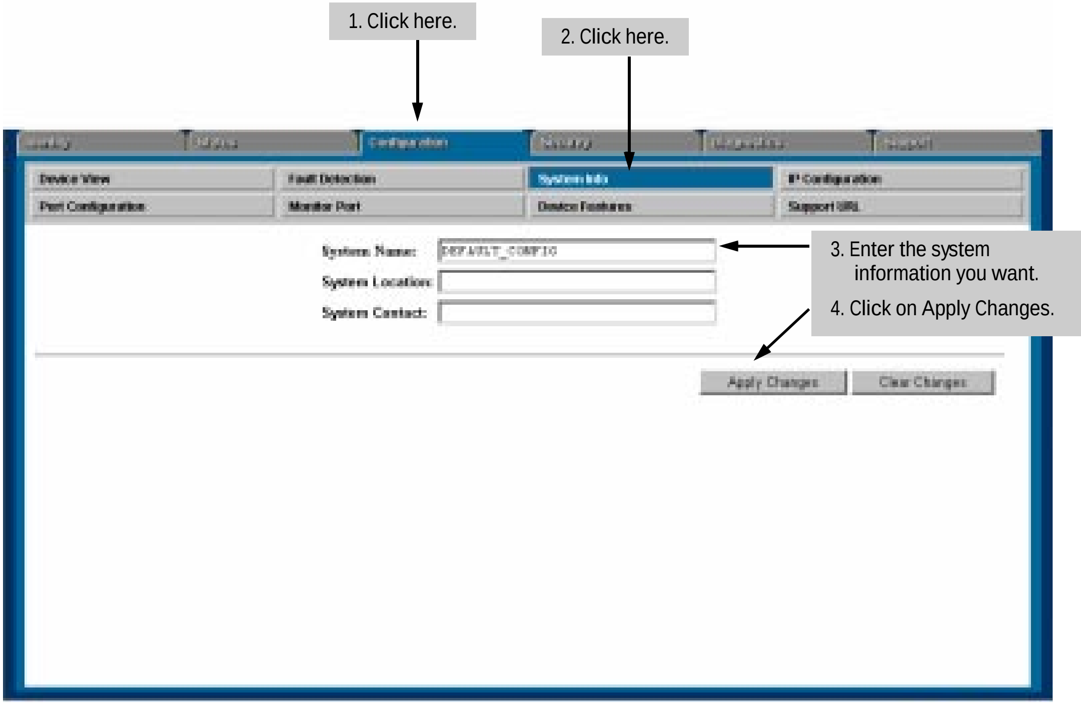
2. Press [E] (for **Edit**). The cursor moves to the **Baud Rate** field.
3. Refer to the online help provided with this screen for further information on configuration options for these features.
4. When you have finished making changes to the above parameters, press [Enter], then press [S] (for **Save**) and return to the Main Menu

System Information

Configures basic switch management information, including system data, address aging, and time zone parameters.

Configuring System Parameters from the Web Browser Interface

In the web browser interface, you can enter the system information shown below. For access to the Address Age Interval and the Time parameters, use the console.



1. Click here.

2. Click here.

System Name: DEFAULT_CONFIG
System Location:
System Contact:

3. Enter the system information you want.

4. Click on Apply Changes.

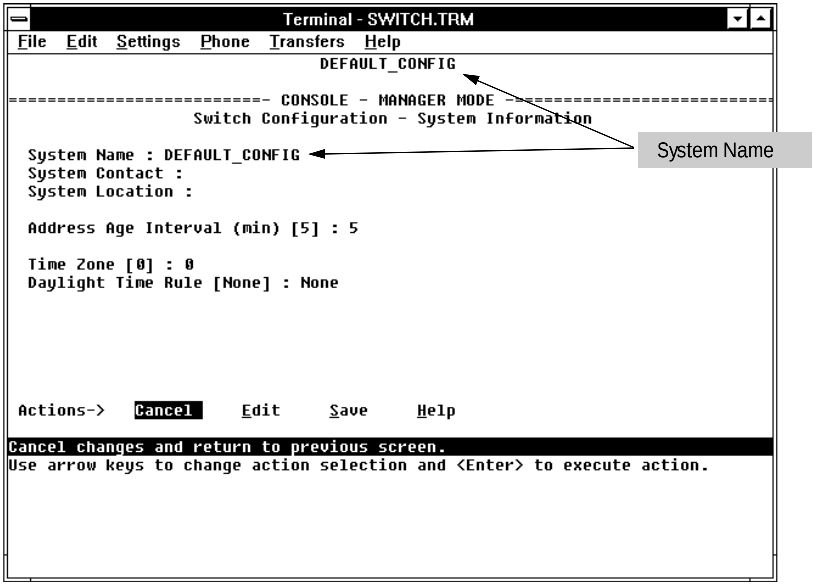
Figure 6-8. Example of System Info Screen on the Web Browser Interface

Configuring System Information from the Console

To Access System Information:

1. From the Console Main Menu, Select...

   2. Switch Configuration...
   1. System Information



```
                         DEFAULT_CONFIG

=========================- CONSOLE - MANAGER MODE -=========================
              Switch Configuration - System Information

  System Name : DEFAULT_CONFIG
  System Contact :
  System Location :

  Address Age Interval (min) [5] : 5

  Time Zone [0] : 0
  Daylight Time Rule [None] : None




 Actions->  Cancel     Edit     Save     Help

Cancel changes and return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 6-9. The System Configuration Screen (Default Values)

Note

To help simplify administration, it is recommended that you configure **System Name** to a character string that is meaningful within your system.

To set the time and date, set the Time Protocol parameters under “IP Configuration” (page 6-6) for your time server or use the time and date commands described in chapter 7, “Monitoring and Analyzing Switch Operation”.

2. Press [E] (for Edit). The cursor moves to the **System Name** field.
3. Refer to the online help provided with this screen for further information on configuration options for these features.
4. When you have finished making changes to the above parameters, press [Enter], then press [S] (for **Save**) and return to the Main Menu.

Port Settings

Configures the operating state for each port. Also optionally enables you to restrict the amount of broadcast traffic on the port. The read-only fields in this screen display the port names and port types.

Port numbers in the configuration correspond to port numbers on the front of the switch.

The following table shows the settings available for each port type.

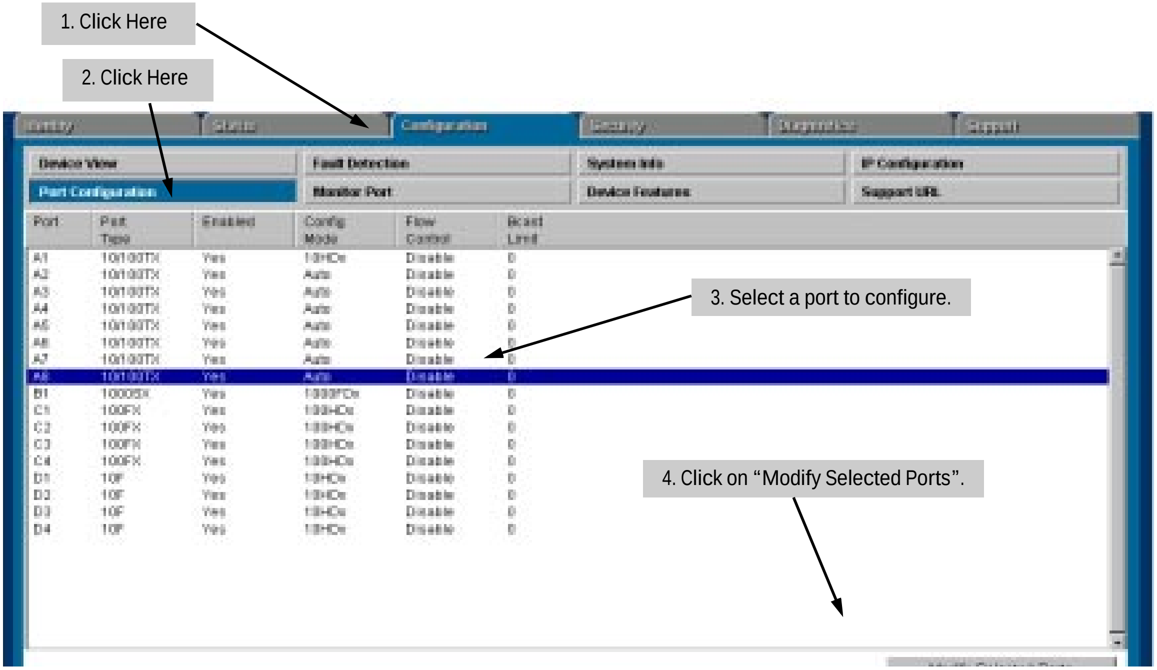
Mode:	**Port Types:**			
	10/100TX	**10FL**	**100Fx**	**1000Sx**
10, 100, or 1000 Mbps	Auto (default) or Manual Select	10 only	100 only	1000 only
Half/Full Duplex	Auto (default) or Manual Select	Manual only Default: Half Dx	Manual only Default: Half Dx	Full Duplex only
Flow Control Enable/Disable	Manual only. Default: Disable			

Auto (Auto-Negotiation): This feature complies with the IEEE 802.3u Auto-Negotiation standard, and is the default setting for 10/100TX ports on the switch. Using Auto, the port automatically selects the network speed (10- or 100Mbps) and the data transfer operation (full- or half-duplex) for the connection to another device, provided that the other device also complies with the IEEE 802.3u Auto-Negotiation protocol and is set to Auto. If the other device does not comply with the 802.3u standard, or is not set to Auto, then the port configuration on the switch must be manually set to match the port configuration on the other device.

Note

Both ports in a link must be configured with the same settings.

Configuring Port Parameters from the Web Browser Interface



1. Click Here

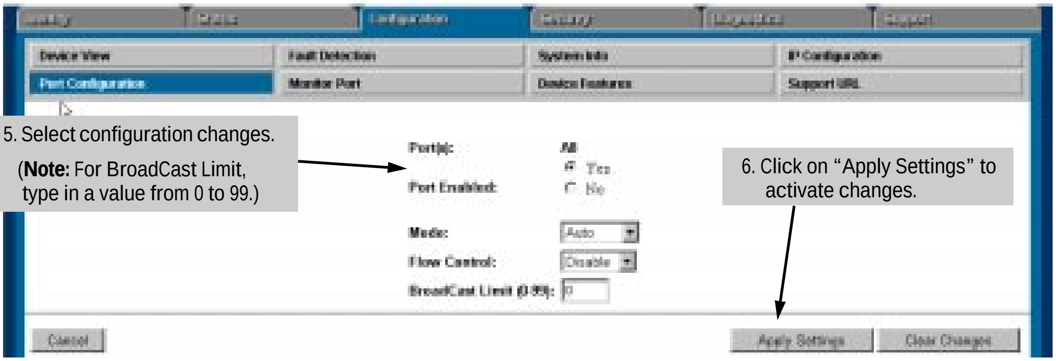
2. Click Here

3. Select a port to configure.

4. Click on "Modify Selected Ports".

Port	Port Type	Enabled	Config Mode	Flow Control	Bcast Limit
A1	10/100TX	Yes	10HDx	Disable	0
A2	10/100TX	Yes	Auto	Disable	0
A3	10/100TX	Yes	Auto	Disable	0
A4	10/100TX	Yes	Auto	Disable	0
A5	10/100TX	Yes	Auto	Disable	0
A6	10/100TX	Yes	Auto	Disable	0
A7	10/100TX	Yes	Auto	Disable	0
A8	10/100TX	Yes	Auto	Disable	0
B1	1000SX	Yes	1000FDx	Disable	0
C1	100FX	Yes	100HDx	Disable	0
C2	100FX	Yes	100HDx	Disable	0
C3	100FX	Yes	100HDx	Disable	0
C4	100FX	Yes	100HDx	Disable	0
D1	10F	Yes	10HDx	Disable	0
D2	10F	Yes	10HDx	Disable	0
D3	10F	Yes	10HDx	Disable	0
D4	10F	Yes	10HDx	Disable	0

Figure 6-10. Example of Port Configuration Screen on the Web Browser Interface



Port(s): All

Port Enabled: ● Yes ○ No

Mode: Auto

Flow Control: Disable

BroadCast Limit (0-99): 0

5. Select configuration changes.

(**Note:** For BroadCast Limit, type in a value from 0 to 99.)

6. Click on “Apply Settings” to activate changes.

Figure 6-11. Example of Port Modification Screen on the Web Browser Interface

HP-WBI Parameter	Description
Enabled	Determines whether the port can be used. Yes (default)
Config Mode 1000SX:	The operational mode of the port. **1000FDx** (default): 1gbps, Full-Duplex **Auto**: The port operates at 1000FDx and auto-negotiates flow control with the device connected to the port.
10/100TX	**Auto** (default): Auto-negotiates with the port at the other end of the link for speed (10Mbps or 100Mbps) and data transfer operation (half-duplex or full-duplex). **Note:** Ensure that the device attached to the port is configured for the same setting that you select here. Also, if “Auto” is used the device to which the port is connected must operate in compliance with the IEEE 802.3u “Auto Negotiation” standard for 100Base-T networks. **10HDx**:10Mbps, Half-Duplex **100HDx**: 100Mbps, Half-Duplex **10FDx**: 10Mbps, Full-Duplex **100FDx**: 100Mbps, Full-Duplex
100FX	**100HDx** (default): 100Mbps, Half-Duplex **100FDx**: 100Mbps, Full-Duplex
10F	**10HDx**:(default): 10Mbps, Half-Duplex **10FDx**: 10Mbps, Full-Duplex
Flow Control	Maximizes circuit efficiency by enabling negotiation of packet parameters with the device to which the port is connected. When enabled, the port uses 802.3x Link Layer Flow Control, generates flow control packets and processes received flow control packets. When disabled, the port will not generate flow control packets and drops received flow control packets. Default: Disable

HP-WBI Parameter	**Description**
Bcast Limit	The theoretical maximum of network bandwidth percentage that can be used for broadcast and multicast traffic. Any broadcast or multicast traffic exceeding that limit will be dropped. Zero (0) means the feature is disabled.

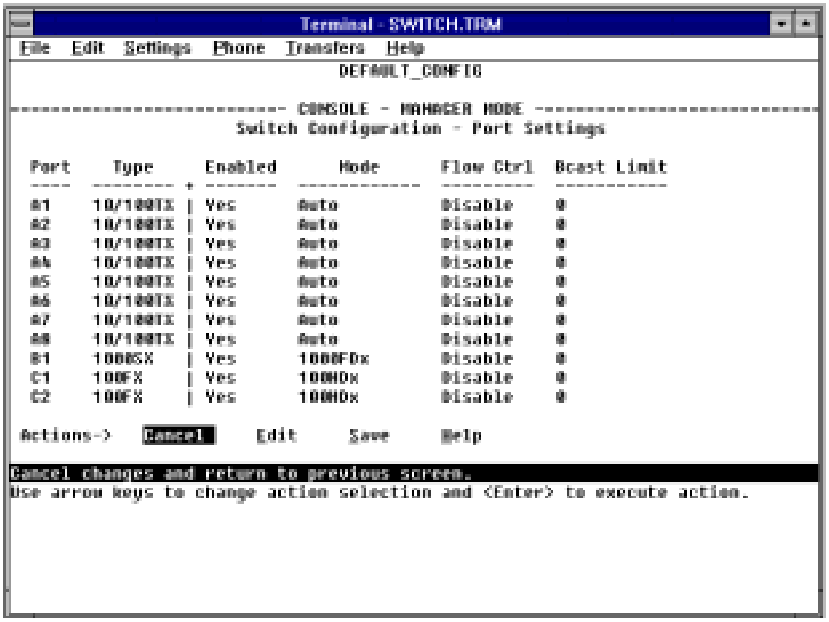
Configuring Port Parameters from the Switch Console

To Access IP Addressing:

1. From the Console Main Menu, Select:

   3. Switch Configuration...

   2. Port Settings



```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                   Switch Configuration - Port Settings

  Port    Type      Enabled      Mode        Flow Ctrl  Bcast Limit
  ----  --------- + -------  ------------  ---------  -----------
  A1    10/100TX  | Yes      Auto          Disable    0
  A2    10/100TX  | Yes      Auto          Disable    0
  A3    10/100TX  | Yes      Auto          Disable    0
  A4    10/100TX  | Yes      Auto          Disable    0
  A5    10/100TX  | Yes      Auto          Disable    0
  A6    10/100TX  | Yes      Auto          Disable    0
  A7    10/100TX  | Yes      Auto          Disable    0
  A8    10/100TX  | Yes      Auto          Disable    0
  B1    1000SX    | Yes      1000FDx       Disable    0
  C1    100FX     | Yes      100HDx        Disable    0
  C2    100FX     | Yes      100HDx        Disable    0

 Actions->   Cancel     Edit     Save     Help

Cancel changes and return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 6-12. Example of the Port Configuration Screen

2. Press [E] (for Edit). The cursor moves to the **Enabled** field for the first port.

3. Refer to the online help provided with this screen for further information on configuration options for these features.

4. When you have finished making changes to the above parameters, press [Enter], then press [S] (for **Save**) and return to the Main Menu.

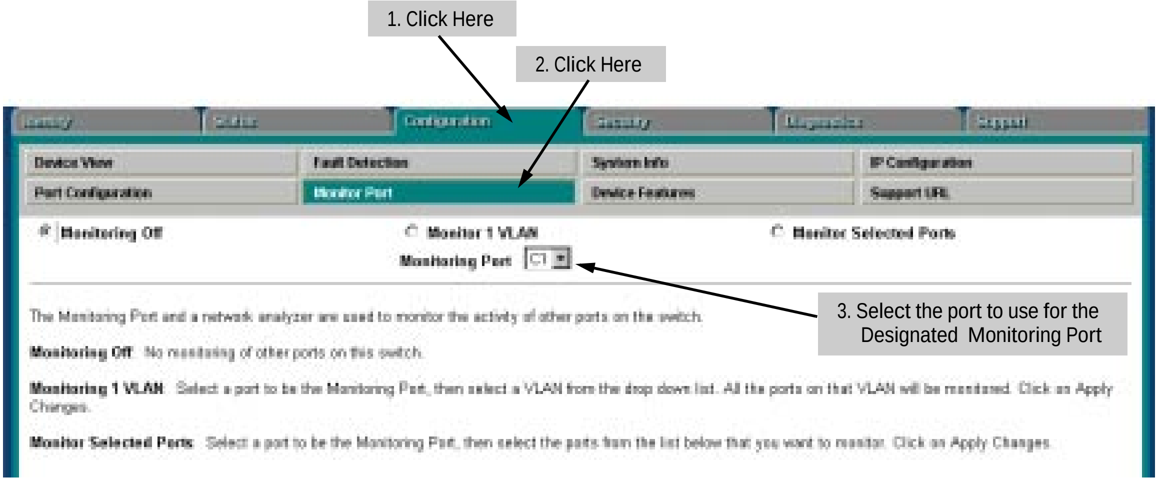
Network Monitoring Port Features

Lets you designate a port for monitoring traffic on one or more other ports or on a VLAN configured on the switch. This is accomplished by copying all traffic from the specified ports or VLAN to the designated monitoring port.

Note

When monitoring multiple ports in a busy network, some frames may not be copied to the monitoring port.

Configuring Port Monitoring from the Web Browser Interface



The Monitoring Port and a network analyzer are used to monitor the activity of other ports on the switch.

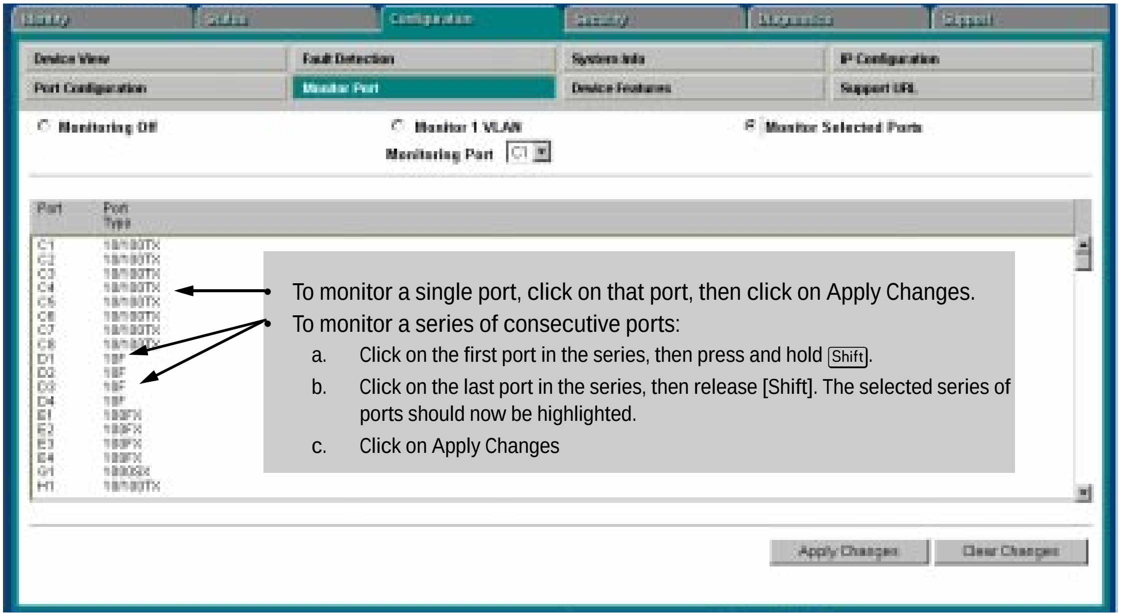
Monitoring Off No monitoring of other ports on this switch.

Monitoring 1 VLAN Select a port to be the Monitoring Port, then select a VLAN from the drop down list. All the ports on that VLAN will be monitored. Click on Apply Changes.

Monitor Selected Ports Select a port to be the Monitoring Port, then select the ports from the list below that you want to monitor. Click on Apply Changes.

Figure 6-13. Setting Up Port Monitoring on the Web Browser Interface

4. Do one of the following:
   - If you want to monitor one port or several consecutive ports, click on the **Monitor Selected Ports** button. (See figure 6-14, below.)
   - If you want to monitor VLAN traffic, click on the **Monitor 1 VLAN** button. (See figure 6-15, below.)



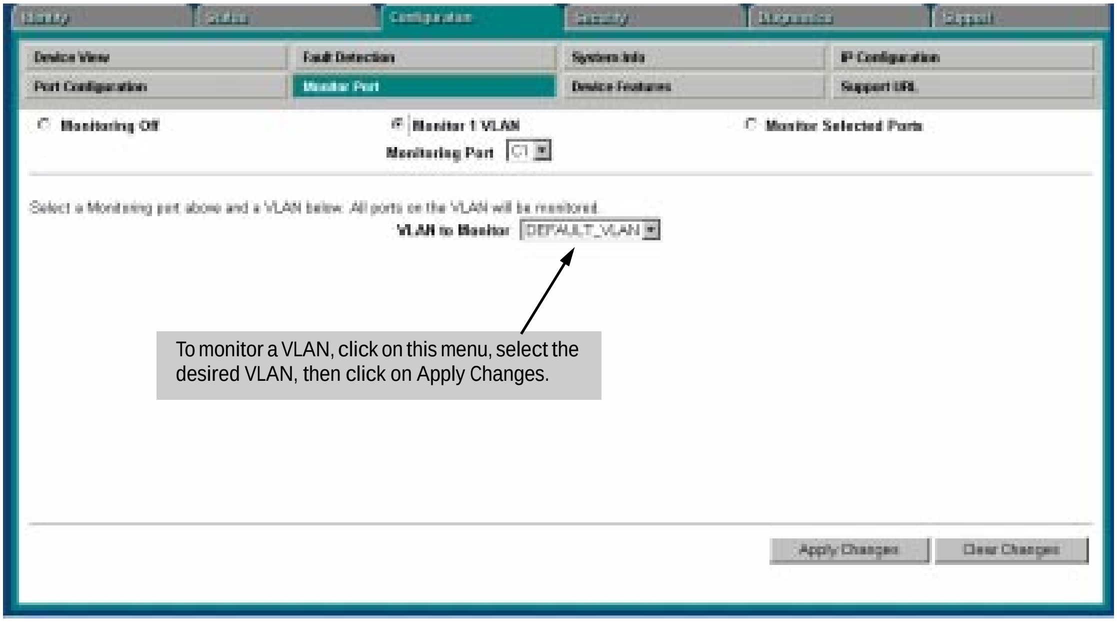
○ Monitoring Off ○ Monitor 1 VLAN ● Monitor Selected Ports

Monitoring Port C1

Port	Port Type
C1	10/100TX
C2	10/100TX
C3	10/100TX
C4	10/100TX
C5	10/100TX
C6	10/100TX
C7	10/100TX
C8	10/100TX
D1	10F
D2	10F
D3	10F
D4	10F
E1	100FX
E2	100FX
E3	100FX
E4	100FX
G1	1000SX
H1	10/100TX

- To monitor a single port, click on that port, then click on Apply Changes.
- To monitor a series of consecutive ports:
  a. Click on the first port in the series, then press and hold [Shift].
  b. Click on the last port in the series, then release [Shift]. The selected series of ports should now be highlighted.
  c. Click on Apply Changes

Figure 6-14. Selecting the Port(s) To Monitor



○ Monitoring Off ● Monitor 1 VLAN ○ Monitor Selected Ports

Monitoring Port C1

Select a Monitoring port above and a VLAN below. All ports on the VLAN will be monitored.

VLAN to Monitor DEFAULT_VLAN

To monitor a VLAN, click on this menu, select the desired VLAN, then click on Apply Changes.

Figure 6-15. Selecting a VLAN To Monitor

Configuring Port Monitoring from the Switch Console

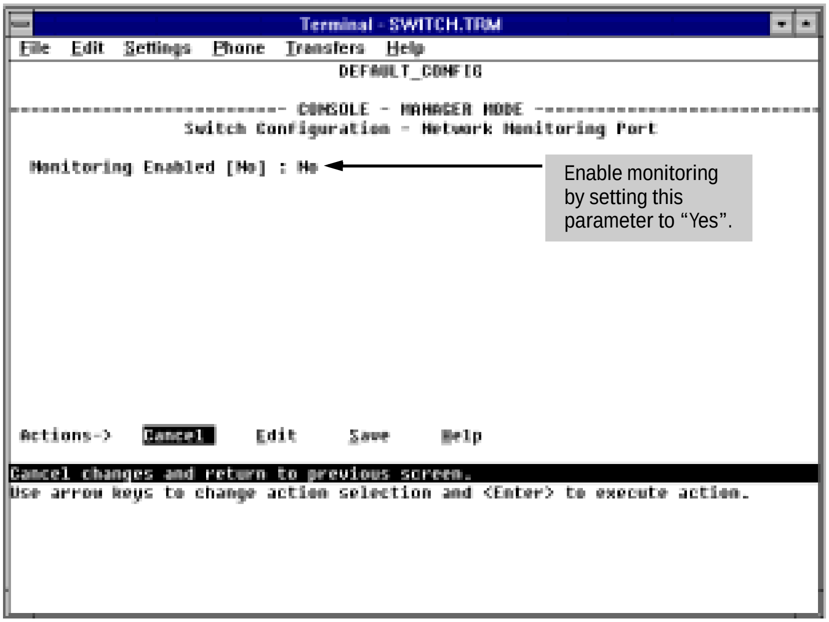
To Access Port Monitoring:

This procedure describes configuring the switch for monitoring when monitoring is disabled. (If monitoring has already been enabled, the screens will appear differently than shown in this procedure.)

1. From the Console Main Menu, Select:

   3. Switch Configuration...

   3. Network Monitoring Port

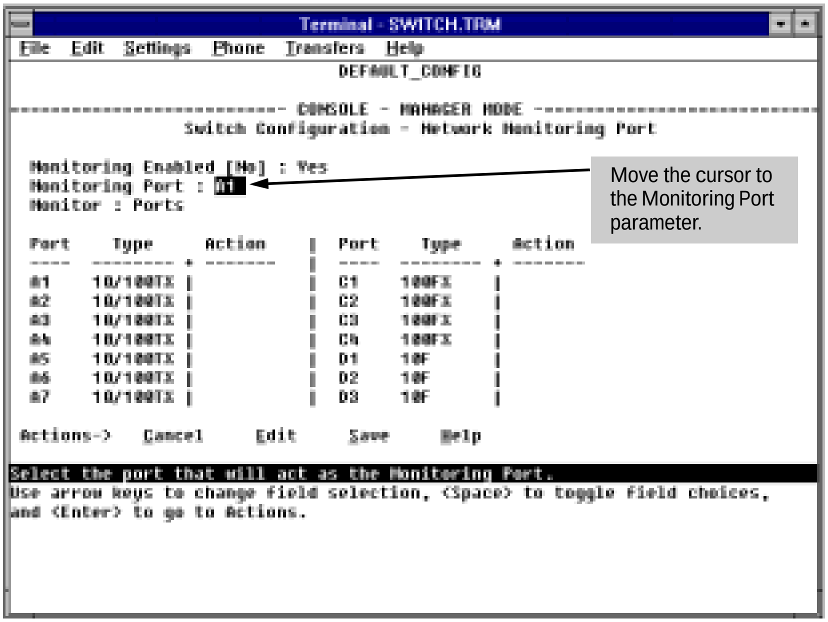


```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                Switch Configuration - Network Monitoring Port

  Monitoring Enabled [No] : No







 Actions->    Cancel     Edit     Save     Help

Cancel changes and return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Enable monitoring by setting this parameter to “Yes”.

Figure 6-16. The Default Network Monitoring Configuration Screen

2. In the Actions menu, press [E] (for `Edit`).
3. If monitoring is currently disabled (the default) then enable it by pressing the Space bar (or [Y]) to select `Yes`.
4. Press [↓] to display a screen similar to the following and move the cursor to the **`Monitoring Port`** parameter.



```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ===========================
              Switch Configuration - Network Monitoring Port

  Monitoring Enabled [No] : Yes
  Monitoring Port : A1
  Monitor : Ports

  Port    Type      Action     |  Port    Type      Action
  ----  --------- + -------    |  ----  --------- + -------
  A1    10/100TX  |            |  C1    100FX     |
  A2    10/100TX  |            |  C2    100FX     |
  A3    10/100TX  |            |  C3    100FX     |
  A4    10/100TX  |            |  C4    100FX     |
  A5    10/100TX  |            |  D1    10F       |
  A6    10/100TX  |            |  D2    10F       |
  A7    10/100TX  |            |  D3    10F       |

 Actions->   Cancel     Edit     Save     Help

Select the port that will act as the Monitoring Port.
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

Move the cursor to the Monitoring Port parameter.

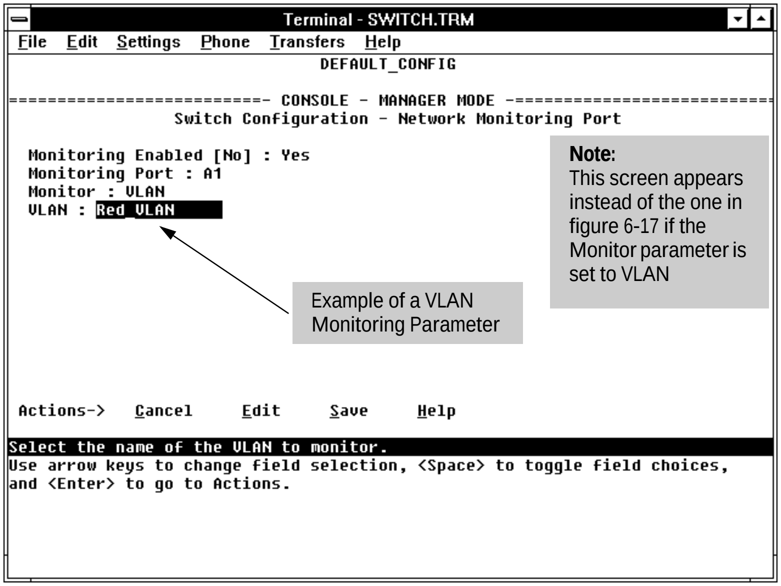
Figure 6-17. Example of Selecting a Monitoring Port

5. Use the Space bar to select which port to use for the monitoring port, then press [↓] to move to the **Monitor** parameter. (The default setting is **Ports**, which you will use if you want to monitor one or more individual ports on the switch.)

6. Do one of the following:

   - If you want to monitor individual ports, leave the **Monitor** parameter set to **Ports** and press [↓] to move the cursor to the **Action** column for the individual ports. Press the Space bar to select **Monitor** for each port that you want monitored. (Use [↓] to move from one port to the next in the **Action** column.) When you are finished, press [Enter], then press [S] (for **Save**) to save your changes and exit from the screen.
   - If, instead of individual ports, you want to monitor all of the ports in a VLAN, press the Space bar to select **VLAN** in the **Monitor** parameter, then press [↓] to move to the **VLAN** parameter (figure 6-18 on page 6-33). Then press the Space bar again to select the VLAN that you want to monitor. When you are finished, press [Enter] , then press [S] (for `Save`) to save your changes and exit from the screen.

7. Return to the Main Menu.



```
                              DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -==========================
                Switch Configuration - Network Monitoring Port

  Monitoring Enabled [No] : Yes
  Monitoring Port : A1
  Monitor  : VLAN
  VLAN : Red_VLAN

 Actions->   Cancel     Edit     Save     Help

Select the name of the VLAN to monitor.
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

Note:
This screen appears instead of the one in figure 6-17 if the Monitor parameter is set to VLAN

Example of a VLAN Monitoring Parameter

Figure 6-18. Example of Selecting a VLAN to Monitor

Note

It is possible in networks with high traffic levels to copy more traffic to a monitor port than the link can support. In this situation, some packets may not be copied to the monitor port.

Spanning Tree Protocol (STP)

The switch uses the IEEE 802.1D Spanning Tree Protocol (STP), when enabled, to ensure that only one path at a time is active between any two nodes on the network. In networks where there is more than one physical path between any two nodes, STP ensures a single active path between them by blocking all redundant paths. Enabling STP is necessary in such networks because having more than one path between a pair of nodes causes loops in the network, which can result in a switch detecting the same node on more than one port. This results in duplication of messages, leading to a "broadcast storm" that can bring down the network.

Note

You should enable STP in any Switch 4000M or Switch 2400M that is part of a redundant physical link (loop topology). (It is recommended that you enable STP on all switches belonging to a loop topology.)

As recommended in the IEEE 802.1Q VLAN standard, STP on the Switch 4000M and Switch 2400M use single-instance STP. Thus, these switches do not distinguish between VLANs when identifying redundant physical links. This topic is covered in more detail under "How STP Operates" on page 6-37.

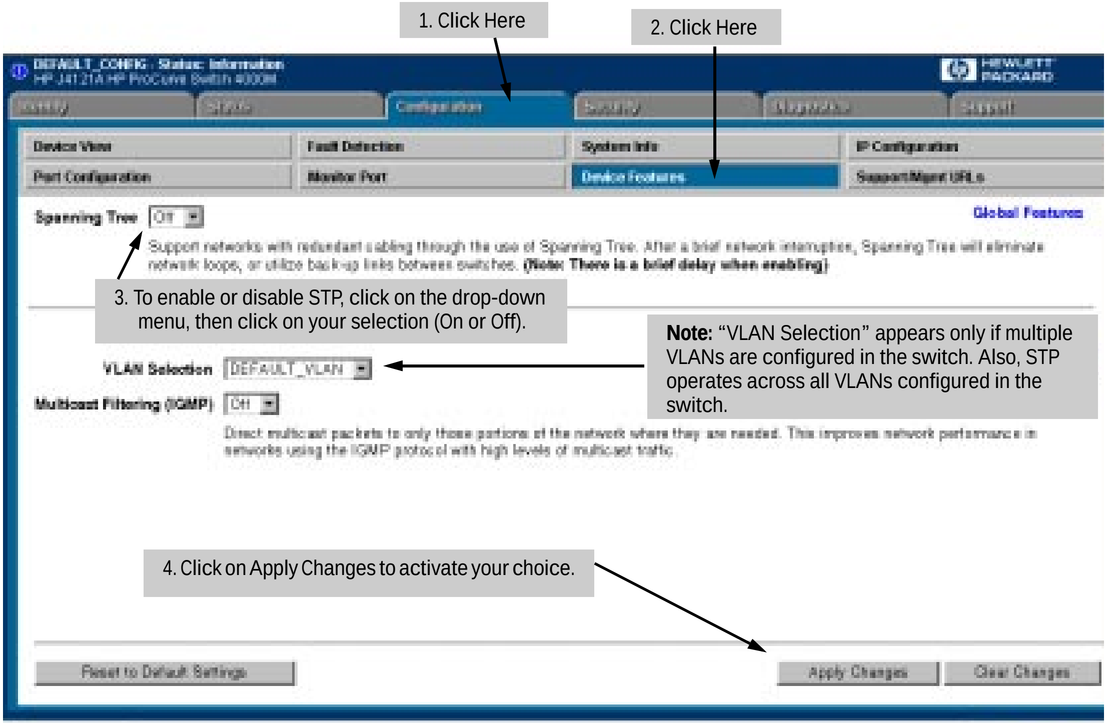
You can activate the IEEE 802.1D Spanning Tree Protocol (STP) and adjust STP parameters. In the factory default configuration, STP is off. Thus, if a redundant link (loop) exists between nodes in your network, you should set the Spanning Tree Enabled parameter to **Yes**. This ensures that all redundant ports (those providing backup parallel connections) are in a blocking state and not used to forward data. In the event of a topology change such as a switch, bridge, or data link failure, STP develops a new spanning tree that may result in changing some ports from the blocking state to the forwarding state. If VLANs are configured on the switch, see "STP Operation with 802.1Q VLANs" on page 6-38.

Caution

Because the switch automatically gives faster links a higher priority, the default STP parameter settings are usually adequate for spanning tree operation. Because incorrect STP settings can adversely affect network performance, you should avoid making changes without having a strong understanding of how STP operates. For more on STP, examine the IEEE 802.1d standard.

Configuring STP from the Web Browser Interface

This procedure enables or disables STP on the switch.



Spanning Tree: Off

Support networks with redundant cabling through the use of Spanning Tree. After a brief network interruption, Spanning Tree will eliminate network loops, or utilize back-up links between switches. **(Note: There is a brief delay when enabling)**

VLAN Selection: DEFAULT_VLAN

Multicast Filtering (IGMP): Off

Direct multicast packets to only those portions of the network where they are needed. This improves network performance in networks using the IGMP protocol with high levels of multicast traffic.

1. Click Here

2. Click Here

3. To enable or disable STP, click on the drop-down menu, then click on your selection (On or Off).

Note: "VLAN Selection" appears only if multiple VLANs are configured in the switch. Also, STP operates across all VLANs configured in the switch.

4. Click on Apply Changes to activate your choice.

Figure 6-19. Configuring STP from the Web Browser Interface

WBI Parameter	Description
Spanning Tree Default: Off	Enables or disables Spanning Tree Protocol across all ports on the switch, including those in separate VLANs. Other STP parameters are available through the console interface. Enabling or disabling STP through the web browser interface does not affect the settings of these other parameters. For more information on STP operation, refer to "How STP Operates" on page 6-37.

Using the Switch Console To Configure STP

In most cases, the default STP parameter settings are adequate. In cases where they are not, use this procedure to make configuration changes.

Caution

If you enable STP, it is recommended that you leave the remainder of the STP parameter settings at their default values until you have had an opportunity to evaluate STP performance in your network. Because incorrect STP settings can adversely affect network performance, you should avoid making changes without having a strong understanding of how STP operates. To learn the details of STP operation, refer to the IEEE 802.1d standard.

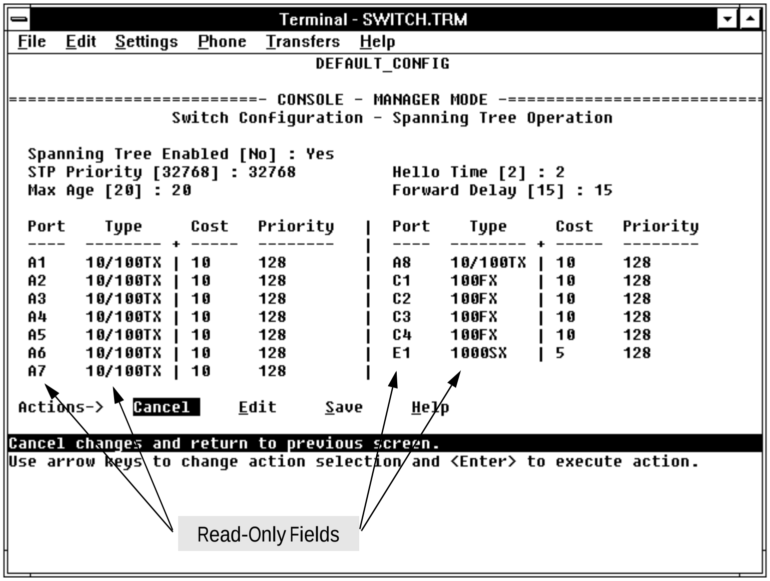
To Access STP:

1. From the Main Menu, select:

   3. Switch Configuration . . .

   4. Spanning Tree Operation

2. Press [E] (for **Edit**) to highlight the **Spanning Tree Enabled** parameter.
3. Press the Space bar to select **Yes** . (This enables STP.)



```
                                DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -===========================
                  Switch Configuration - Spanning Tree Operation

  Spanning Tree Enabled [No] : Yes
  STP Priority [32768] : 32768          Hello Time [2] : 2
  Max Age [20] : 20                     Forward Delay [15] : 15

  Port    Type     Cost   Priority   |  Port    Type     Cost   Priority
  ----  -------- + -----  --------   |  ----  -------- + -----  --------
  A1    10/100TX | 10     128        |  A8    10/100TX | 10     128
  A2    10/100TX | 10     128        |  C1    100FX    | 10     128
  A3    10/100TX | 10     128        |  C2    100FX    | 10     128
  A4    10/100TX | 10     128        |  C3    100FX    | 10     128
  A5    10/100TX | 10     128        |  C4    100FX    | 10     128
  A6    10/100TX | 10     128        |  E1    1000SX   | 5      128
  A7    10/100TX | 10     128        |

 Actions->  Cancel     Edit     Save     Help

Cancel changes and return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Read-Only Fields

Figure 6-20. Example of the STP Configuration Screen

4. If the remaining STP parameter settings are adequate for your network, go to step 8.
5. Use [Tab] or the arrow keys to select the next parameter you want to change, then type in the new value. (If you need information on STP parameters, press [Enter] to select the **Actions** line, then press **H** to get help.)
6. Repeat step 5 for each additional parameter you want to change.
7. When you are finished editing parameters, press [Enter] to return to the **Actions** line.
8. Press [S] to save the currently displayed STP parameter settings, then return to the Main Menu.

How STP Operates

The switch automatically senses port identity and type, and automatically defines port cost and priority for each type. The console interface allows you to adjust the Cost and Priority for each port, as well as the global STP parameter values for the switch.

While allowing only one active path through a network at any time, STP retains any redundant physical path to serve as a backup (blocked) path in case the existing active path fails. Thus, if an active path fails, STP automatically activates (unblocks) an available backup to serve as the new active path for as long as the original active path is down. For example:

- Active path from node A to node B: 1—> 3
- Backup (redundant) path from node A to node B: 4 —> 2 —> 3

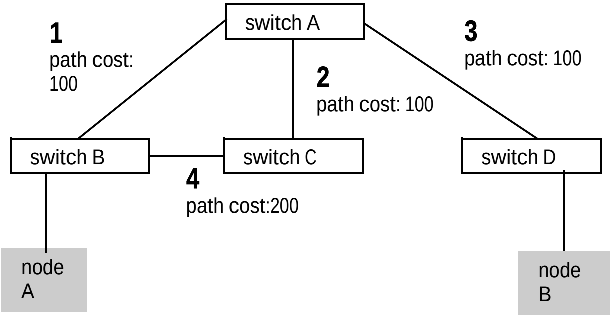


Figure 6-21. Example of Redundant Paths Between Two Nodes

STP Operation with 802.1Q VLANs

As recommended in the IEEE 802.1Q VLAN standard, spanning tree is configured for all ports across the switch, including those in separate VLANs. This means that if redundant physical links exist in separate VLANs, spanning tree will block all but one of those links. However, if you need to use STP on the Switch 4000M or Switch 2400M in a VLAN environment with redundant physical links, you can prevent blocked redundant links by using a port trunk. The following example shows how you can use a port trunk with 802.1Q (tagged) VLANs and STP without unnecessarily blocking any links or losing any bandwidth.

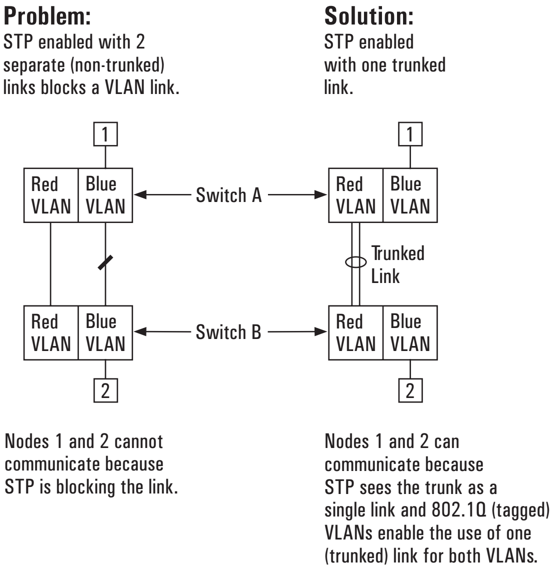

Problem:
STP enabled with 2 separate (non-trunked) links blocks a VLAN link.
Solution:
STP enabled with one trunked link.
1
Red VLAN
Blue VLAN
Switch A
Red VLAN
Blue VLAN
1
Trunked Link
Red VLAN
Blue VLAN
Switch B
Red VLAN
Blue VLAN
2
2
Nodes 1 and 2 cannot communicate because STP is blocking the link.
Nodes 1 and 2 can communicate because STP sees the trunk as a single link and 802.1Q (tagged) VLANs enable the use of one (trunked) link for both VLANs.

Figure 6-22. Example of Using a Trunked Link with STP and VLANs

For more information, refer to “Spanning Tree Protocol Operation with VLANs” on page 6-59.

Further Information

For further explanation and examples of Spanning Tree Protocol operating with other switch features, see HP’s Network City website at the following URL on the World Wide Web:

http://www.hp.com/go/network_city

Traffic/Security Filter Features

To enhance bandwidth usage and in-band security, configure static per-port \filters to forward desired traffic or drop unwanted traffic, as described below.

Table 6-2. Filter Types and Criteria

Static Filter Type	Selection Criteria
Multicast	Traffic having a specified multicast address will be forwarded or dropped on a per-port (destination) basis.
Source Port	Traffic from a designated source port will be forwarded or dropped on a per-port (destination) basis within the same VLAN.

Up to 141 static filters can be configured in the switch. For configuration information, turn to the next page. For more information on filter types and operation, refer to "Filter Types and Operation" on page 6-42.

Configuring Port Monitoring from the Switch Console

Use this procedure to specify the type of filters to use on the switch and whether to forward or drop filtered packets for each filter you specify.

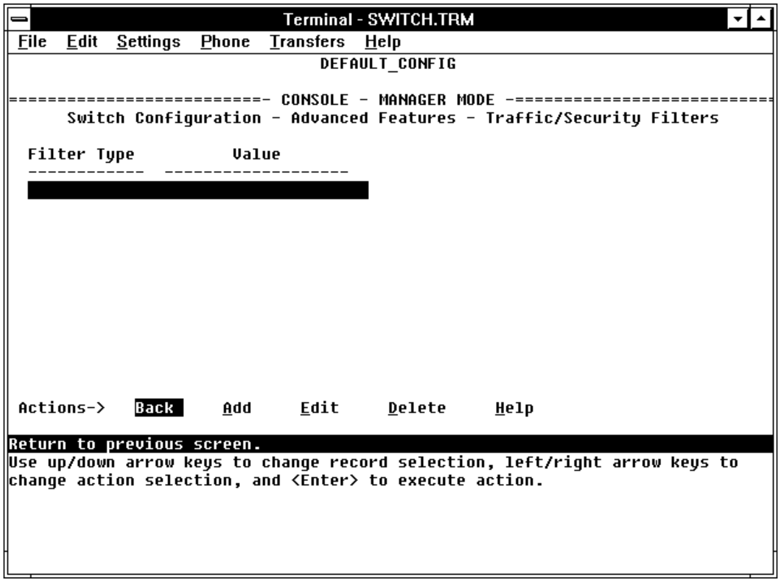
To Access Traffic/Security Filters

1. From the Console Main Menu, Select:

3. Switch Configuration...

5. Advanced Features...

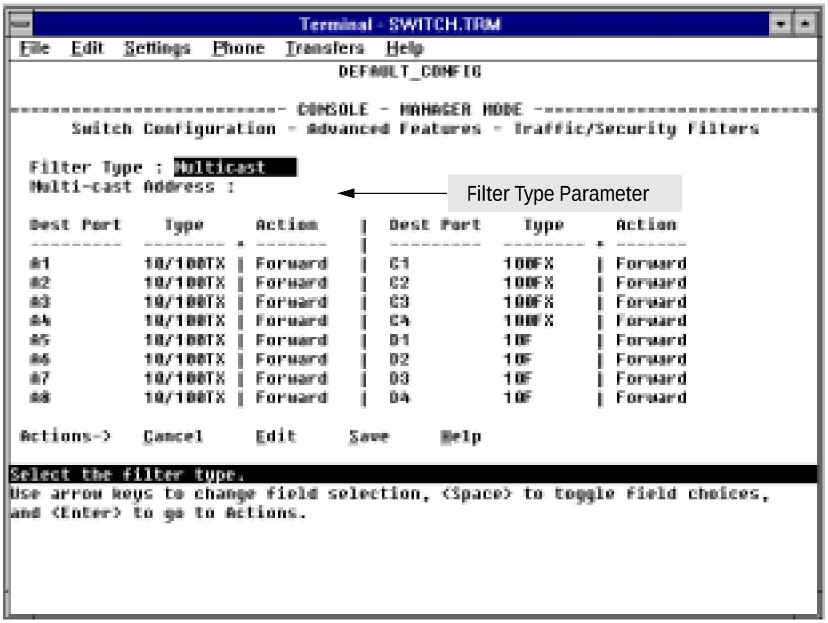
1. Traffic/Security Filters



```
                              DEFAULT_CONFIG

=========================- CONSOLE - MANAGER MODE -=========================
     Switch Configuration - Advanced Features - Traffic/Security Filters

  Filter Type         Value
  ------------  -------------------



 Actions->   Back     Add     Edit     Delete     Help

Return to previous screen.
Use up/down arrow keys to change record selection, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Figure 6-23. The Traffic/Security Filters List Screen (Default Values)

2. In the Actions line, press [A] (for **Add**) to display the Traffic/Security Filters Configuration screen shown in figure 6-24.



```
                              DEFAULT_CONFIG

=========================- CONSOLE - MANAGER MODE -=========================
     Switch Configuration - Advanced Features - Traffic/Security Filters

  Filter Type : Multicast
  Multi-cast Address :

  Dest Port    Type       Action   |  Dest Port    Type       Action
  ---------  --------- + -------   |  ---------  --------- + -------
  A1         10/100TX  | Forward   |  C1         100FX     | Forward
  A2         10/100TX  | Forward   |  C2         100FX     | Forward
  A3         10/100TX  | Forward   |  C3         100FX     | Forward
  A4         10/100TX  | Forward   |  C4         100FX     | Forward
  A5         10/100TX  | Forward   |  D1         10F       | Forward
  A6         10/100TX  | Forward   |  D2         10F       | Forward
  A7         10/100TX  | Forward   |  D3         10F       | Forward
  A8         10/100TX  | Forward   |  D4         10F       | Forward

 Actions->   Cancel     Edit     Save     Help

Select the filter type.
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

Filter Type Parameter

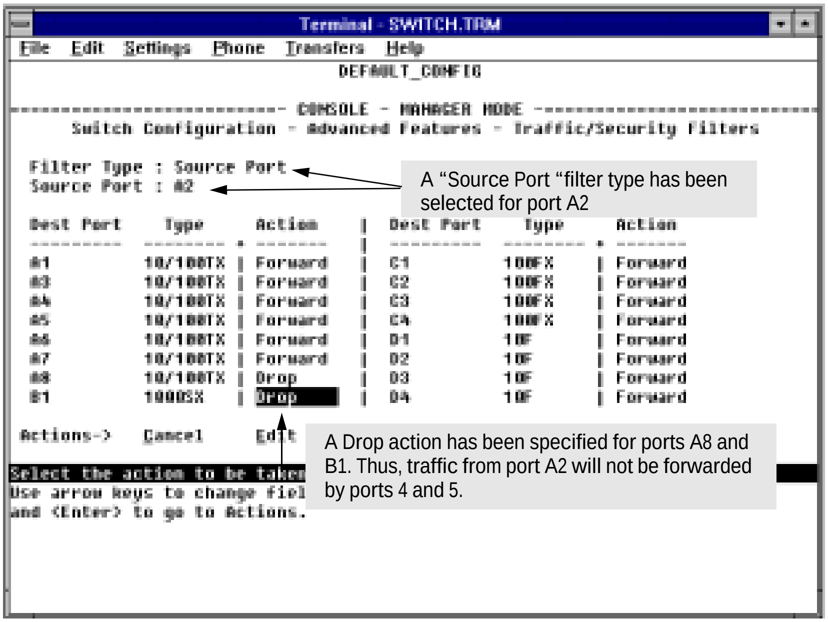
Figure 6-24. Example of the Traffic/Security Filters Configuration Screen

3. Press the Space bar to select the type of filter you want to configure. The options are:
   - Multicast (the default)
   - Source Port

4. Press ↓ once to highlight the next line. Depending on the type of filter you selected in step 3, select one of the options listed in the following table:

Filter Type Option Selected in step 3	Next Line for Filter Type Option	Action for Selected Filter Option
Multicast	Multicast Address	Type in the multicast address.
Source Port	Source Port	Use the Space bar to select the source port.

5. Configure the filter action for each destination port. For example:



```
                              DEFAULT_CONFIG

--------------------------- CONSOLE - MANAGER MODE ---------------------------
     Switch Configuration - Advanced Features - Traffic/Security Filters

  Filter Type : Source Port
  Source Port : A2

  Dest Port      Type       Action      |  Dest Port      Type       Action
  ---------    -------- + -------      |  ---------    -------- + -------
  A1           10/100TX | Forward      |  C1           100FX    | Forward
  A3           10/100TX | Forward      |  C2           100FX    | Forward
  A4           10/100TX | Forward      |  C3           100FX    | Forward
  A5           10/100TX | Forward      |  C4           100FX    | Forward
  A6           10/100TX | Forward      |  D1           10F      | Forward
  A7           10/100TX | Forward      |  D2           10F      | Forward
  A8           10/100TX | Drop         |  D3           10F      | Forward
  B1           1000SX   | Drop         |  D4           10F      | Forward

 Actions->    Cancel      Edit

Select the action to be taken
Use arrow keys to change fiel
and <Enter> to go to Actions.
```

A "Source Port "filter type has been selected for port A2

A Drop action has been specified for ports A8 and B1. Thus, traffic from port A2 will not be forwarded by ports 4 and 5.

Figure 6-25. Example of Specifying Filter Actions for Individual Ports

a. Press ↓ to highlight the **Action** option for a destination port (**Dest Port**).

b. Press the Space bar to select the filter action for that port (**Forward** filtered packets--the default--or **Drop** filtered packets).

   c. Do one of the following:
      – To configure the filter action for another destination port, return to step a.
      – If you are finished configuring actions for the current filter, go to step 6.

6. Press [Enter] to return to the Actions line, then press [S] (for **Save**) to save the current filter configuration.

7. Do one of the following:
   - If you want to configure another filter, return to step 3.
   - If you are finished configuring filters, press [B] (for **Back**) to return to the Configuration menu.

8. When you are finished configuring the switch, return to the Main Menu.

Filter Types and Operation

Multicast Filters

This filter type enables the switch to send multicast traffic to a specified set of destination ports. This helps to preserve bandwidth by reducing multicast traffic on ports where it is unnecessary, and to isolate multicast traffic to enhance security.

IGMP-controlled filters will override multicast filters defined in the Traffic/ Security Filters screen and having the same multicast address as specified by IGMP (page 6-71).

Static multicast filters and IGMP filters (addresses) together can total up to 255 in the switch. If multiple VLANs are configured, then each filter is counted once per VLAN in which it is used.

Note:

IP Multicast Filters

IP multicast addresses occur in the range from 224.0.0.0 through 239.255.255.255. Any static Traffic/Security filters (page 6-39) configured with a "Multicast" filter type and a "Multicast Address" in this range will continue in effect unless IGMP learns of a multicast group destination in this range. In this case, IGMP takes over the filtering function for the multicast destination address(es) for as long as the IGMP group is active. If the IGMP group subsequently deactivates, the static filter resumes control over traffic to the multicast address formerly controlled by IGMP.

If Spanning Tree is enabled, then the Spanning Tree multicast MAC address should not be filtered. (STP will not operate properly if the multicast MAC address is filtered.)

Source Port Filters

This filter type enables the switch to restrict traffic from *all* end nodes on the indicated source port to specific destination ports (or to be dropped for all destination ports on the switch). If VLANs are configured, the destination port must be in the same VLAN as the source port. Only one source port filter can be configured for each of the ports in the switch.

Note

If more than one VLAN is configured, then the set of destination ports (Dest Port parameter) can consist of only the destination ports that are in the same VLAN as the source port.

Port-Based Virtual LANs (VLANs)

A VLAN is a group of ports designated by the switch as belonging to the same broadcast domain. (That is, all ports carrying traffic for a particular subnet address would belong to the same VLAN.) Using a VLAN, you can group users by logical function instead of physical location. This helps to control bandwidth usage by allowing you to group high-bandwidth users on low-traffic segments and to organize users from different LAN segments according to their need for common resources. The Switch 4000M and the Switch 2400M enable you to configure up to 8 port-based, 802.1Q-compatible VLANs. This enables you to use the same port for two or more VLANs and still allows interoperation with older switches that require a separate port for each VLAN.

General Use and Operation. Port-based VLANs are typically used to enable broadcast traffic reduction and increased security. By using port groupings, traffic is isolated to specific domains. A group of network users assigned to a VLAN are a separate traffic domain so that packets are forwarded only between ports that are designated for the same VLAN. Thus, all ports carrying traffic for a particular subnet address should be configured to the same VLAN. Cross-domain broadcast traffic is eliminated and bandwidth is saved by not allowing packets to flood throughout the network. An external router is required to enable separate VLANs to communicate with each other.

For example, if ports 1 through 4 belong to VLAN_1 and ports 5 through 8 belong to VLAN_2, traffic from end-node stations on ports 2 through 4 is restricted to only VLAN 1, while traffic from ports 5 through 7 is restricted to only VLAN 2. For nodes on VLAN_1 to communicate with VLAN_2, their traffic must go through an external router via ports 1 and 8.

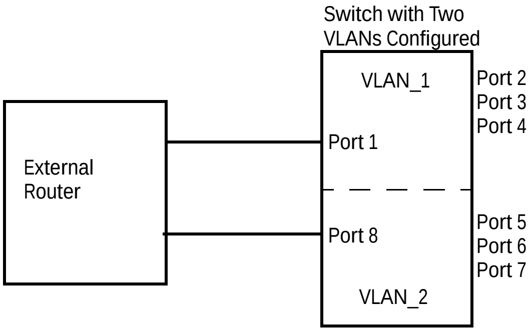


Figure 6-26. Example of Routing Between VLANs via an External Router

Overlapping (Tagged) VLANs. A port on the Switch 4000M or Switch 2400M can be a member of more than one VLAN if the device to which it is connected complies with the 802.1Q VLAN standard. For example, a port connected to a central server using a network interface card (NIC) that complies with the 802.1Q standard can be a member of multiple VLANs, allowing members of multiple VLANs to use the server. Although these VLANs cannot communicate with each other through the server, they can all use the server *over the same link*. Where VLANs overlap in this way, VLAN "tags" are used to distinguish between traffic from different VLANs.

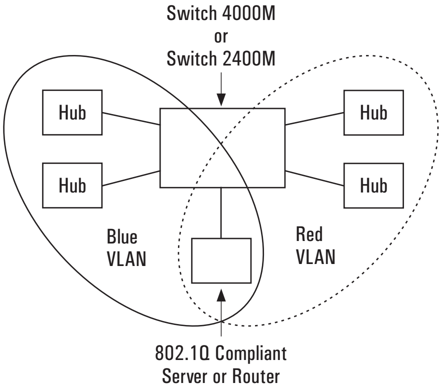


Figure 6-27. Example of Overlapping VLANs Using the Same Server

Similarly, using 802.1Q-compliant switches, you can connect multiple VLANs through the same link.

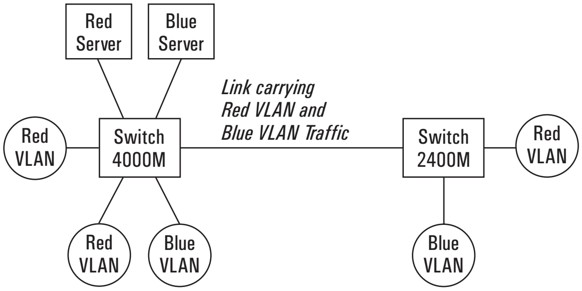


Figure 6-28. Example of Connecting Multiple VLANs Through the Same Link

Introducing Tagged VLAN Technology into Networks Running Legacy (Untagged) VLANs. You can introduce 802.1Q-compliant devices into networks that have built untagged VLANs based on earlier VLAN technology. The fundamental rule is that legacy/untagged VLANs require a separate link for each VLAN, while 802.1Q, or tagged VLANs can combine several VLANs in one link. This means that on the 802.1Q-compliant device, a separate port must be used to connect separate VLANs to non-802.1Q devices.

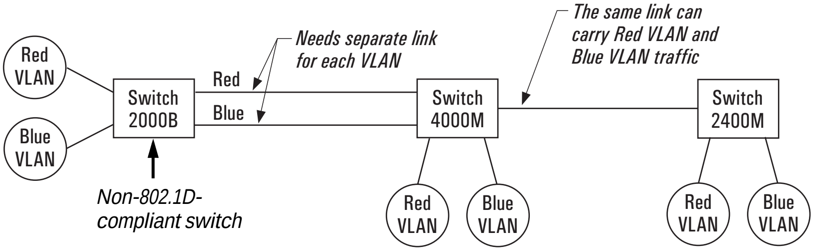

The same link can carry Red VLAN and Blue VLAN traffic
Needs separate link for each VLAN
Red VLAN
Blue VLAN
Switch 2000B
Red
Blue
Switch 4000M
Switch 2400M
Non-802.1D-compliant switch
Red VLAN
Blue VLAN
Red VLAN
Blue VLAN

Figure 6-29. Example of Tagged and Untagged VLAN Technology in the Same Network

For more information on VLANs, refer to:

- "Overview of Using VLANs on the Switch 4000M and Switch 2400M", below.
- "Using the Switch Console To Configure VLAN Parameters" on page 6-48.
- "Further VLAN Operating Information" on page 6-55.
- "VLAN Tagging" on page 6-55.
- "Effect of VLANs on Other Switch Features" on page 6-59.
- "VLAN Restrictions" on page 6-60.

Overview of Using VLANs

VLAN Support and the Default VLAN

In the factory default configuration, VLAN support is de-activated. When you activate VLAN support, all ports are assigned to a physical broadcast domain named **DEFAULT_VLAN**. You can partition the switch into multiple virtual broadcast domains by adding one or more additional VLANs and moving ports from the default VLAN to the new VLANs. Because the default VLAN permanently exists in the switch, adding one new VLAN results in two VLANs existing in the switch. Adding another VLAN results in three VLANs existing in the switch, and so on. (The switch can have a maximum of 8 VLANs, including the DEFAULT_VLAN.)

To use VLANs, follow these general steps:

1. Plan your VLAN strategy and create a map of the logical topology that will result from configuring VLANs. Include consideration for the interaction between VLANs and other features such as Spanning Tree Protocol, load balancing, and IGMP. (Refer to “Effect of VLANs on Other Switch Features” on page 6-59.)
2. Enable VLANs in the switch. (In the factory default configuration, VLANs are disabled.)
3. Configure at least one VLAN in addition to the default VLAN (DEFAULT_VLAN).
4. If you are managing VLANs with SNMP in an IP network, either configure an IP address and subnet mask for each VLAN or use the (default) DHCP/Bootp feature to download an IP configuration from a DHCP or Bootp server. Refer to “IP Configuration” on page 6-6.

Note

Before you delete a VLAN, you must re-assign its ports to another VLAN.

When VLANs are used and are managed from an SNMP workstation, you should configure IP services for each VLAN. (Refer to pages 6-7 and 6-8.)

IGMP and some other features operate on a “per VLAN” basis. This means you must configure such features separately for each VLAN in which you want them to operate.

Further Information

- For further operating information and restrictions, refer to "Further VLAN Operating Information" on page 6-55.
- For further explanation and examples of VLANs operating with other switch features, see HP's Network City website at the following URL on the World Wide Web:

  http://www.hp.com/go/network_city

Using the Switch Console To Configure VLAN Parameters

In the factory default state, VLANs are disabled and all ports belong to the same broadcast/multicast domain. This domain is called "DEFAULT_VLAN" and appears in the "VLAN Names" screen after you activate VLAN support and reboot the switch. You can create up to 7 additional VLANs by adding new VLAN names, and then assigning one or more ports to each VLAN. (The switch accepts a maximum of 8 VLANs, including the default VLAN.) Note that each port can be assigned to multiple VLANs by using VLAN tagging (described later in this section). DEFAULT_VLAN *can be renamed, but not deleted*. Any ports not specifically assigned to another VLAN will remain assigned to DEFAULT_VLAN.

To Activate or De-Activate VLANs

In the factory default configuration, VLANs are deactivated. Before you can configure VLANs, you must first activate VLAN support and reboot the switch.

Note

If you activate VLAN support and configure VLANs, then subsequently de-activate VLAN support, all VLANs except the DEFAULT_VLAN will be cleared from the switch and all ports will be reassigned to the default VLAN. Depending on the network topology, this could result in redundant links causing broadcast storms unless the Spanning Tree Protocol is enabled.

To Activate VLANs:

1. From the Main Menu select:

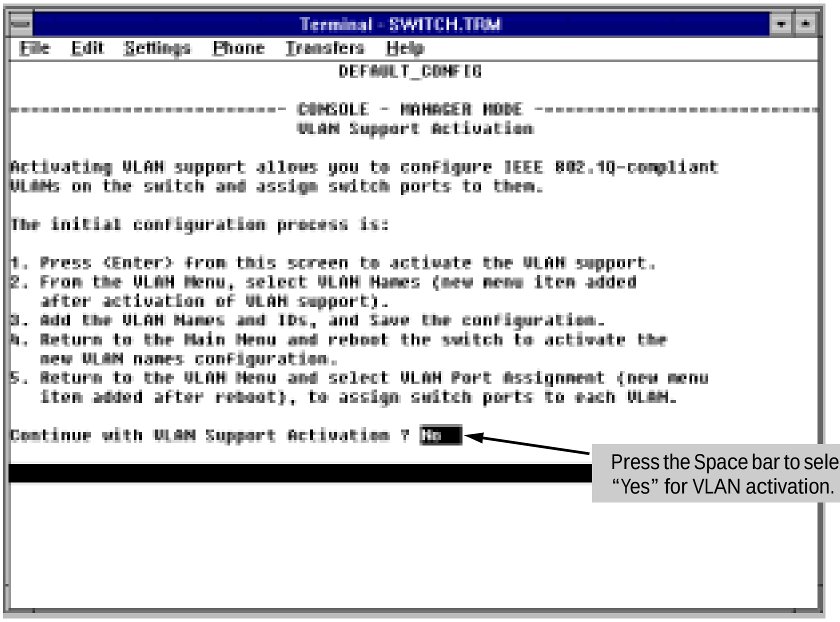
   3. Switch Configuration

   5. Advanced Features

   5. VLAN Menu . . .

   1. Activate VLAN Support

   You will then see the following screen:



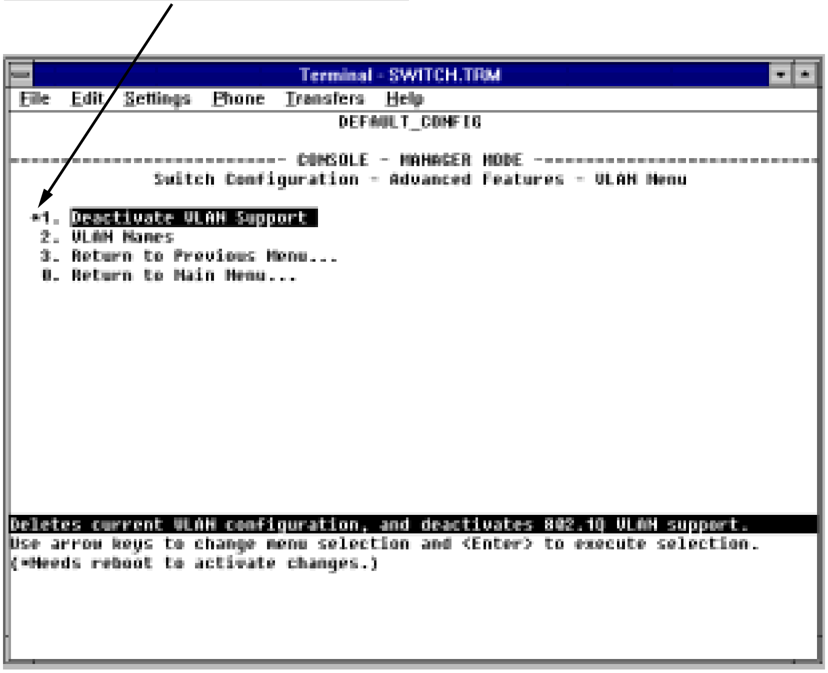
```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                          VLAN Support Activation

Activating VLAN support allows you to configure IEEE 802.1Q-compliant
VLANs on the switch and assign switch ports to them.

The initial configuration process is:

1. Press <Enter> from this screen to activate the VLAN support.
2. From the VLAN Menu, select VLAN Names (new menu item added
   after activation of VLAN support).
3. Add the VLAN Names and IDs, and Save the configuration.
4. Return to the Main Menu and reboot the switch to activate the
   new VLAN names configuration.
5. Return to the VLAN Menu and select VLAN Port Assignment (new menu
   item added after reboot), to assign switch ports to each VLAN.

Continue with VLAN Support Activation ? No
```

Press the Space bar to select "Yes" for VLAN activation.

Figure 6-30. VLAN Support Activation Screen

2. Press the Space bar to select **Yes** (for activating VLAN support), then press [Enter]. You will then see the VLAN Menu screen:

The “*” indicates you should reboot the switch to implement the change performed in step 1, above (activate VLAN support).



```
                               DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
              Switch Configuration - Advanced Features - VLAN Menu

  *1. Deactivate VLAN Support
   2. VLAN Names
   3. Return to Previous Menu...
   0. Return to Main Menu...

Deletes current VLAN configuration, and deactivates 802.1Q VLAN support.
Use arrow keys to change menu selection and <Enter> to execute selection.
(*Needs reboot to activate changes.)
```

Figure 6-31. The VLAN Menu Screen

3. Do one of the following:
   - If you are not ready to add a specific VLAN at this time, return to the Main Menu and reboot the switch to implement VLAN activation. Once this is done, you can return to the VLAN menu at any time to add specific VLANs.
   - If you want to add one or more specific VLANs now, refer to “How To Create or Edit a VLAN” on page 6-51.

How To Create or Edit a VLAN.

Use this procedure to add a new VLAN or to edit the name of an existing VLAN.

Note

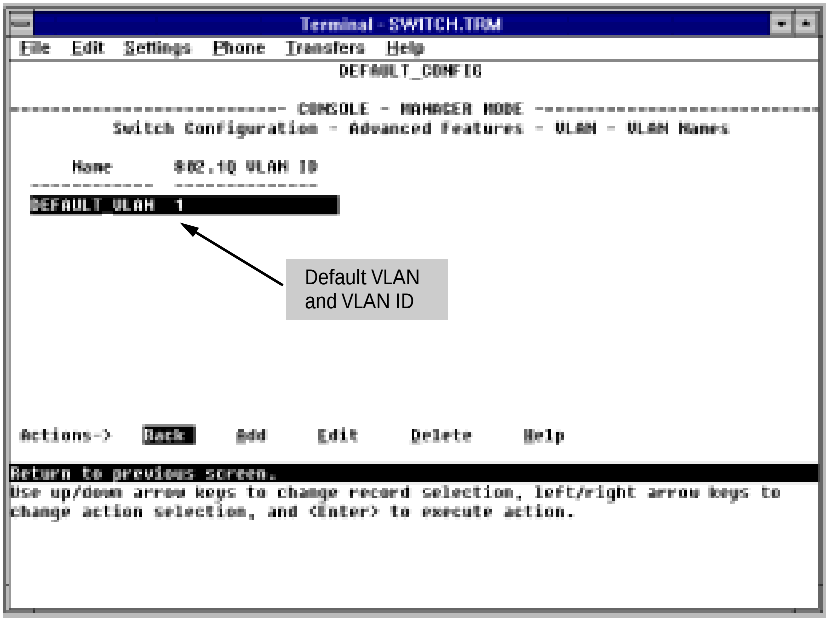
If you add a new VLAN or edit the name of an existing VLAN, you should then reboot the switch to activate the new VLAN. (A new VLAN will not appear as an option in the Port VLAN Assignment screen until after the switch is rebooted.) If you create a new VLAN without also rebooting the switch, you will be prompted to choose whether to reboot the switch before entering the Port VLAN Assignment screen. When you assign a port to an active VLAN, the new assignment is automatically enabled, and it is not necessary to reboot the switch a second time.

1. From the Main Menu select:

   3. Switch Configuration

   - **5. Advanced Features**
     - **5. VLAN Menu . . .**
       - **2. VLAN Names**

   If multiple VLANs are not configured you will see a screen similar to the one shown next.



```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
      Switch Configuration - Advanced Features - VLAN - VLAN Names

     Name          802.1Q VLAN ID
  -------------   ---------------
  DEFAULT_VLAN     1








 Actions->   Back     Add     Edit     Delete     Help

Return to previous screen.
Use up/down arrow keys to change record selection, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Default VLAN and VLAN ID

Figure 6-32. The (Default) VLAN Names Screen

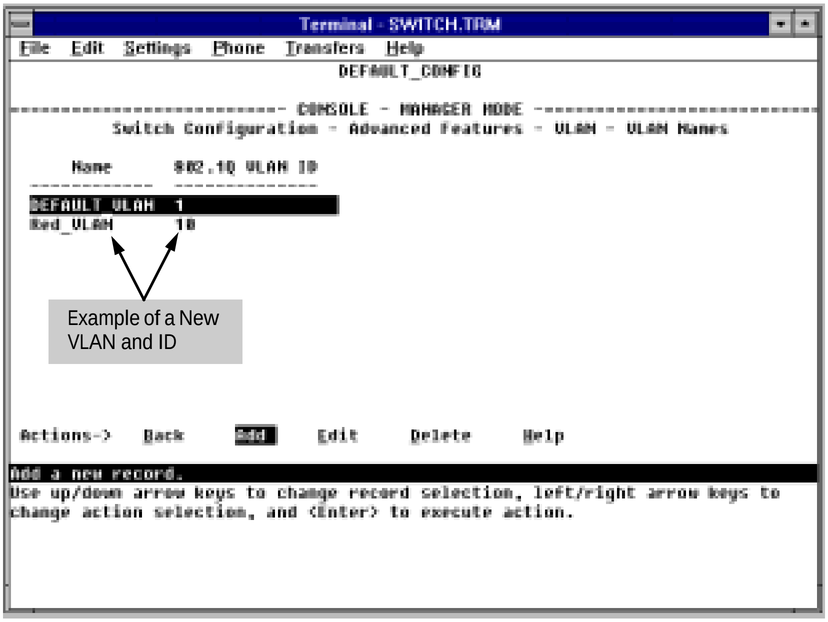
2. Press [A] (for **Add**). You will then be prompted for a new VLAN name and VLAN ID:

   Name : _
   802.1Q VLAN ID : 1

3. Type the name (up to 12 characters, with no spaces) of a new VLAN that you want to add, then press [Enter].

4. Press [↓] to move the cursor to the **802.1Q VLAN ID** line and type in a VLAN ID number, then press [Enter]. (This can be any number between 1 and 4095 that is not already being used by another VLAN.) Remember that a VLAN should have the same VLAN ID in every switch in which you configure the VLAN.

5. Press [S] (for `Save`). You will then see the VLAN Names screen with the new VLAN listed.


Terminal - SWITCH.TRM
File Edit Settings Phone Transfers Help
Example of a New VLAN and ID

```
                              DEFAULT_CONFIG

=========================- CONSOLE - MANAGER MODE -=========================
       Switch Configuration - Advanced Features - VLAN - VLAN Names

    Name          802.1Q VLAN ID
 ------------   ---------------
 DEFAULT_VLAN   1
 Red_VLAN       10




Actions->   Back      Add      Edit      Delete      Help

Add a new record.
Use up/down arrow keys to change record selection, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Figure 6-33. Example of the VLAN Names Screen with a New VLAN Added

6. Return to the Main Menu and reboot the switch to activate the new VLAN(s) you have just entered.

Note

After entering a new VLAN, you must reboot the switch before assigning ports to the new VLAN. Also, you can rename **"DEFAULT_VLAN"**, but you cannot delete it from the switch, regardless of which name you assign to it. When there are no other VLANs configured in the switch, all ports belong to the default VLAN.

To Add or Remove a Port VLAN Assignment

Use this procedure to change the VLAN assignment(s) for any port. (Ports not specifically assigned to a VLAN are automatically in the default VLAN.)

1. From the Main Menu select:

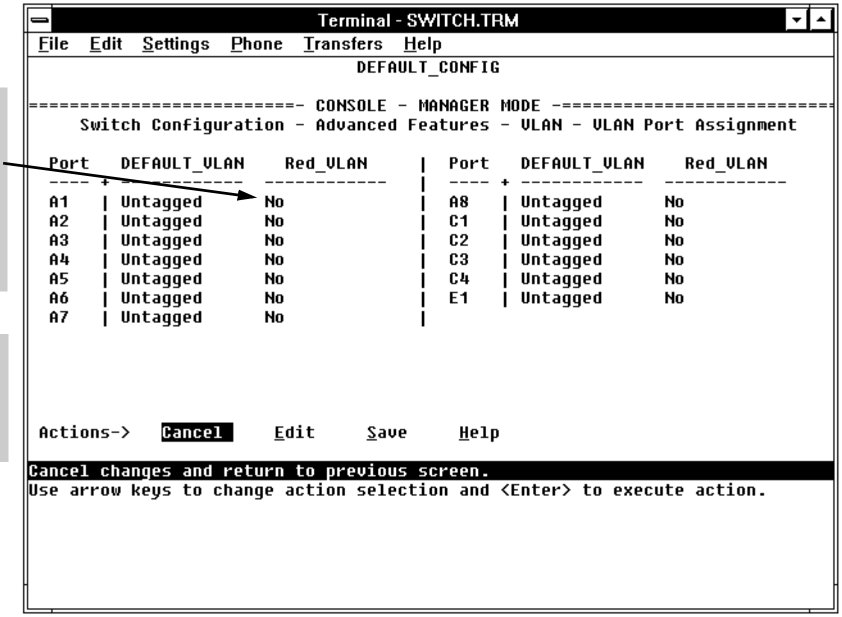
   3. Switch Configuration

   5. Advanced Features

   5. VLAN Menu . . .

   2. VLAN Port Assignment

You will then see a VLAN Port Assignment screen similar to the following



```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
    Switch Configuration - Advanced Features - VLAN - VLAN Port Assignment

  Port   DEFAULT_VLAN    Red_VLAN     |  Port   DEFAULT_VLAN    Red_VLAN
  ---- + ------------  ------------   |  ---- + ------------  ------------
  A1   | Untagged      No             |  A8   | Untagged      No
  A2   | Untagged      No             |  C1   | Untagged      No
  A3   | Untagged      No             |  C2   | Untagged      No
  A4   | Untagged      No             |  C3   | Untagged      No
  A5   | Untagged      No             |  C4   | Untagged      No
  A6   | Untagged      No             |  E1   | Untagged      No
  A7   | Untagged      No             |

 Actions->   Cancel     Edit     Save     Help

Cancel changes and return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

In this example, the "Red_VLAN" has been configured, but no ports have yet been assigned to it. ("No" means the port is not assigned to that VLAN.)

A port can be assigned to several VLANs, but only one of those assignments can be "Untagged".

Figure 6-34. Example of the VLAN Port Assignment Screen

2. To change a port's VLAN assignment(s):
   a. Press [E] (for `Edit`).
   b. Use the arrow keys to select a VLAN assignment you want to change.
   c. Press the Space bar to make your assignment selection (**No**, **Tagged**, or **Untagged**).

Note

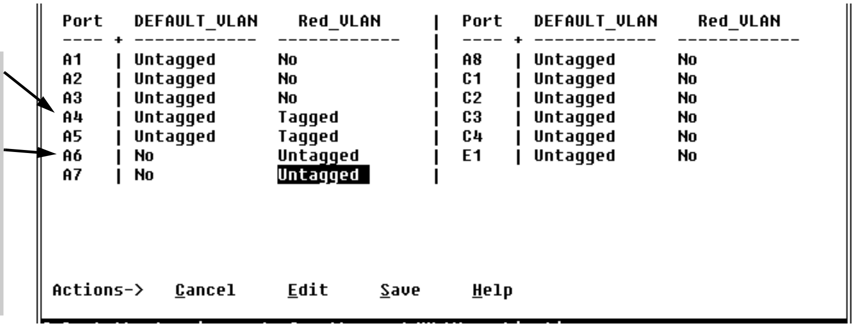
Only one untagged VLAN is allowed per port. Also, there must be at least one VLAN assigned to each port. In the factory default configuration, all ports are assigned to the default VLAN (DEFAULT_VLAN).

For example, if you wanted ports A4 and A5 to belong to both the DEFAULT_VLAN and the Red_VLAN, and ports A6 and A7 to belong only to the Red_VLAN, your selections would look like this:

Ports A4 and A5 are assigned to both VLANs.

Ports A6 and A7 are assigned only to the Red VLAN.

All other ports are assigned only to the Default VLAN.



```
 Port   DEFAULT_VLAN    Red_VLAN     | Port   DEFAULT_VLAN    Red_VLAN
 ---- + ------------  ------------   | ---- + ------------  ------------
 A1   | Untagged      No             | A8   | Untagged      No
 A2   | Untagged      No             | C1   | Untagged      No
 A3   | Untagged      No             | C2   | Untagged      No
 A4   | Untagged      Tagged         | C3   | Untagged      No
 A5   | Untagged      Tagged         | C4   | Untagged      No
 A6   | No            Untagged       | E1   | Untagged      No
 A7   | No            Untagged       |




Actions->   Cancel     Edit     Save     Help
```

Figure 6-35. Example of VLAN Assignments for Specific Ports

For information on VLAN tags (“Untagged” and “Tagged”), refer to “Vlan Tagging” on page 6-55.

d. If you are finished assigning ports to VLANs, press [Enter] and then [S] (for `Save`) to activate the changes you've made and to return to the Configuration menu. (The console then returns to the VLAN menu.)

3. Return to the Main menu. (It is not necessary to reboot the switch for changes in port VLAN assignments; they are implemented when you do the “save” in the preceding step.)

Further VLAN Operating Information

VLAN Tagging

VLAN tagging enables traffic from more than one VLAN to use the same port. (Even when two or more VLANs use the same port they remain as separate domains and cannot receive traffic from each other without going through a router.) As mentioned earlier, a “tag” is simply a unique VLAN identification number (VLAN ID) assigned to a VLAN at the time that you configure the VLAN name in the switch. In the Switch 4000M and 2400M the tag can be any number from 1 to 4095 that is not already assigned to a VLAN. When you subsequently assign a port to a given VLAN, you need to implement the VLAN tag (VLAN ID) only if the port will carry traffic for more than one VLAN. Otherwise, the port VLAN assignment can remain “untagged” because the tag is not needed. On a given switch, this means you should use the “Untagged” designation for a port VLAN assignment where the port is connected to non 802.1Q-compliant device or is assigned to only one VLAN. Use the “Tagged” designation for a port VLAN assignment where the port is assigned to more than one VLAN or the port is connected to a device that does comply with the 802.1Q standard.

For example, if port X7 on an 802.1Q-compliant switch is assigned to only the red VLAN, the assignment can remain "untagged" because the port will forward traffic only for the red VLAN. However, if both the red and green VLANs are assigned to port X7, then at least one of those VLAN assignments must be "tagged" so that red traffic can be distinguished from green traffic. The following illustration demonstrates this concept:

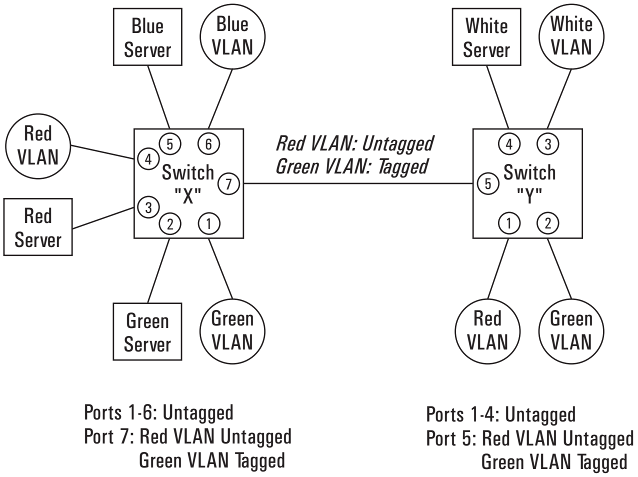
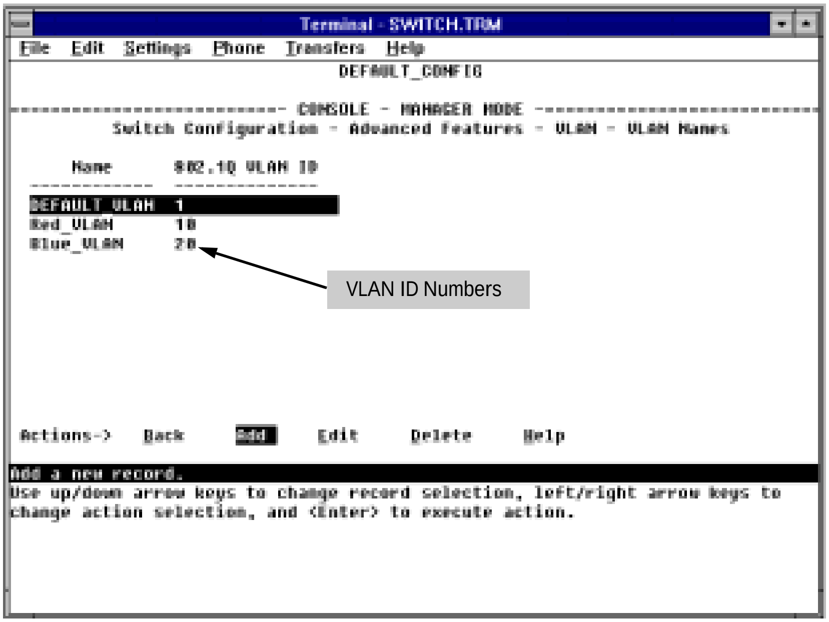


Figure 6-36. Example of Tagged and Untagged VLAN Port Assignments

- In switch X:
  - VLANs assigned to ports X1 - X6 can all be untagged because there is only one VLAN assignment per port. Red traffic will go out only the red ports; green traffic will go out only the green ports, and so on. Devices connected to these ports do not have to be 802.1Q-compliant.
  - However, because both the red VLAN and the green VLAN are assigned to port X7, at least one of the VLANs must be tagged for this port.
- In switch Y:
  - VLANs assigned to ports Y1 - Y4 can all be untagged because there is only one VLAN assignment per port. Devices connected to these ports do not have to be 802.1Q-compliant.
  - Because both the red VLAN and the green VLAN are assigned to port Y5, at least one of the VLANs must be tagged for this port.
- In both switches: The ports on the link between the two switches must be configured the same. That is, the Red VLAN must be untagged on port X7 and Y5 and the Green VLAN must be tagged on port X7 and Y5, or vice-versa.

Note

Each 802.1Q-compliant VLAN must have its own unique VLAN ID number. That is, a particular VLAN should be given the same VLAN ID in every device. That is, if the "red" VLAN has a VLAN ID of 10 in switch "X", then 10 should also be used for the red VLAN ID in switch "Y".



```
                               DEFAULT_CONFIG

=========================- CONSOLE - MANAGER MODE -=========================
          Switch Configuration - Advanced Features - VLAN - VLAN Names

      Name          802.1Q VLAN ID
      ------------  --------------
  DEFAULT_VLAN      1
  Red_VLAN          10
  Blue_VLAN         20

 Actions->    Back      Add      Edit      Delete      Help

Add a new record.
Use up/down arrow keys to change record selection, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Figure 6-37. Example of VLAN ID Numbers Assigned in the VLAN Names Screen

VLAN tagging gives you several options:

- Since the purpose of VLAN tagging is to allow multiple VLANs on the same port, any port that has only one VLAN assigned to it can be configured as "Untagged" (the default).
- Any port that has two or more VLANs assigned to it can have one VLAN assignment for that port as "Untagged". All other VLANs assigned to the same port must be configured as "Tagged". (There can be no more than one Untagged VLAN on a port.)
- If all end nodes on a port comply with the 802.1Q standard and are configured to use the correct VLAN tag number, then, you can configure all VLAN assignments on a port as "Tagged" if doing so makes it easier to manage your VLAN assignments.

For example, in the following network, switches "X" and "Y" and servers S1 and S2 are 802.1Q-compliant. (Server S3 could also be 802.1Q-compliant, but it makes no difference for this example.)

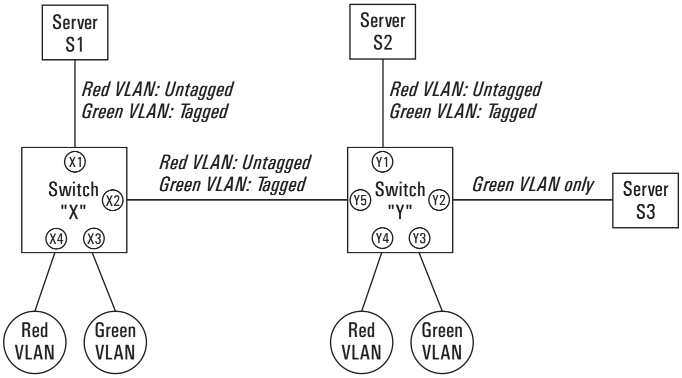


Figure 6-38. Example of Networked 802.1Q-Compliant Devices with Multiple VLANs on Some Ports

The VLANs assigned to ports X3, X4, Y2, Y3, and Y4 can all be untagged because there is only one VLAN assigned per port. Port X1 has multiple VLANs assigned, which means that one VLAN assigned to this port can be untagged and any others must be tagged. The same applies to ports X2, Y1, and Y5.

Switch "X"				Switch "Y"		
Port	Red VLAN	Green VLAN		Port	Red VLAN	Green VLAN
X1	Untagged	Tagged		Y1	Untagged	Tagged
X2	Untagged	Tagged		Y2	No*	Untagged
X3	No*	Untagged		Y3	No*	Untagged
X4	Untagged	No*		Y4	Untagged	No*
				Y5	Untagged	Tagged

*"No" means the port is not a member of that VLAN. For example, port X3 is not a member of the Red VLAN and does not carry Red VLAN traffic.

Note

VLAN configurations on ports connected by the same link must match. Because ports X2 and Y5 are opposite ends of the same point-to-point connection, both ports must have the same VLAN configuration; that is, both ports configure the Red VLAN as "Untagged" and the Green VLAN as "Tagged".

To summarize:

VLANs Per Port	Tagging Scheme
1	Untagged or Tagged
2 or More	1 VLAN Untagged; all others Tagged or All VLANs Tagged

A VLAN should have the same VLAN ID on any 802.1Q-compliant device in the network.

The ports connecting two 802.1Q devices should have identical VLAN configurations, as shown for ports X2 and Y5, above.

Effect of VLANs on Other Switch Features

Spanning Tree Protocol Operation with VLANs

Because the Switch 4000M and the Switch 2400M follow the 802.1Q VLAN recommendation to use single-instance spanning tree, STP operates across the switch instead of on a per-VLAN basis. This means that if redundant physical links exist between the switch and another 802.1Q device, all but one link will be blocked, regardless of whether the redundant links are in separate VLANs. However, you can use port trunking to prevent STP from unnecessarily blocking ports (and to improve overall network performance). Refer to "STP Operation with 802.1Q VLANs" on page 6-38.

Note that STP operates differently in different devices. For example, in the (non-802.1Q) HP Switch 2000 and the HP Switch 800T, STP operates on a per-VLAN basis, allowing redundant physical links as long as they are in separate VLANs. Thus, redundant links connecting a Switch 4000M or Switch 2400M to the Switch 2000 or Switch 800T in a VLAN environment will not be blocked if the links are in different VLANs.

IPX and IP Interfaces.

There is a one-to-one relationship between a VLAN and an IP or IPX network interface. Since the VLAN is defined by a group of ports, the state (up/down) of those ports determines the state of the IP or IPX network interface associated with that VLAN. When a VLAN comes up because one or more of its ports is up, the IP or IPX interface for that VLAN is also activated. Likewise, when a VLAN is deactivated because all of its ports are down, the corresponding IP or IPX interface is also deactivated.

VLAN MAC Addresses

The switch has one unique MAC address for each of its VLAN interfaces. You can send an 802.2 test packet to this MAC address to verify connectivity to the switch. Likewise, you can assign an IP address to the VLAN interface, and when you Ping that address, ARP will resolve the IP address to this MAC address. (For IPX networks, each VLAN interface is automatically assigned a node address that is equivalent to the MAC address for that VLAN interface.) The switch allows up to 8 VLAN MAC addresses (one per possible VLAN).

Port Trunks

When assigning a port trunk to a VLAN, all ports in the trunk are automatically assigned to the same VLAN. You cannot split trunk members across multiple VLANs. Also, a port trunk is tagged, untagged, or excluded from a VLAN in the same way as for individual, untrunked ports.

Port Monitoring

If you designate a port on the switch for network monitoring, this port will appear in the Port VLAN Assignment screen and can be configured as a member of any VLAN. For information on how broadcast, multicast, and unicast packets are tagged inside and outside of the VLAN to which the monitor port is assigned, refer to page 8-6.

VLAN Restrictions

- A port must be a member of at least one VLAN. In the factory default configuration, all ports are assigned to the default VLAN (DEFAULT_VLAN).
- A port can be assigned to several VLANs, but only one of those assignments can be untagged. (The “Untagged” designation enables VLAN operation with non 802.1Q-compliant devices.)

- An external router must be used to communicate between VLANs.
- Duplicate MAC addresses on different VLANs are not supported and can cause VLAN operating problems. These duplicates are possible and common in situations involving Sun workstations with multiple network interface cards, with DECnet routers, and with certain Hewlett-Packard routers using OS versions earlier than A09.70 where any of the following are enabled:
  - IPX
  - IP Host-Only
  - STP
  - XNS
  - DECnet

  Currently, the problem of duplicate MAC addresses in IPX and IP Host-Only environments is addressed through the HP router OS version described below. However, for XNS and DECnet environments, a satisfactory solution is not available from any vendor at this time.

Note

Operating problems associated with duplicate MAC addresses are likely to occur in VLAN environments where XNS and DECnet are used. For this reason, using VLANs in XNS and DECnet environments is not currently supported.

- Before you can delete a VLAN, you must re-assign all ports in the VLAN to another VLAN.

HP Router Requirements. *Use the Hewlett-Packard version A.09.70 (or later) router OS release if any of the following Hewlett-Packard routers are installed in networks in which you will be using VLANs:*

HP Router 440 (formerly Router ER)
HP Router 470 (formerly Router LR)
HP Router 480 (formerly Router BR)
HP Router 650

Release A.09.70 (or later) is available electronically through the HP BBS service and the World Wide Web. Refer to the "Customer Support Services" booklet shipped with the switch.

Symptoms of Duplicate MAC Addresses in VLAN Environments

There are no definitive events or statistics to indicate the presence of duplicate MAC addresses in a VLAN environment. However, one symptom that may occur is that a duplicate MAC address can appear in the Port Address Table screen to be linked with one port, and then later appear to be linked to another port.

Load Balancing: Port Trunking

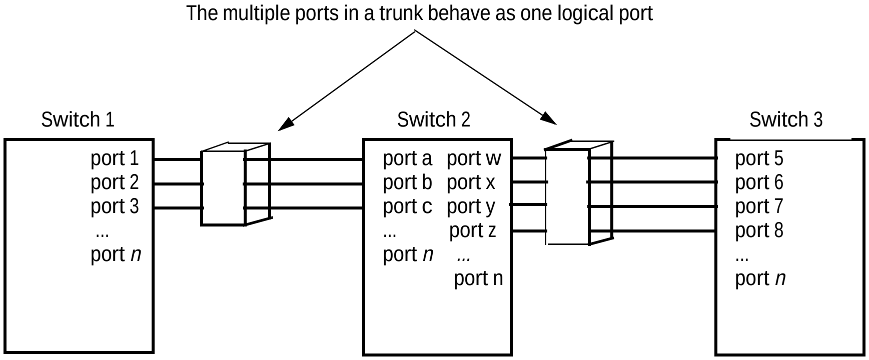


Figure 6-39. Conceptual Illustration of Port Trunking

Port trunking allows up to four ports to be connected together to function as a single, higher-speed link that dramatically increases bandwidth. This capability can be applied to connections between backbone devices as well as connections in other network areas where traffic bottlenecks have developed. With full-duplex operation in a four-port trunk, this enables the following bandwidth capabilities:

- 10Base-T links: Up to 80Mbps
- 100Base-T links: Up to 800 Mbps

The Switch 4000M and the Switch 2400M both support up to ten four-port trunks.

Note

To avoid broadcast storms or loops in your network while configuring trunks, first disable or disconnect all ports you want to add or remove from both sides of the trunk. After you finish configuring the trunk, enable or re-connect the ports.

Traffic distribution across the links in a port trunk is based on source/destination or source-only address forwarding methods described later in this section. This results in load balancing based on distribution of source and/or destination addresses across the links in a trunk. Because the amount of traffic coming from or going to various nodes in a network can vary widely, it is possible for one link in a trunk to be fully utilized while others in the same trunk have unused bandwidth capacity even though the address assignments are evenly distributed across the links in a trunk. In actual networking environments, this is rarely a problem. However, if it becomes a problem, you can use the HP TopTools for Hubs & Switches network management software available from Hewlett-Packard to quickly and easily identify the sources of heavy traffic (top talkers) and make adjustments to improve performance.

Fault Tolerance: If a link in a port trunk fails, traffic originally destined for that link will be redistributed to the remaining links in the trunk. The trunk remains operable as long as there is at least one link in operation. If a link is restored, traffic is again redistributed to utilize the restored link.

Port Connections and Configuration: All port trunk links must be point-to-point connections between the Switch 4000M/2400M and another switch, router, server, or workstation. It is important to note that ports on both ends of a port trunk should be configured with the same trunk type, mode, flow control, and broadcast limit settings.

Note

Using more than one media type and/or link speed in a port trunk is not supported. The console interface allows only links of the same media type within the same trunk. Similarly, it is recommended that all links in the same trunk have the same speed. You should also apply these rules when using a network management application to configure a port trunk.

Use with Spanning Tree and Advanced Features. A configured trunk appears as a single port (labeled **Trk1**, **Trk2**...**Trk9**, **Trk0**) on other configuration screens, such as the Spanning Tree, IP Multicast (IGMP), and VLAN port assignment screens. When Spanning Tree forwards on a trunk, all ports in the trunk will be forwarding. Conversely, when Spanning Tree blocks a trunk, all ports in the trunk are blocked. Also, when a trunk port is assigned to a VLAN, all ports in that trunk are assigned to the same VLAN. (If you assign a trunk to a VLAN, and then remove a port from the trunk, that port will automatically be assigned to the same VLAN as the trunk.)

When you add a port to a trunk, the port takes on the properties of the trunk. If you remove a port from a trunk, the port retains the trunk properties (except for the filtering properties, which are returned to their previous state). For example, if you:

1. Use ports A1, A2, and A3 to create trunk 1 in the red VLAN.
2. Move trunk 1 to the blue VLAN.
3. Remove port A3 from the blue VLAN.

then port A3 will be a member of the blue VLAN instead of the original red VLAN. However, if filters are in use:

- If, for example, port A3 was configured to *drop* IPX packets *before* it became a member of trunk 1 and . . .
- If trunk 1 was configured to *forward* IPX packets, then port A3 will also forward IPX packets while it is a member of trunk 1. However, if you subsequently remove port A3 from trunk 1, then port A3 resumes dropping IPX packets.

Interoperability

The Switch 4000M and the Switch 2400M enable trunking with the HP switch products listed below. These two switches also offer trunking interoperation with products offered by some other vendors.

Note

When this manual was released, an IEEE standard for port trunking was not yet available. Thus, standards compliance cannot yet be used to determine how successfully various vendors' implementations of port trunking will interoperate with the Switch 4000M and Switch 2400M. (However, note that the Trunk option uses the IEEE 802.3 standards for auto-negotiating half- or full-duplex operation and auto-sensing 10Mbps, 100Mbps, and 1Gps links.) For more on this topic, see the Technology area of HP's Network City website at:

www.hp.com/go/network_city

Trunk Configuration Options

There are two trunk configuration types from which to select:

Type	Distribution Method	Recommended Switch 4000M/2400M Configuration for Trunking to:
Trunk	Source Address/Destination Address (SA/DA)	• Another HP Switch 4000M/2400M • HP Switch 8000M/1600M • HP Switch 2000A/B • HP Switch 800T • SA/DA forwarding devices such as the Sun Trunk Server and some vendors' switches • Windows NT and HP-UX workstations and servers
SA-Trunk	Source-Address Distribution	Forwarding devices such as low-end switches or devices that do not support SA/DA port trunks.

Using the Console To Configure Port Trunks

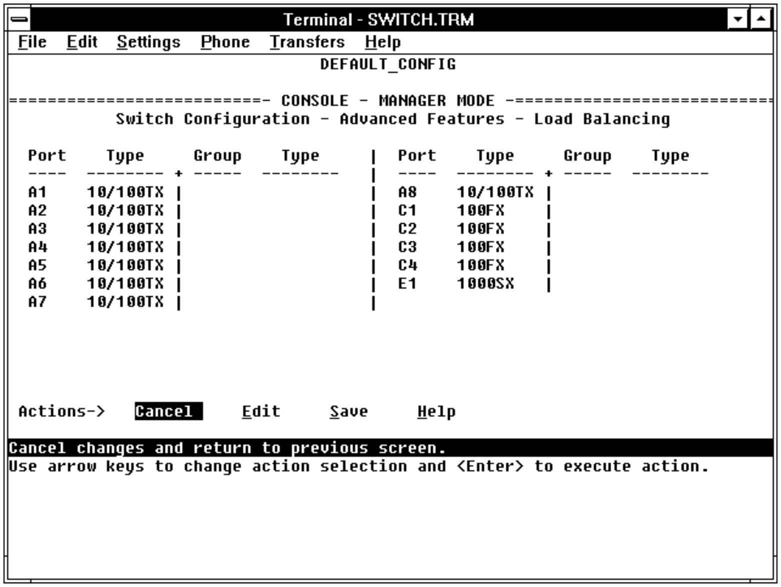
Important. Use this procedure to configure port trunking *before* you connect the trunked links between switches. Otherwise, a broadcast storm could occur. (If you need to connect the ports before configuring them for trunking, you can use the Port Settings feature—page 6-25—to temporarily disable the ports until the trunk is configured.)

To Access Port Trunking:

1. If you need to connect ports for a trunk before configuring them, refer to "Port Settings" on page 6-25 to temporarily disable the ports until the trunk is configured. Otherwise, just avoid connecting the ports in the trunk until after you configure trunking. (This avoids creating a loop that could result in overloading the network with a broadcast storm.)
2. From the Main Menu, Select:

   3. Switch Configuration
   5. Advanced Features
   2. Load Balancing (Trunks)

3. Press [E] (for **Edit**) to access the load balancing parameters.



```
                              DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -===========================
           Switch Configuration - Advanced Features - Load Balancing

  Port    Type     Group    Type       |  Port    Type     Group    Type
  ----  -------- + -----  --------     |  ----  -------- + -----  --------
  A1    10/100TX |                     |  A8    10/100TX |
  A2    10/100TX |                     |  C1    100FX    |
  A3    10/100TX |                     |  C2    100FX    |
  A4    10/100TX |                     |  C3    100FX    |
  A5    10/100TX |                     |  C4    100FX    |
  A6    10/100TX |                     |  E1    1000SX   |
  A7    10/100TX |                     |




 Actions->   Cancel     Edit     Save     Help

Cancel changes and return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 6-40. Example of the Screen for Configuring Ports for Load Balancing

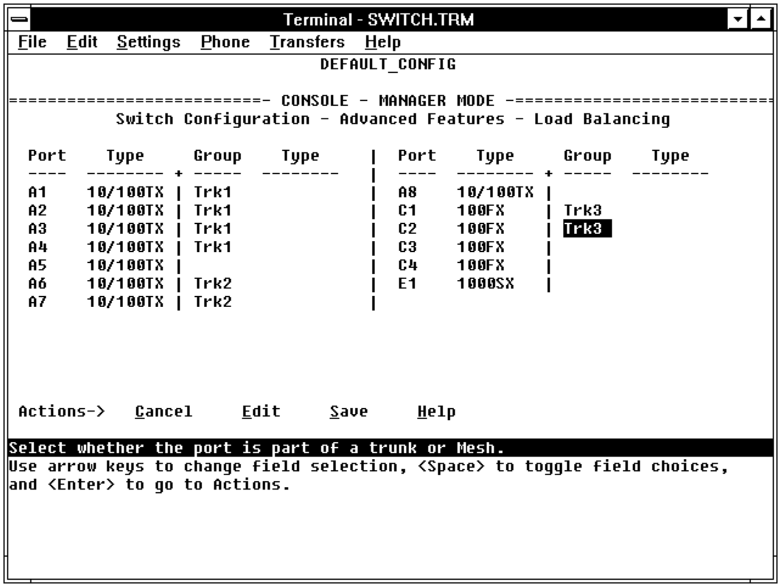
4. In the Group column, move the cursor to the port you want to configure.

5. Use the Space bar (or type the trunk name, such as **trk5**) to choose a trunk assignment for the selected port.

   - All ports in a trunk should have the same media type and mode (such as 10/100TX set to 100HDx, or 100FX set to 100FDx). The flow control and broadcast limit settings should also be the same for all ports in a given trunk. To verify these settings, refer to “Port Settings” on page 6-25.

   - You can configure up to ten different trunks (**Trk1**...**Trk9**,**Trk0**), with one, two, three, or four ports per trunk. A port can be assigned to only one trunk. However, you can move ports between trunks. If multiple VLANs are configured, all ports within a given trunk must belong to the same VLAN or set of VLANs. (With the 802.1Q VLAN capability built into the switch, more than one VLAN can be assigned to a port. Refer to “Port-Based Virtual LANs (VLANs)” on page 6-44.)

     (To return a port to a non-trunk status, keep pressing the Space bar until a blank appears in the highlighted Group cell for that port.)



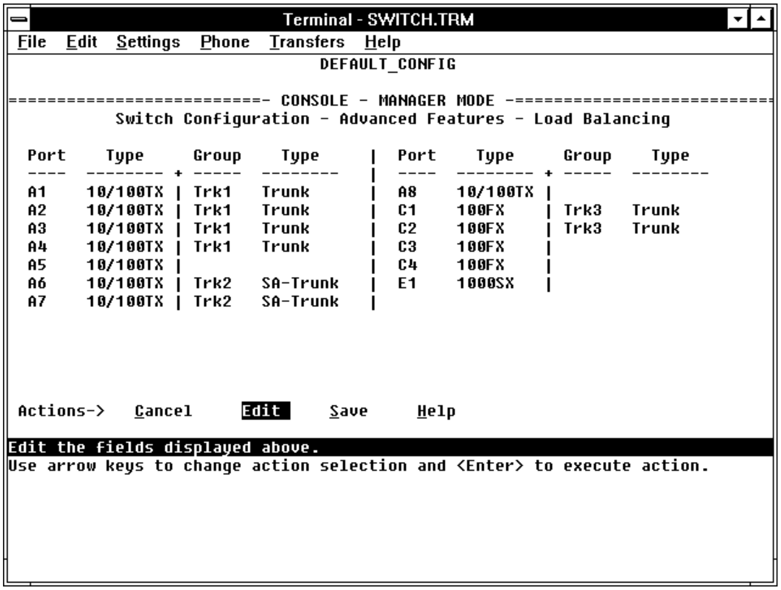
```
                                DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -===========================
             Switch Configuration - Advanced Features - Load Balancing

  Port    Type     Group    Type      |  Port    Type     Group    Type
  ----  -------- + -----  --------    |  ----  -------- + -----  --------
  A1    10/100TX | Trk1               |  A8    10/100TX |
  A2    10/100TX | Trk1               |  C1    100FX    | Trk3
  A3    10/100TX | Trk1               |  C2    100FX    | Trk3
  A4    10/100TX | Trk1               |  C3    100FX    |
  A5    10/100TX |                    |  C4    100FX    |
  A6    10/100TX | Trk2               |  E1    1000SX   |
  A7    10/100TX | Trk2               |





 Actions->   Cancel     Edit     Save     Help

Select whether the port is part of a trunk or Mesh.
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

Figure 6-41. Example of Trunk Group Assignments for Several Ports

6. Move the cursor to the Type column for the selected port and use the Space bar to select the trunk type:

- Trunk (Source Address/Destination Address trunk; the default type if you do not select a type)—page 6-69.
- SA-Trunk (Source-Address trunk)—page 6-70

All ports in the same trunk must have the same Type (**Trunk** or **SA-Trunk**).



```
                          DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -===========================
           Switch Configuration - Advanced Features - Load Balancing

  Port    Type      Group    Type      |  Port    Type      Group    Type
  ----  -------- + -----  --------     |  ----  -------- + -----  --------
  A1    10/100TX | Trk1   Trunk        |  A8    10/100TX |
  A2    10/100TX | Trk1   Trunk        |  C1    100FX    | Trk3   Trunk
  A3    10/100TX | Trk1   Trunk        |  C2    100FX    | Trk3   Trunk
  A4    10/100TX | Trk1   Trunk        |  C3    100FX    |
  A5    10/100TX |                     |  C4    100FX    |
  A6    10/100TX | Trk2   SA-Trunk     |  E1    1000SX   |
  A7    10/100TX | Trk2   SA-Trunk     |




 Actions->   Cancel     Edit     Save     Help

Edit the fields displayed above.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 6-42. Example of trunks with different trunk types

7. When you are finished assigning ports to trunks, press Enter, then S (for **Save**) and return to the Main Menu. (It is not necessary to reboot the switch.)

   During the Save process, traffic on the ports configured for trunking will be delayed for several seconds. If the Spanning Tree Protocol is enabled, the delay may be up to 15 seconds.

8. Connect the trunked ports on the switch to the corresponding ports on the opposite device. If you previously disabled any of the trunked ports on the switch, enable them now. (Refer to “Port Settings” on page 6-25.

9. Check the Event Log (page 8-8) to verify that the trunked ports are operating properly.

Operating Information

This section describes port usage and how traffic is distributed by the various trunking options.

Trunk Operation Using the Trunk (Source Address/ Destination Address, or SA/DA) Option

This method provides the best means for evenly distributing traffic over trunked links to devices.

Configuring the Trunk (SA/DA) option for a port trunk causes the switch to distribute traffic in a sequential manner to the links within the trunk on the basis of source/destination pairs. That is, traffic from the same source address to the same destination addresses will travel over the same trunked link. Traffic from the same source address but meant for different destination addresses will be distributed across different links. Likewise, traffic for the same destination address but from different source addresses will be distributed across different links. Because of this feature, broadcasts, multicasts, and floods from different source addresses are distributed evenly across the links. As links are added or deleted, traffic will be redistributed across the trunk. For example, in the three-port trunk shown below, traffic could be assigned as shown in the table below.

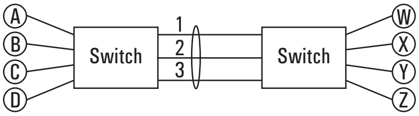


Figure 6-43. Example of Port-Trunked Network

Example of Link Assignments in a Trunk

Source:	Destination:	Link:
Node A	Node W	1
Node B	Node X	2
Node C	Node Y	3
Node D	Node Z	1
Node A	Node Y	2
Node B	Node W	3

Trunk Operation Using the SA-Trunk (Source-Address Distribution) Option

This option is less efficient than the SA/DA option described above. However, it is useful for trunking to devices that do not have built-in support for the SA/ DA- trunking method.

Configuring the SA-Trunk option for a port trunk causes the switch to distribute traffic in a sequential manner to the links within the trunk on the basis of source address only. That is, traffic from the same source address will travel over the same trunked link regardless of destination address. Traffic from other sources to the same or different destinations may travel over different links within the same trunk. This prevents the source address from appearing on different ports in the non-trunking device. For example, in figure 6-43 above:

Source Nodes:	Destination Nodes:	Link:
Node A	Node W	1
Node B	Node X	2
Node C	Node Y	3
Node D	Node Z	1
Node A	Node Y	1
Node B	Node W	2

Source Nodes A and D Always Appear on Port 1

IP Multicast (IGMP) Service Features—Multimedia Traffic Control

In a network where IP multicast traffic is transmitted for various multimedia applications, you can use the switch to reduce unnecessary bandwidth usage on a per-port basis by configuring IGMP (Internet Group Management Protocol). In the factory default state (IGMP disabled), the switch forwards all IGMP traffic to all ports, which can cause unnecessary bandwidth usage on ports not belonging to multicast groups. Enabling IGMP allows the ports to detect IGMP queries and report packets and manage IP multicast traffic through the switch.

IGMP is useful in multimedia applications such as LAN TV, desktop conferencing, and collaborative computing, where there is multipoint communication; that is, communication from one to many hosts, or communication originating from many hosts and destined for many other hosts. In such multipoint applications, IGMP will be configured on the hosts, and multicast traffic will be generated by one or more servers (inside or outside of the local network). Switches in the network (that support IGMP) can then be configured to direct the multicast traffic to only the ports where needed. If multiple VLANs are configured, you can configure IGMP on a per-VLAN basis.

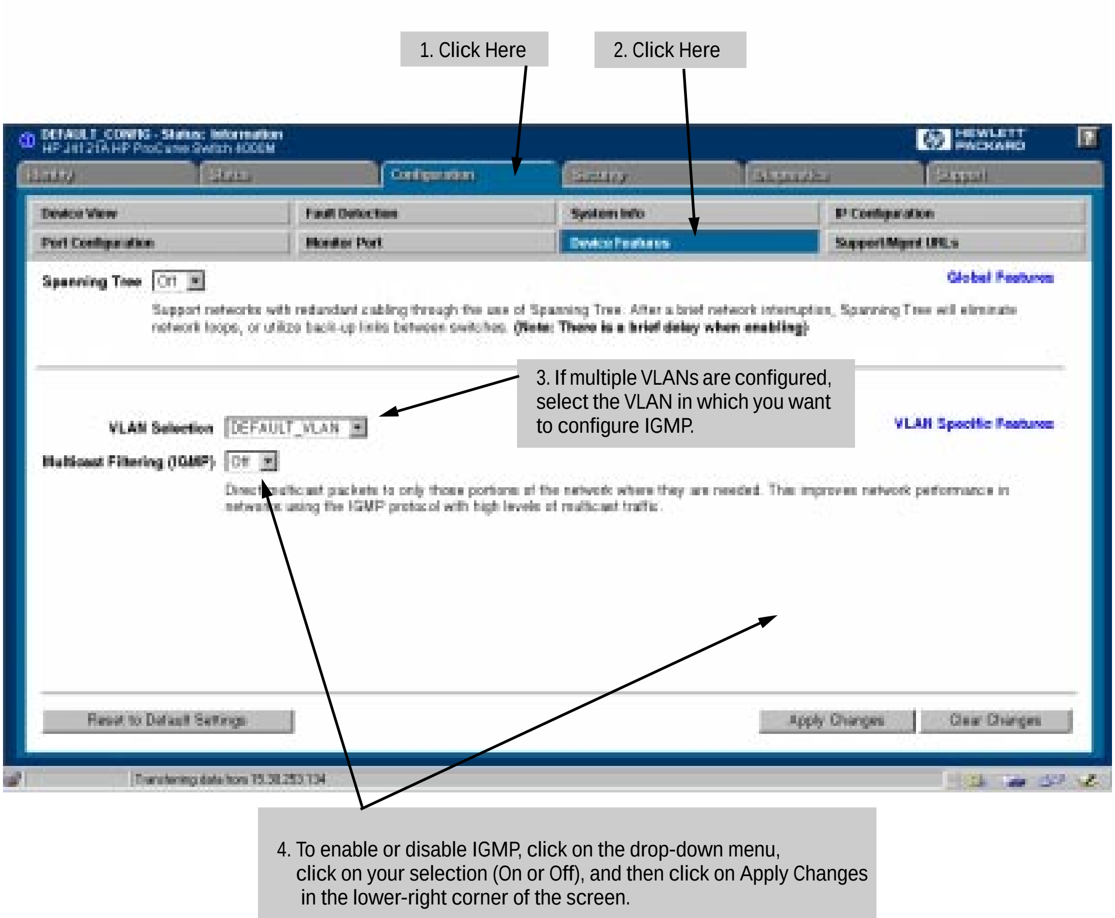
Enabling IGMP allows the ports to detect IGMP queries and report packets and manage IP multicast traffic through the switch. If no other querier is detected, the switch will then also function as the querier. (If you need to disable the querier feature, you can do so through the IGMP configuration MIB. Refer to “Changing the Querier Configuration Setting” on page 6-81.)

Note

In order for IGMP service to take effect, an IP address must be configured and active. If multiple VLANs are configured, an IP address must be configured for the VLAN in which you are configuring IGMP. Refer to “IP Configuration" on page 6-6.

For more information on IGMP operation, refer to “How IGMP Operates” on page 6-76.

Configuring IGMP from the Web Browser Interface



Spanning Tree: Off

Support networks with redundant cabling through the use of Spanning Tree. After a brief network interruption, Spanning Tree will eliminate network loops, or utilize back-up links between switches. **(Note: There is a brief delay when enabling)**

VLAN Selection: DEFAULT_VLAN

Multicast Filtering (IGMP): Off

Direct multicast packets to only those portions of the network where they are needed. This improves network performance in networks using the IGMP protocol with high levels of multicast traffic.

1. Click Here

2. Click Here

3. If multiple VLANs are configured, select the VLAN in which you want to configure IGMP.

4. To enable or disable IGMP, click on the drop-down menu, click on your selection (On or Off), and then click on Apply Changes in the lower-right corner of the screen.

Figure 6-44. Configuring IGMP on the Web Browser Interface

WBI Parameter	Description
Multicast Filtering (IGMP) Default: Off	Determines whether the switch or VLAN uses IGMP on a per-port basis to manage IP Multicast traffic. If multiple VLANs are configured, you can configure IGMP separately for each VLAN. To access a VLAN using the HP web browser interface, enter that VLAN's IP address as the URL. When Off, all ports on the switch or VLAN simply forward IP multicast traffic. When On, enables each port on the switch or VLAN to detect IGMP queries and report packets, and to manage IP multicast traffic. When you use the web browser interface to enable Multicast Filtering, the default operation is for each port in the switch or VLAN to automatically forward or drop IGMP traffic, depending on whether there are any IGMP hosts or multicast routers on the port.
Further Options Available in the Switch Console	By using the switch console, you can make these further changes to IGMP operation: • On a per-port basis, block or forward all IP multicast traffic. • For all ports on the switch or VLAN, forward IP multicast traffic at high priority. (The default is for the switch or VLAN to process IGMP traffic, along with other traffic, in the order received.) • Change the querier configuration setting. (By default, the switch will act as a querier if a multicast router is not present to perform this function.) For more information, refer to "Using the Switch Console to Configure IGMP" (page 6-74) and "How IGMP Operates" (page 6-76.).

Using the Switch Console To Configure IGMP

In the factory default configuration, IGMP is disabled. If multiple VLANs are configured, you can configure IGMP on a per-VLAN basis. When you use either the console or the web browser interface to enable IGMP on the switch or a VLAN, the switch forwards IGMP traffic only to ports belonging to multicast groups. Using the console enables these additional options:

- **Forward with High Priority.** Disabling this parameter (the default) causes the switch or VLAN to process IP multicast traffic, along with other traffic, in the order received. If priority forwarding is supported by the network technology you are using, enabling this parameter causes the switch or VLAN to give a higher priority to IP multicast traffic than to other traffic.
- **Auto/Blocked/Forward:** You can use the console to configure individual ports to any of the following states:
  - **Auto** (the default): Causes the switch to interpret IGMP packets and to filter IP multicast traffic based on the IGMP packet information for ports belonging to a multicast group. This means that IGMP traffic will be forwarded on a specific port only if an IGMP host or multicast router is connected to the port.
  - **Blocked:** Causes the switch to drop all IGMP transmissions received from a specific port and to block all outgoing IP Multicast packets for that port. This has the effect of preventing IGMP traffic from moving through specific ports.
  - **Forward:** Causes the switch to forward all IGMP and IP multicast transmissions through the port.

For more information, refer to “How IGMP Operates” on page 6-76.

To Access IGMP Service:

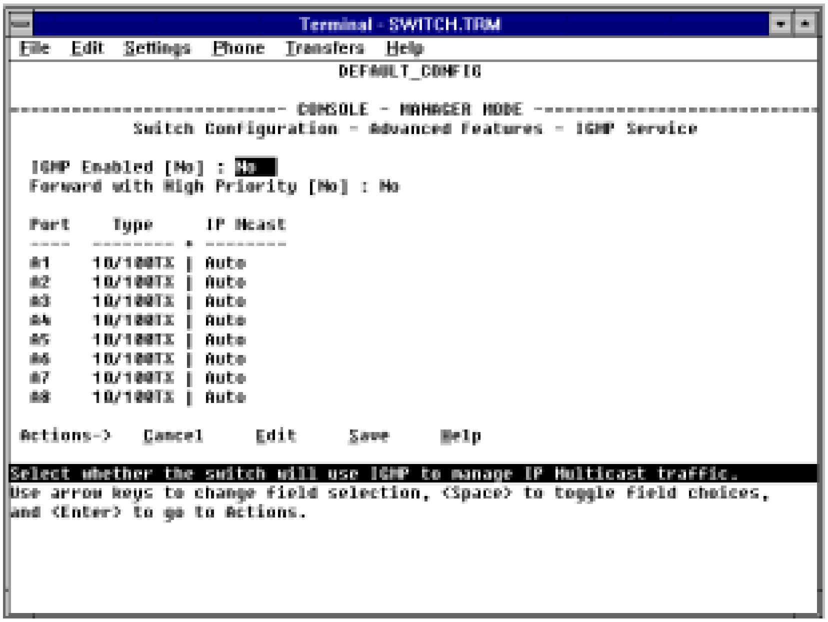
Use this procedure to configure or edit the IGMP settings for a switch or VLAN.

1. From the Main Menu, select:

   3. Switch Configuration

   5. Advanced Features

   3. IP Multicast (IGMP) Service



```
                              DEFAULT_CONFIG

========================- CONSOLE - MANAGER MODE -========================
          Switch Configuration - Advanced Features - IGMP Service

  IGMP Enabled [No] : No
  Forward with High Priority [No] : No

  Port    Type      IP Mcast
  ----  -------- + --------
  A1    10/100TX | Auto
  A2    10/100TX | Auto
  A3    10/100TX | Auto
  A4    10/100TX | Auto
  A5    10/100TX | Auto
  A6    10/100TX | Auto
  A7    10/100TX | Auto
  A8    10/100TX | Auto

 Actions->   Cancel     Edit     Save     Help

Select whether the switch will use IGMP to manage IP Multicast traffic.
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

Figure 6-45. Example of the (Default) IGMP Service Screen

2. Press the Space bar to select **Yes** (to enable IGMP).

3. Use ↓ to highlight the **Forward with High Priority** parameter.

4. If you want IGMP traffic to be forwarded with a higher priority than other traffic on the switch or VLAN, use the Space bar to select **Yes**. Otherwise, leave this parameter set to **No**.

5. Use ↓ to highlight the **IP Mcast** parameter setting for a port you want to reconfigure. (The options are: **Auto**, **Blocked**, and **Forward**. Refer to the online Help for further information on these choices.)

6. Repeat step 5 for each port you want to configure.

7. When you are finished configuring the **IP Mcast** parameter for the displayed ports, press [Enter] and [S] (for **Save**) to activate the changes you've made to the IGMP configuration.

8. Return to the Main Menu. (It is not necessary to reboot the switch. The new IGMP configuration is implemented when you select "Save" in step 7.)

How IGMP Operates

The Internet Group Management Protocol (IGMP) is an internal protocol of the Internet Protocol (IP) suite. IP manages multicast traffic by using switches, multicast routers, and hosts that support IGMP. (In Hewlett-Packard's implementation of IGMP, a multicast router is not necessary as long as a switch is configured to support IGMP with the querier feature enabled.) A set of hosts, routers, and/or switches that send or receive multicast data streams to or from the same source(s) are termed a *multicast group*, and have the same multicast group address. The multicast group running version 2 of IGMP uses three fundamental types of messages to communicate:

- **Query:** A message sent from the querier (multicast router or switch) asking for a response from each host belonging to the multicast group. If a multicast router supporting IGMP is not present, then the switch must assume this function in order to elicit group membership information from the hosts on the network. (If you need to disable the querier feature, you can do so through the console, using the IGMP configuration MIB. Refer to "Changing the Querier Configuration Setting" on 6-81.)
- **Report:** A message sent by a host to the querier to indicate that the host wants to be or is a member of a given group indicated in the report message.
- **Leave Group:** A message sent by a host to the querier to indicate that the host has ceased to be a member of a specific multicast group.

Thus, IGMP identifies members of a multicast group (within a subnet) and allows IGMP-configured hosts (and routers) to join or leave multicast groups.

IGMP Data.

To display data showing active group addresses, reports, queries, querier access port, and active group address data (port, type, and access), see "IP Multicast (IGMP) Status" on page 7-18.

Role of the Switch

When IGMP is enabled on the switch, it examines the IGMP packets it receives:

- To learn which of its ports are linked to IGMP hosts and multicast routers/ queriers belonging to any multicast group
- To become a querier if a multicast router/querier is not discovered on the network

Once the switch learns the port location of the hosts belonging to any particular multicast group, it can direct group traffic to only those ports, resulting in bandwidth savings on ports where group members do not reside. The following example illustrates this operation.

Figure 6-46 on page 6-78 shows a network running IGMP.

- PCs 1 and 4, Switch #2, and all of the routers are members of an IP multicast group. (The routers operate as queriers.)
- Switch #1 ignores IGMP traffic and does not distinguish between IP multicast group members and non-members. Thus, it is sending large amounts of unwanted multicast traffic out the ports to PCs 2 and 3.
- Switch #2 is recognizing IGMP traffic and learns that PC #4 is in the IP multicast group receiving multicast data from the video server (PC X). Switch #2 then sends the multicast data only to the port for PC #4, thus avoiding unwanted multicast traffic on the ports for PCs #5 and #6.

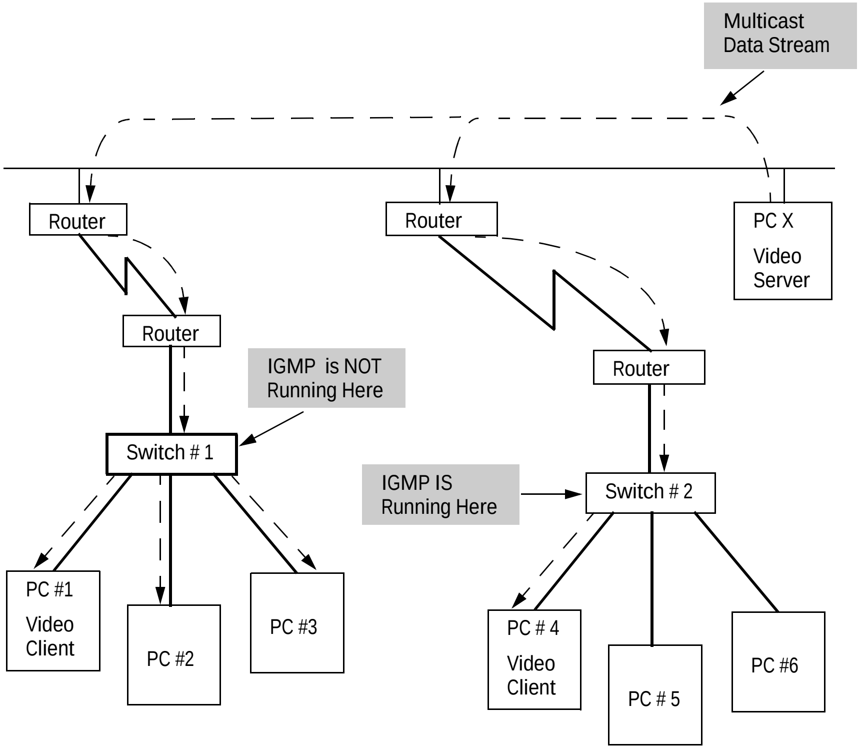


Figure 6-46. The Advantage of Using IGMP

The next figure (6-47) shows a network running IP multicasting using IGMP without a multicast router. In this case, the IGMP-configured switch runs as a querier.

PCs 2, 5, and 6 are members of the same IP multicast group.

IGMP is configured on switches 3 and 4. Either of these switches can operate as querier because a multicast router is not present on the network. (If an IGMP switch does not detect a querier, it automatically assumes this role, assuming the querier feature is enabled—the default—within IGMP.)

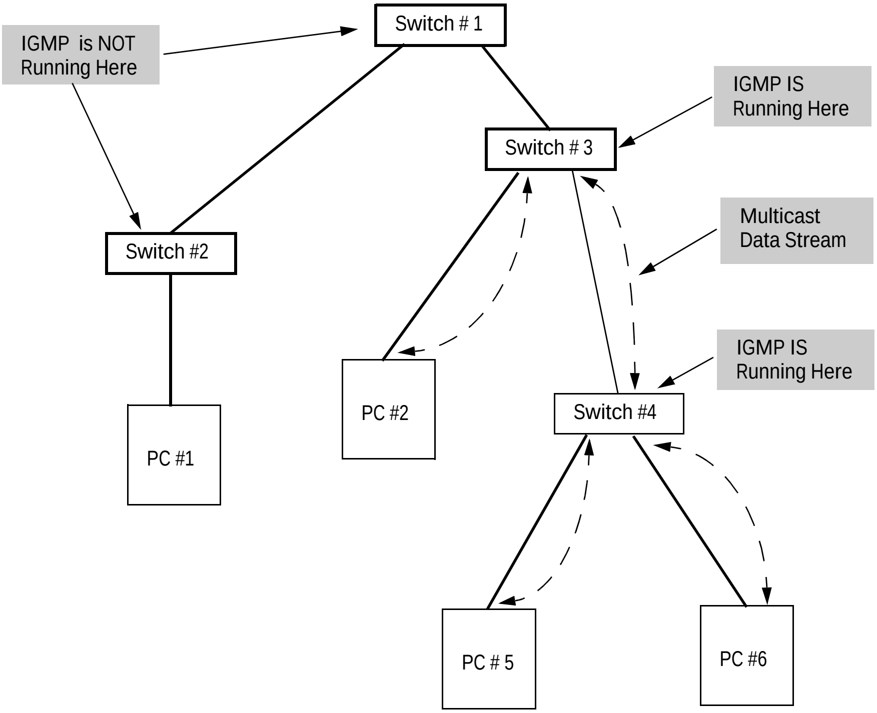


Figure 6-47. Isolating IP Multicast Traffic in a Network

- In the above figure, the multicast group traffic does not go to switch 1 and beyond because either the port on switch 3 that connects to switch 1 has been configured as blocked or there are no hosts off of switch 1 or switch 2 that belong to the multicast group.
- For PC #1 to become a member of the same multicast group without flooding IP multicast traffic on all ports of switches 1 and 2, IGMP must be configured on both switches 1 and 2.

Note:

IP Multicast Filters

IP multicast addresses occur in the range from 224.0.0.0 through 239.255.255.255. Any static Traffic/Security filters (page 6-39) configured with a "Multicast" filter type and a "Multicast Address" in this range will continue in effect unless IGMP learns of a multicast group destination in this range. In this case, IGMP takes over the filtering function for the multicast destination address(es) for as long as the IGMP group is active. If the IGMP group subsequently deactivates, the static filter resumes control over traffic to the multicast address formerly controlled by IGMP.

Number of IP Multicast Addresses Allowed

Multicast filters and IGMP filters (addresses) together can total up to 255 in the switch. If multiple VLANs are configured, then each filter is counted once per VLAN in which it is used.

Interaction with Multicast Traffic/Security Filters.

IGMP-controlled filters override multicast filters defined in the Traffic/Security Filters screen (page 6-39) and having the same multicast address as specified by IGMP.

Changing the Querier Configuration Setting

The Querier feature, by default, is enabled and in most cases should be left in this setting. If you need to change the querier setting, you can do so using the IGMP Configuration MIB. To disable the querier setting, select the Command Prompt from the Main Menu and enter this command:

```
setmib  hpSwitchIgmpQuerierState.<vlan number> -i 2
```

To enable the querier setting, select the Command Prompt from the Main Menu and enter this command:

```
setmib  hpSwitchIgmpQuerierState.<vlan number> -i 1
```

To view the current querier setting, select the Command Prompt from the Main Menu and enter this command:

```
getmib  hpSwitchIgmpQuerierState.<vlan number>
```

where:

<vlan number> is the sequential (index) number of the specific VLAN. If no VLANs are configured, use “1”. For example:

```
getmib  hpSwitchIgmpQuerierState.1
```

Note

The above commands are case-sensitive.

Whenever IGMP is enabled, the switch generates an Event Log message indicating whether querier functionality is enabled.

Monitoring and Analyzing Switch Operation

Overview

You can use the console interface (and, in some cases, the web browser interface) to access read-only status and counter information to help you monitor, analyze, and troubleshoot switch operation.

Note

Link test, ping test, browse configuration, and the Command prompt—analysis tools in troubleshooting situations—are described in chapter 8, "Troubleshooting". See "Diagnostics" on page 8-13.

The Event Log, a diagnostic tool that is often used for troubleshooting switch operation, is described in chapter 8, "Troubleshooting". See "Using the Event Log To Identify Problem Sources" on page 8-8

Status and Counters Screens

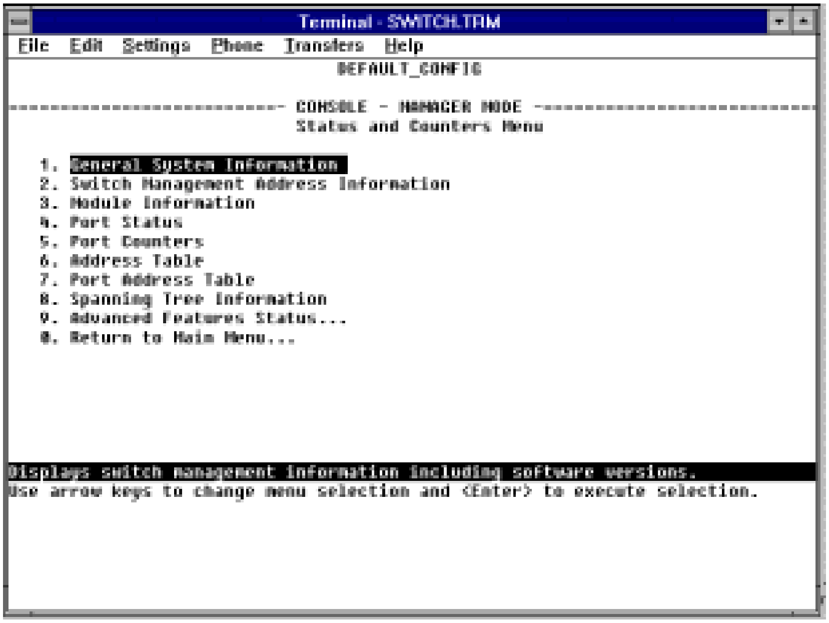
This section describes the status and counters screens available through the switch console interface and/or the web browser interface.

Note

You can access all console screens from the web browser interface via Telnet to the console. See "Configuration Tab" on page 3-20.

Status or Counters Type	Interface	Purpose
General System Information	Console	Lists switch-level operating information **(page 7-4)**.
Management Address Information	Console	Lists the MAC address, IP address, and IPX network number for each VLAN or, if no VLANs are configured, for the switch **(page 7-5)**.
Module Information	Console	For each slot, lists the module type (such as 10/100TX) and description **(page 7-6)**.
Port Status Overview	Browser	Shows port utilization and the Alert Log **(page 3-11).**
Port Status	Console Browser	Displays the operational status of each port **(page 7-7)**.
Port Counters	Console Browser	Summarizes port activity **(page 7-9)**.
Address Table (Address Forwarding Table)	Console	Lists the MAC addresses of nodes the switch has detected on the network, with the corresponding switch port **(page 7-13)**.
Port Address Table	Console	Lists the MAC addresses that the switch has learned from the selected port **(page 7-14)**.
Spanning Tree Information	Console	Lists Spanning Tree data for the switch and for individual ports. If VLANs are configured, reports on a per-VLAN basis **(page 7-16)**.
IP Multicast (IGMP) Status	Console	Lists IGMP groups, reports, queries, and port on which querier is located **(page 7-18)**.
VLAN Information	Console	For each VLAN configured in the switch, lists 802.1Q VLAN ID and up/down status **(page 7-20)**.

Select **Status and Counters** from the Main Menu to display the Status and Counters menu:

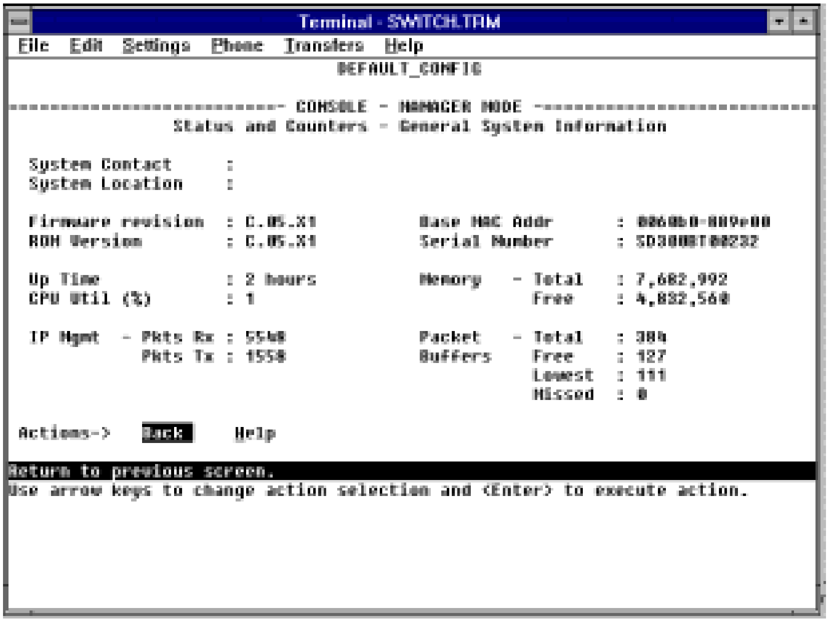


```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                          Status and Counters Menu

   1. General System Information
   2. Switch Management Address Information
   3. Module Information
   4. Port Status
   5. Port Counters
   6. Address Table
   7. Port Address Table
   8. Spanning Tree Information
   9. Advanced Features Status...
   0. Return to Main Menu...

Displays switch management information including software versions.
Use arrow keys to change menu selection and <Enter> to execute selection.
```

Figure 7-1. The Status and Counters Menu

Each of the above menu items accesses the read-only screens described on the following pages. Refer to the online help for a description of the entries displayed in these screens.

General System Information

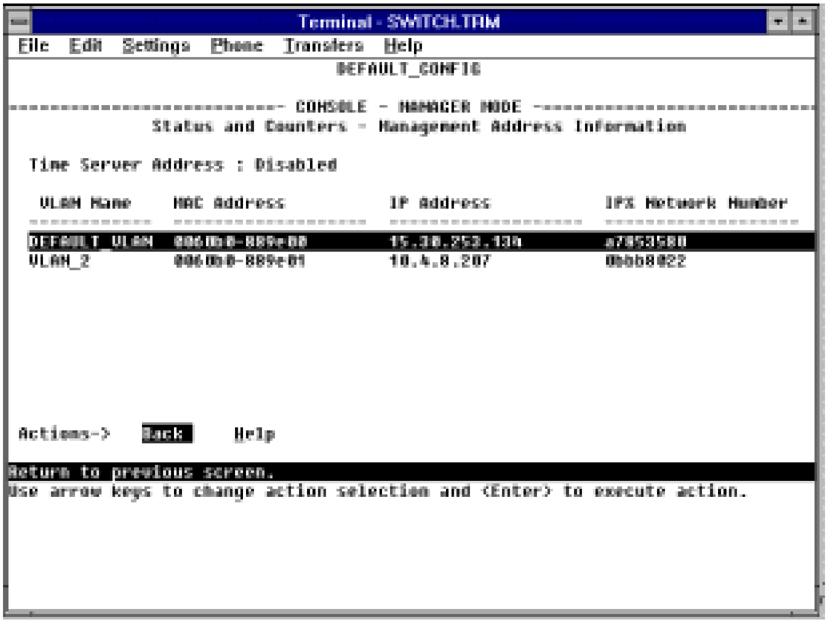


```
                              DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                Status and Counters - General System Information

  System Contact      :
  System Location     :

  Firmware revision   : C.05.X1           Base MAC Addr      : 0060b0-889e00
  ROM Version         : C.05.X1           Serial Number      : SD38OBT00232

  Up Time             : 2 hours           Memory   - Total   : 7,682,992
  CPU Util (%)        : 1                            Free    : 4,832,560

  IP Mgmt   - Pkts Rx : 5540              Packet   - Total   : 384
              Pkts Tx : 1558              Buffers    Free    : 127
                                                     Lowest  : 111
                                                     Missed  : 0

 Actions->    Back     Help

Return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 7-2. Example of General Switch Information

This screen dynamically indicates how individual switch resources are being used. See the online Help for details.

Switch Management Address Information

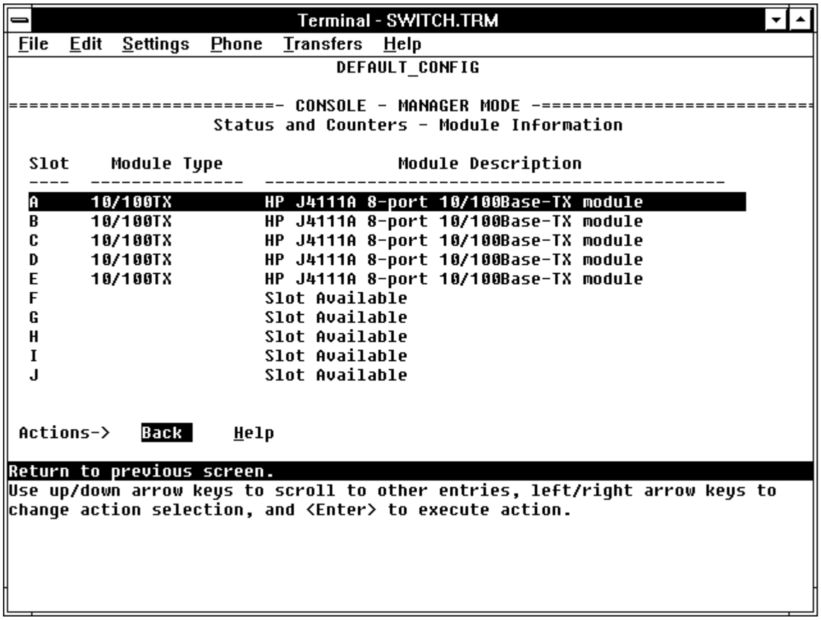


```
                                DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
              Status and Counters - Management Address Information

  Time Server Address : Disabled

   VLAN Name     MAC Address          IP Address           IPX Network Number
  ------------  -------------------  -------------------  -------------------
  DEFAULT_VLAN  0060b0-889e00        15.30.253.135        a7853580
  VLAN_2        0060b0-889e01        10.4.8.207           0bbb8022




 Actions->    Back     Help

Return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 7-3. Example of Management Address Information with VLANs Configured

If multiple VLANs are not configured, this screen displays data for the entire switch. See the online Help for details.

Module Information



```
                                DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -==========================
                   Status and Counters - Module Information

  Slot    Module Type                Module Description
  ----   ---------------   ---------------------------------------------
  A      10/100TX          HP J4111A 8-port 10/100Base-TX module
  B      10/100TX          HP J4111A 8-port 10/100Base-TX module
  C      10/100TX          HP J4111A 8-port 10/100Base-TX module
  D      10/100TX          HP J4111A 8-port 10/100Base-TX module
  E      10/100TX          HP J4111A 8-port 10/100Base-TX module
  F                        Slot Available
  G                        Slot Available
  H                        Slot Available
  I                        Slot Available
  J                        Slot Available


 Actions->    Back     Help

Return to previous screen.
Use up/down arrow keys to scroll to other entries, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

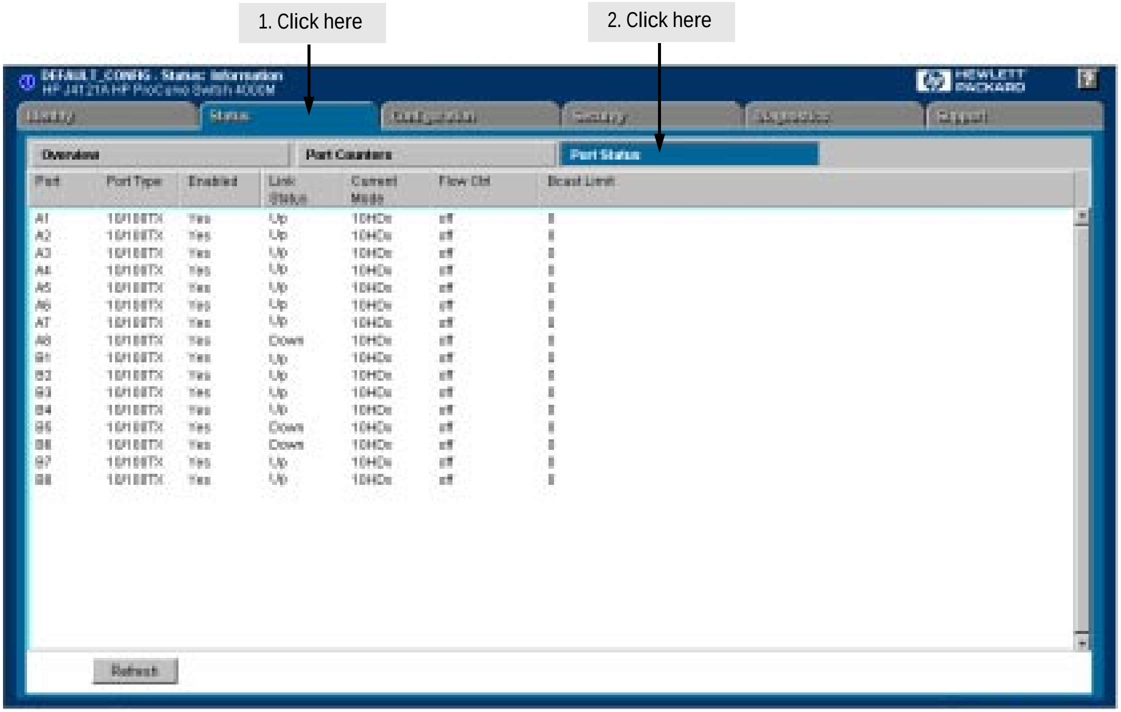
Figure 7-4. Example of the Module Information Screen (Switch 4000M)

Displays data on the current installed modules. See the online Help for details.

Port Status

The web browser interface and the console interface show the same port status data.

Displaying Port Status from the Web Browser Interface



1. Click here

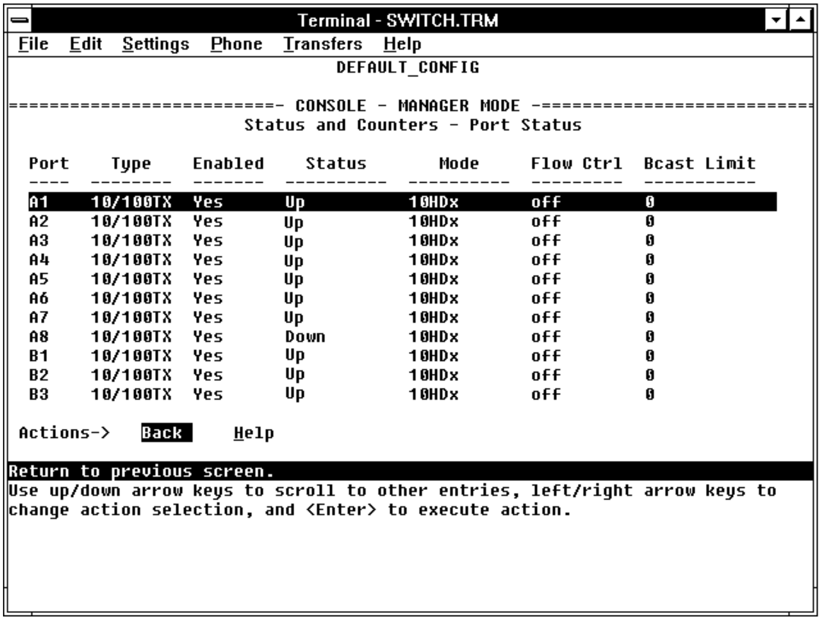
2. Click here

DEFAULT_CONFIG - Status: Information
HP J4121A HP ProCurve Switch 4000M
HEWLETT PACKARD
Status
Overview
Port Counters
Port Status
Refresh

Port	Port Type	Enabled	Link Status	Current Mode	Flow Ctrl	Bcast Limit
A1	10/100TX	Yes	Up	10HDx	off	0
A2	10/100TX	Yes	Up	10HDx	off	0
A3	10/100TX	Yes	Up	10HDx	off	0
A4	10/100TX	Yes	Up	10HDx	off	0
A5	10/100TX	Yes	Up	10HDx	off	0
A6	10/100TX	Yes	Up	10HDx	off	0
A7	10/100TX	Yes	Up	10HDx	off	0
A8	10/100TX	Yes	Down	10HDx	off	0
B1	10/100TX	Yes	Up	10HDx	off	0
B2	10/100TX	Yes	Up	10HDx	off	0
B3	10/100TX	Yes	Up	10HDx	off	0
B4	10/100TX	Yes	Up	10HDx	off	0
B5	10/100TX	Yes	Down	10HDx	off	0
B6	10/100TX	Yes	Down	10HDx	off	0
B7	10/100TX	Yes	Up	10HDx	off	0
B8	10/100TX	Yes	Up	10HDx	off	0

Figure 7-5. Example of Port Status on the Web Browser Interface (Switch 4000M)

Displaying Port Status from the Console Interface



```
                                  DEFAULT_CONFIG

=========================- CONSOLE - MANAGER MODE -=========================
                       Status and Counters - Port Status

  Port    Type     Enabled    Status       Mode      Flow Ctrl  Bcast Limit
  ----  --------  -------  ----------  ----------  ---------  -----------
  A1    10/100TX  Yes      Up          10HDx       off        0
  A2    10/100TX  Yes      Up          10HDx       off        0
  A3    10/100TX  Yes      Up          10HDx       off        0
  A4    10/100TX  Yes      Up          10HDx       off        0
  A5    10/100TX  Yes      Up          10HDx       off        0
  A6    10/100TX  Yes      Up          10HDx       off        0
  A7    10/100TX  Yes      Up          10HDx       off        0
  A8    10/100TX  Yes      Down        10HDx       off        0
  B1    10/100TX  Yes      Up          10HDx       off        0
  B2    10/100TX  Yes      Up          10HDx       off        0
  B3    10/100TX  Yes      Up          10HDx       off        0

 Actions->    Back     Help

Return to previous screen.
Use up/down arrow keys to scroll to other entries, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Figure 7-6. Example of Port Status on the Console Interface (Switch 4000M)

Port Counters

The web browser interface and the console interface show the same port counter data.

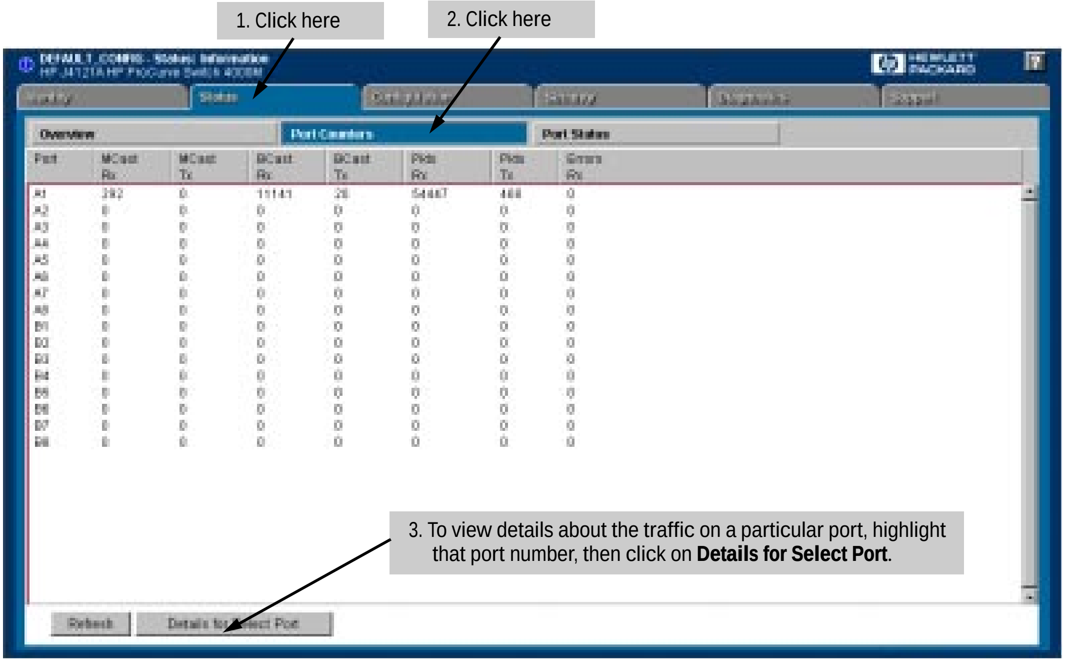
These screens enables you to determine the traffic patterns for each port. Port Counter features include:

- Dynamic display of counters summarizing the traffic on each port since the last reboot or reset
- Option to reset the counters to zero (for the current console session). This is useful for troubleshooting. Refer to the Note, below.
- An option to display the link status and further port activity details for a specific port (console: **Show details** or browser: **Details for Select Port**).

Note

The Reset action resets the counter display to zero for the current session, but does not affect the cumulative values in the actual hardware counters. (In compliance with the SNMP standard, the values in the hardware counters are not reset to zero unless you reboot the switch.) Thus, using the **Reset** action resets the displayed counters to zero for the current session only. Exiting from the console session and starting a new session restores the counter displays to the accumulated values in the hardware counters.

Displaying Port Counters from the Web Browser Interface



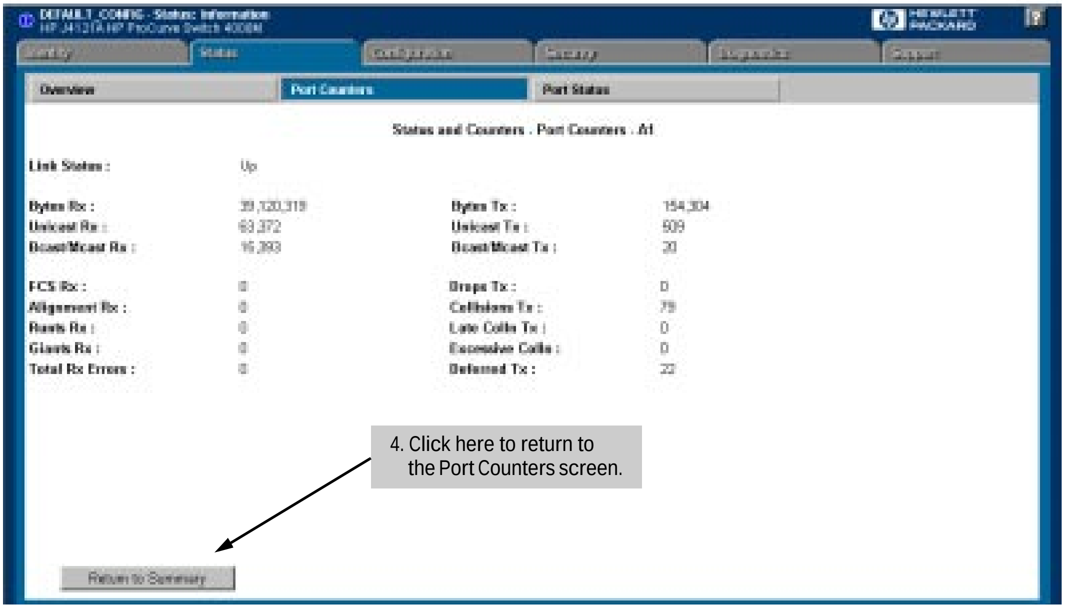
1. Click here

2. Click here

DEFAULT_CONFIG - Status: Information
HP J4121A HP ProCurve Switch 4000M

Port	MCast Rx	MCast Tx	BCast Rx	BCast Tx	Pkts Rx	Pkts Tx	Errors Rx
A1	282	0	11141	28	54487	468	0
A2	0	0	0	0	0	0	0
A3	0	0	0	0	0	0	0
A4	0	0	0	0	0	0	0
A5	0	0	0	0	0	0	0
A6	0	0	0	0	0	0	0
A7	0	0	0	0	0	0	0
A8	0	0	0	0	0	0	0
B1	0	0	0	0	0	0	0
B2	0	0	0	0	0	0	0
B3	0	0	0	0	0	0	0
B4	0	0	0	0	0	0	0
B5	0	0	0	0	0	0	0
B6	0	0	0	0	0	0	0
B7	0	0	0	0	0	0	0
B8	0	0	0	0	0	0	0

3. To view details about the traffic on a particular port, highlight that port number, then click on **Details for Select Port**.



DEFAULT_CONFIG - Status: Information
HP J4121A HP ProCurve Switch 4000M

Status and Counters . Port Counters . A1

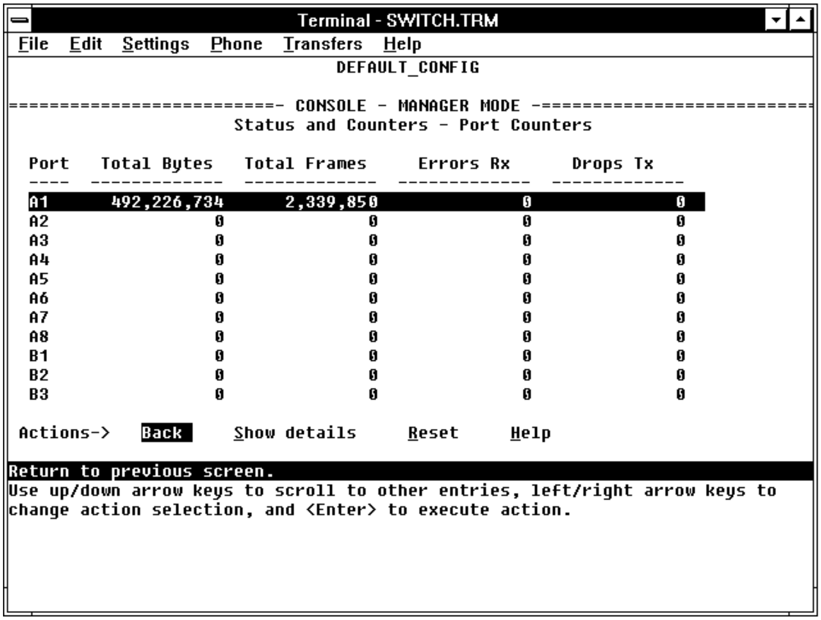
Link Status : Up

Bytes Rx :	39,120,319	Bytes Tx :	154,304
Unicast Rx :	63,272	Unicast Tx :	909
Bcast/Mcast Rx :	16,393	Bcast/Mcast Tx :	20
FCS Rx :	0	Drops Tx :	0
Alignment Rx :	0	Collisions Tx :	79
Runts Rx :	0	Late Colln Tx :	0
Giants Rx :	0	Excessive Colln :	0
Total Rx Errors :	0	Deferred Tx :	22

4. Click here to return to the Port Counters screen.

Figure 7-7. Example of Port Counters and Details on the Web Browser Interface

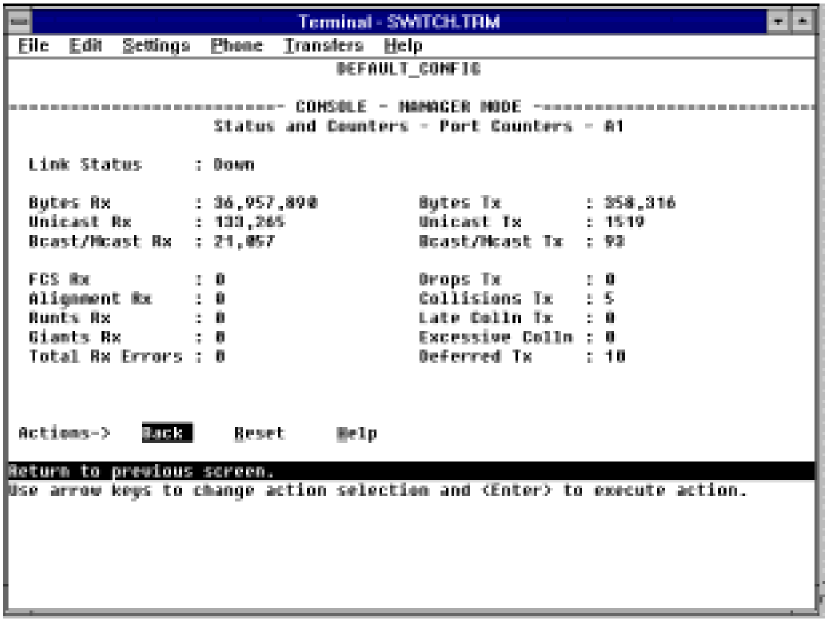
Displaying Port Counters from the Console Interface



```
                              DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -==========================
                  Status and Counters - Port Counters

  Port   Total Bytes   Total Frames     Errors Rx      Drops Tx
  ----  -------------  -------------  -------------  -------------
  A1      492,226,734      2,339,850              0              0
  A2                0              0              0              0
  A3                0              0              0              0
  A4                0              0              0              0
  A5                0              0              0              0
  A6                0              0              0              0
  A7                0              0              0              0
  A8                0              0              0              0
  B1                0              0              0              0
  B2                0              0              0              0
  B3                0              0              0              0

 Actions->    Back     Show details     Reset     Help

Return to previous screen.
Use up/down arrow keys to scroll to other entries, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Figure 7-8. Example of Port Counters on the Console Interface

To view details about the traffic on a particular port, highlight that port number (figure 7-8), then select **Show Details**. For example, selecting port A1 displays a screen similar to figure 7-9, below.

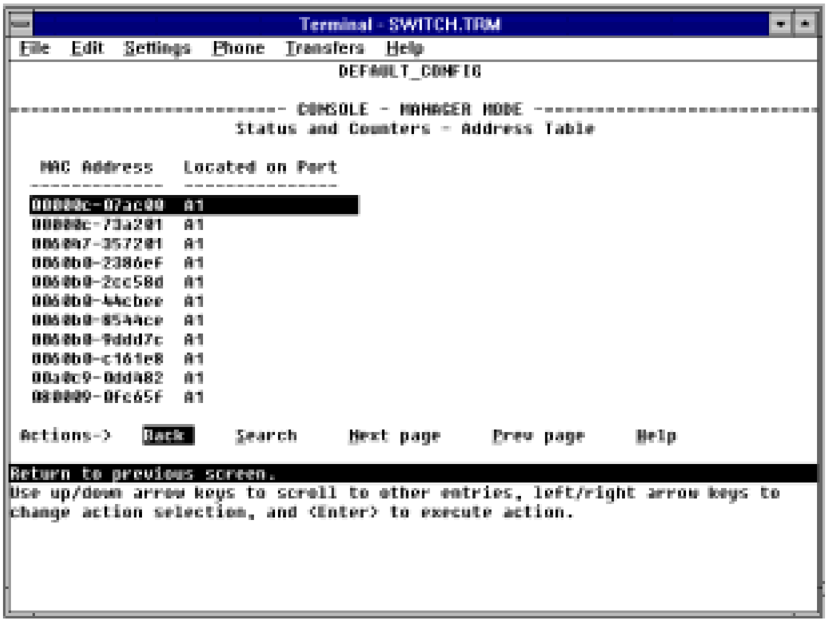


```
                               DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                   Status and Counters - Port Counters - A1

  Link Status     : Down

  Bytes Rx        : 36,957,890          Bytes Tx        : 358,316
  Unicast Rx      : 133,265             Unicast Tx      : 1519
  Bcast/Mcast Rx  : 21,057              Bcast/Mcast Tx  : 93

  FCS Rx          : 0                   Drops Tx        : 0
  Alignment Rx    : 0                   Collisions Tx   : 5
  Runts Rx        : 0                   Late Colln Tx   : 0
  Giants Rx       : 0                   Excessive Colln : 0
  Total Rx Errors : 0                   Deferred Tx     : 10



 Actions->    Back     Reset     Help

Return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 7-9. Example of the Display for Show details on a Selected Port

This screen also includes the **Reset** action. Refer to the note on page 7-9.

Address Table



```
                         DEFAULT_CONFIG

------------------------- CONSOLE - MANAGER MODE --------------------------
                  Status and Counters - Address Table

  MAC Address    Located on Port
 -------------  ---------------

 00000c-07ac00  A1
 00000c-73a201  A1
 0060A7-357201  A1
 0060b0-2386eF  A1
 0060b0-2cc58d  A1
 0060b0-44cbee  A1
 0060b0-8544ce  A1
 0060b0-9ddd7c  A1
 0060b0-c161e8  A1
 00a0c9-0dd482  A1
 080009-0fc65F  A1

Actions->   Back     Search     Next page     Prev page     Help

Return to previous screen.
Use up/down arrow keys to scroll to other entries, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Figure 7-10. Example of the Address Table (Switch 4000M)

This screen lets you determine which switch port is being used to communicate with a specific device on the network. The listing includes:

- The MAC addresses that the switch has learned from network devices attached to the switch
- The port on which each MAC address was learned

Use the **Search** action at the bottom of the screen to locate a specific device (MAC address).

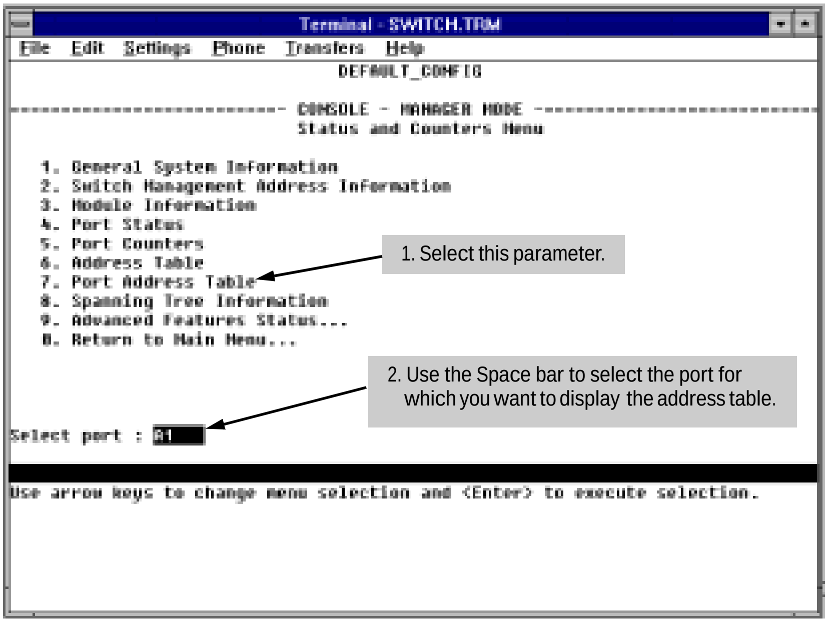
Port Address Table

This screen lets you determine which devices are attached to the selected switch port by listing all of the MAC addresses detected on that port.

Use the **Search** action at the bottom of the screen to determine whether a specific device (MAC address) is connected to the selected port.

To use the port address table:

1. Select **Port Address Table** from the menu in the Status and Counters screen.



```
                                DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                            Status and Counters Menu

   1. General System Information
   2. Switch Management Address Information
   3. Module Information
   4. Port Status
   5. Port Counters
   6. Address Table
   7. Port Address Table
   8. Spanning Tree Information
   9. Advanced Features Status...
   0. Return to Main Menu...


Select port : 01

Use arrow keys to change menu selection and <Enter> to execute selection.
```

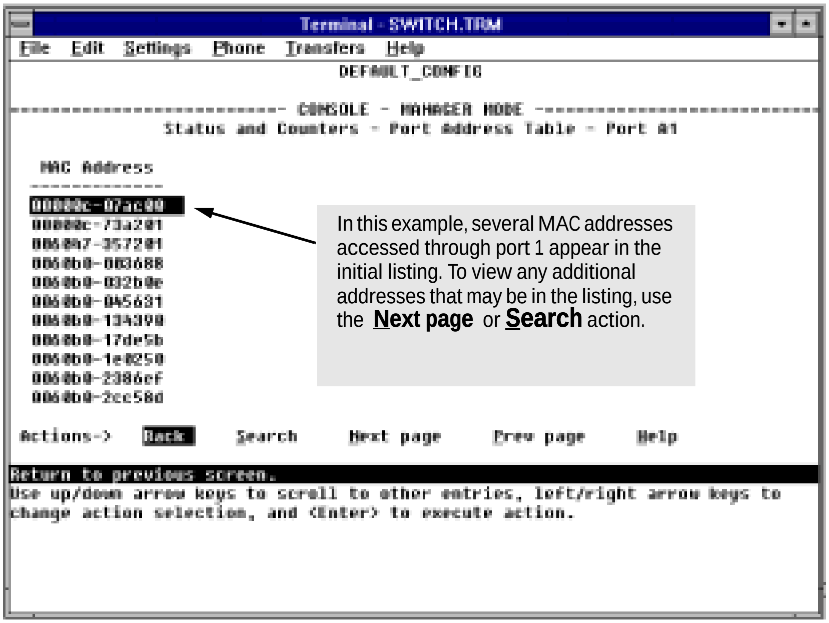
1. Select this parameter.

2. Use the Space bar to select the port for which you want to display the address table.

Figure 7-11. Example of How To Access the Port Address Table

2. When the   prompt appears, press the Space bar or type the port name to display the port you want to examine, then press Enter. (See figure 7-11, above.)

   Each port is identified by the sequential port numbers on the front of the switch.



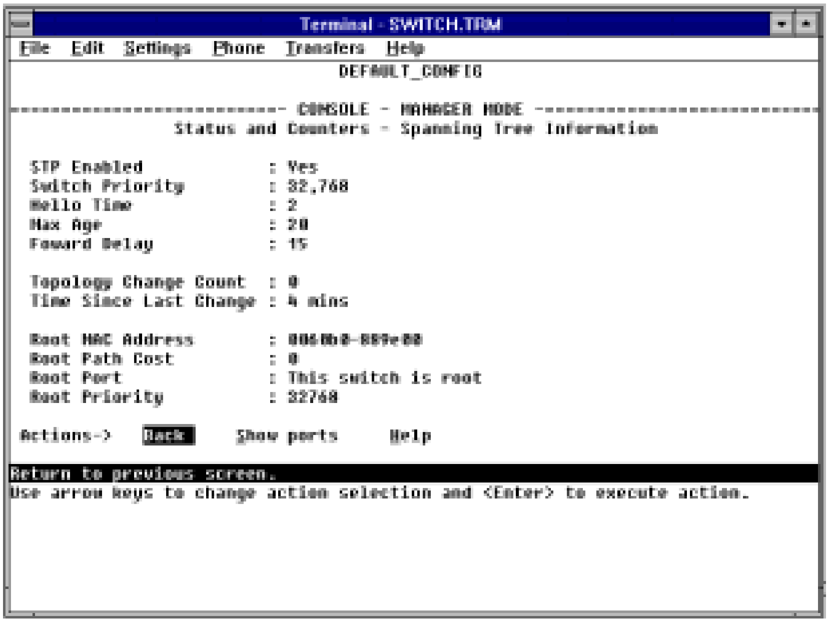
```
                               DEFAULT_CONFIG

========================- CONSOLE - MANAGER MODE -==========================
            Status and Counters - Port Address Table - Port A1

  MAC Address
 --------------
 00000c-07ac00
 00000c-73a201
 006097-357201
 0060b0-003688
 0060b0-032b0e
 0060b0-045631
 0060b0-134390
 0060b0-17de5b
 0060b0-1e0250
 0060b0-2386ef
 0060b0-2cc58d

Actions->   Back    Search    Next page    Prev page    Help

Return to previous screen.
Use up/down arrow keys to scroll to other entries, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

In this example, several MAC addresses accessed through port 1 appear in the initial listing. To view any additional addresses that may be in the listing, use the **Next page** or **Search** action.

Figure 7-12. Example of a Port Address Table for a Specific Port

Spanning Tree (STP) Information

STP must be enabled on the switch to display the following data:

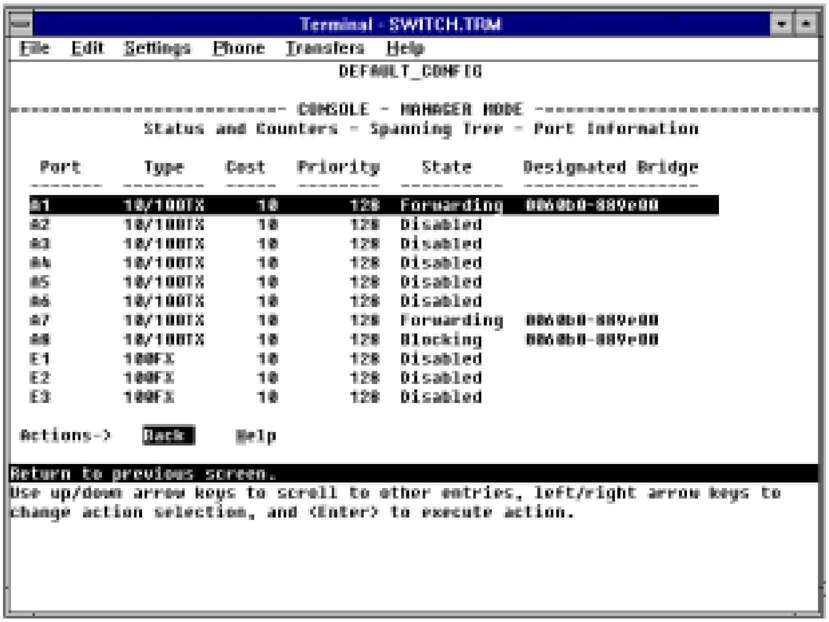


```
                              DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -==========================
                Status and Counters - Spanning Tree Information

  STP Enabled              : Yes
  Switch Priority          : 32,768
  Hello Time               : 2
  Max Age                  : 20
  Foward Delay             : 15

  Topology Change Count    : 0
  Time Since Last Change   : 4 mins

  Root MAC Address         : 0060b0-889e00
  Root Path Cost           : 0
  Root Port                : This switch is root
  Root Priority            : 32768

 Actions->    Back     Show ports     Help

Return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

Figure 7-13. Example of Spanning Tree Information

Use this screen to determine current switch-level STP parameter settings and statistics.

You can use the **Show ports** action at the bottom of the screen to display port-level information and parameter settings for each port in the switch (including port type, cost, priority, operating state, and designated bridge).



```
                                DEFAULT_CONFIG

===========================- CONSOLE - MANAGER MODE -===========================
                 Status and Counters - Spanning Tree - Port Information

   Port        Type      Cost   Priority     State       Designated Bridge
  --------   ---------   -----  ---------  -----------   -----------------
  A1         10/100TX      10        128   Forwarding    0060b0-889e00
  A2         10/100TX      10        128   Disabled
  A3         10/100TX      10        128   Disabled
  A4         10/100TX      10        128   Disabled
  A5         10/100TX      10        128   Disabled
  A6         10/100TX      10        128   Disabled
  A7         10/100TX      10        128   Forwarding    0060b0-889e00
  A8         10/100TX      10        128   Blocking      0060b0-889e00
  E1         100FX         10        128   Disabled
  E2         100FX         10        128   Disabled
  E3         100FX         10        128   Disabled

 Actions->    Back      Help

Return to previous screen.
Use up/down arrow keys to scroll to other entries, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Figure 7-14. Example of STP Port Information (Switch 4000M)

IP Multicast (IGMP) Status

To access this screen from the Main Menu, click on:

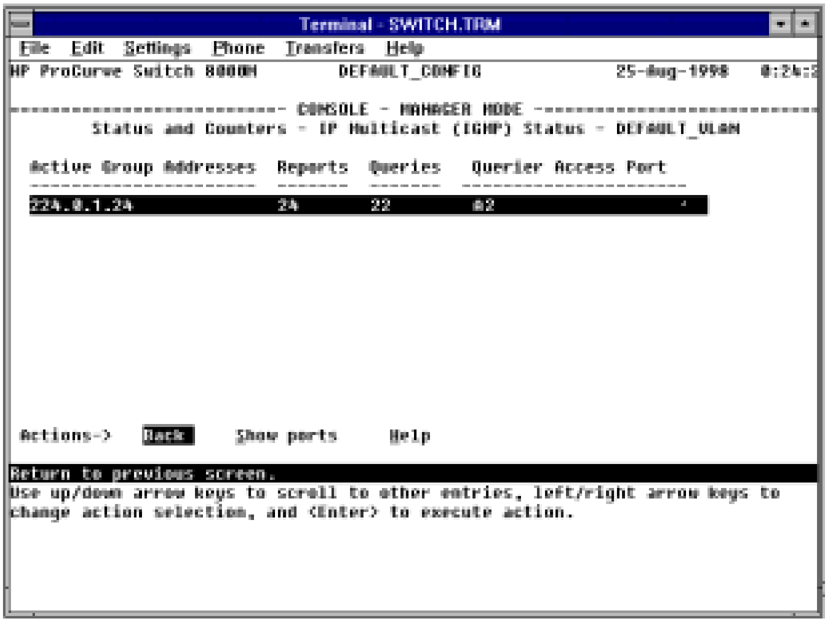
1. Status and Counters

9. Advanced Features Status

1. IP Multicast (IGMP) Status

Note If multiple VLANs are configured on the switch, you will be prompted to select a VLAN (by using the Space bar, then pressing [Enter]) to display this screen.

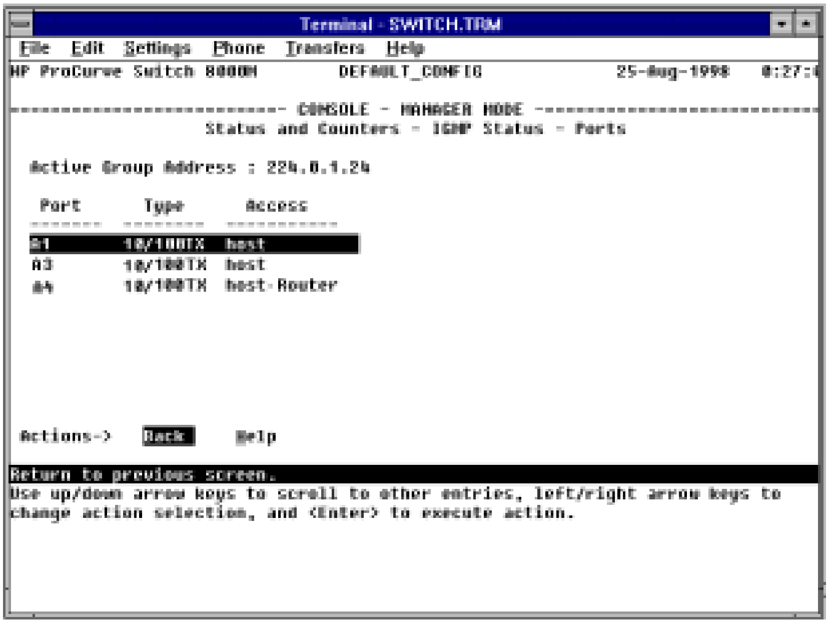
This screen identifies the active IP multicast groups the switch has detected, along with the number of report packets and query packets seen for each group. It also indicates which port is used for connecting to the querier.



```
HP ProCurve Switch 8000M          DEFAULT_CONFIG               25-Aug-1998   8:24:2

========================- CONSOLE - MANAGER MODE -========================
       Status and Counters - IP Multicast (IGMP) Status - DEFAULT_VLAN

  Active Group Addresses  Reports  Queries   Querier Access Port
  ----------------------  -------  -------  ----------------------
  224.0.1.24              24       22        A2



 Actions->   Back     Show ports     Help

Return to previous screen.
Use up/down arrow keys to scroll to other entries, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Figure 7-15. Example of IGMP Status Screen

You can also display the port status of the individual multicast groups. (That is, you can display the ports, port types, and whether the IGMP devices connected to the switch via the port are hosts, routers, or both.) To do so, select the group from the above screen and press [S] for **Show ports**. For example, suppose you wanted to view the status of the IP multicast group 224.0.1.24 shown in the above screen. You would highlight the row beginning with that group number, then press [S]. You would then see a screen similar to the following:



```
HP ProCurve Switch 8000M        DEFAULT_CONFIG              25-Aug-1998    0:27:

========================- CONSOLE - MANAGER MODE -========================
                 Status and Counters - IGMP Status - Ports

  Active Group Address : 224.0.1.24

   Port      Type       Access
  -------  --------   -----------
  A1       10/100TX   host
  A3       10/100TX   host
  A4       10/100TX   host-Router



 Actions->   Back     Help

Return to previous screen.
Use up/down arrow keys to scroll to other entries, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Figure 7-16. Example of an IGMP Status Screen for a Selected Multicast Group

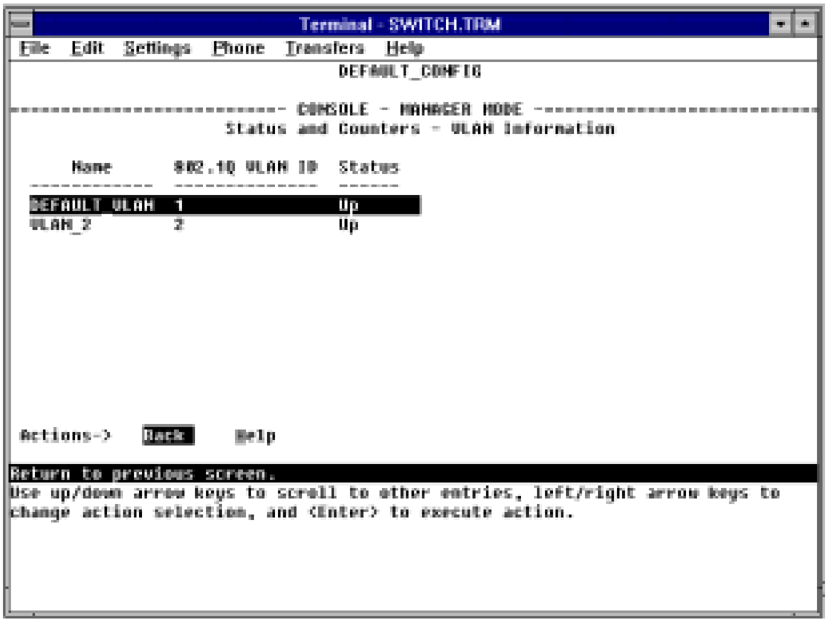
VLAN Information

To access this screen from the Main Menu, click on:

1. Status and Counters

9. Advanced Features Status

4. VLAN Information



```
                                DEFAULT_CONFIG

========================= CONSOLE - MANAGER MODE =========================
                     Status and Counters - VLAN Information

     Name          802.1Q VLAN ID   Status
  ------------     --------------   ------
  DEFAULT_VLAN     1                Up
  VLAN_2           2                Up



 Actions->    Back      Help

Return to previous screen.
Use up/down arrow keys to scroll to other entries, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Figure 7-17. Example of VLAN Information Screen

This screen displays the VLAN identification and status for each VLAN configured in the switch.

Troubleshooting

This chapter addresses performance-related network problems that can be caused by topology, switch configuration, and the effects of other devices or their configurations on switch operation. (For switch-specific information on hardware problems indicated by LED behavior, cabling requirements, and other potential hardware-related problems, refer to the installation guide you received with the switch.)

This chapter includes:

- Troubleshooting Approaches (page 8-2)
- Browser or Console Interface Problems (page 8-3)
- Unusual Network Activity (page 8-4)
  - General Problems (page 8-4)
  - IGMP-Related Problems (page 8-5)
  - STP-Related Problems (page 8-5)
  - VLAN-Related Problems (page 8-6)
- Using the Event Log To Identify Problem Sources (page 8-8)
- Diagnostics (page 8-13)

For information on support and warranty provisions, see the Support and Warranty booklet shipped with the switch.

Troubleshooting Approaches

There are six primary ways to diagnose switch problems:

- Check for flashing fault LEDs. (See the installation guide shipped with the switch.)
- Check the network topology/installation. (See the installation guide shipped with the switch.)
- Check cables for damage, correct type, and proper connections. (See the installation guide shipped with the switch.)
- Use HP TopTools for Hubs & Switches (if installed on your network) to help isolate problems and recommend solutions. (HP TopTools is shipped at no extra cost with the switch.)
- Use the Port Utilization Graph and Alert Log in the web browser interface included in the switch to help isolate problems. (See chapter 3, "Using the HP Web Browser Interface" for operating information.)
- For help in isolating problems, use the easy-to-access Console RS-232 port built into the switch or Telnet to the switch console. (See chapter 4, "Using the Switch Console Interface" for operating information.)
  - Status and Counters screens
  - Event Log
  - Diagnostics tools (Link test, Ping test, configuration file)

Browser or Console Interface Problems

Cannot access the web browser interface:

- Access may be disabled by the **Web Agent Enabled** parameter in the switch console. Check the setting on this parameter by selecting:

  2. Switch Management Access Configuration

  4. Console/Serial Link.

- The switch may not have the correct IP address, subnet mask or gateway. Verify by connecting a console to the switch's Console port and selecting:

  2. Status Management Access Configuration (IP, SNMP, Console...)

  1. IP Configuration

  Note: If DHCP/Bootp is used to configure the switch, use **2. Switch Management Address Information** under **1. Status and Counters** to view IP addressing information. If Bootp is in use, check the Bootp configuration file in the Bootp server to verify correct gateway addressing.

- If you are using DHCP to acquire the IP address for the switch, the IP address "lease time" may have expired so that the IP address has changed. For more information on how to "reserve" an IP address, refer to the documentation for the DHCP application that you are using.
- Java™ applets may not be running on the web browser. They are required for the switch web browser interface to operate correctly. See the online Help on your web browser for how to run the Java applets.

Cannot Telnet into the switch console from a station on the network:

- Telnet access may be disabled by the **Inbound Telnet Enabled** parameter in the switch console. See "Using the Switch Console To Configure the Console/Serial Link" on page 6-22.
- The switch may not have the correct IP address, subnet mask, or gateway. Verify by connecting a console to the switch's Console port and selecting:

  2. Status Management Access Configuration (IP, SNMP, Console...)

  1. IP Configuration

  Note: If DHCP/Bootp is used to configure the switch, see the **Note**, above.

- If you are using DHCP to acquire the IP address for the switch, the IP address "lease time" may have expired so that the IP address has changed. For more information on how to "reserve" an IP address, refer to the documentation for the DHCP application that you are using.

Unusual Network Activity

Network activity that exceeds accepted norms often indicates a hardware problem with one or more of the network components, possibly including the switch. Unusual network activity is usually indicated by the LEDs on the front of the switch or measured with the ASCII console interface or with a network management tool such as the HP TopTools for Hubs & Switches. Refer to the installation guide you received with the switch for information on using LEDs to identify unusual network activity.

General Problems

The network runs slow; processes fail; users cannot access servers or other devices. Broadcast storms may be occurring in the network. These may be due to redundant links between nodes.

- If you are configuring a port trunk, finish configuring the ports in the trunk before connecting the related cables. Otherwise you may inadvertently create a number of redundant links that will cause broadcast storms.
- Turn on Spanning Tree Protocol to block redundant links.

Duplicate IP Addresses. This is indicated by this Event Log message:

ip: Invalid ARP source: *IP address* **on** *IP address*

where: both instances of *IP address* are the same address, indicating the switch's IP address has been duplicated somewhere on the network.

Duplicate IP Addresses in a DHCP Network. If you use a DHCP server to automatically assign IP addresses in your network and you find a device with a valid IP address that does not appear to communicate properly with the server or other devices, a duplicate IP address may have been issued by the server. This can occur if a client has not released a DHCP-assigned IP address after the intended expiration time and the server "leases" the address to another device. This can also happen, for example, if the server is first configured to issue IP addresses with an unlimited duration, then is subsequently configured to issue IP addresses that will expire after a limited duration. One solution is to configure "reservations" in the DHCP server for specific IP addresses to be assigned to devices having specific MAC addresses. For more information, refer to the documentation for the DHCP server.

One indication of a duplicate IP address in a DHCP network is this Event Log message:

> **ip: Invalid ARP source:** *IP address* **on** *IP address*
>
> *where:* both instances of *IP address* are the same address, indicating the IP address that has been duplicated somewhere on the network.

The Switch Has Been Configured for DHCP/Bootp Operation, But Has Not Received a DHCP or Bootp Reply. When the switch is first configured for DHCP/Bootp operation, or if it is rebooted with this configuration, it immediately begins sending request packets on the network. If the switch does not receive a reply to its DHCP/Bootp requests, it continues to periodically send request packets, but with decreasing frequency. Thus, if a DHCP or Bootp server is not available or accessible to the switch when DHCP/Bootp is first configured, the switch may not immediately receive the desired configuration. After verifying that the server has become accessible to the switch, reboot the switch to re-start the process.

IGMP-Related Problems

IP Multicast (IGMP) Traffic Does Not Reach IGMP Hosts or a Multicast Router Connected to a Port. IGMP must be enabled on the switch and the affected port must be configured for "Auto" or "Forward" operation.

IP Multicast Traffic Floods Out All Ports; IGMP Does Not Appear To Filter Traffic. The IGMP feature does not operate if the switch or VLAN does not have an IP address configured manually or obtained through DHCP/Bootp. To verify whether an IP address is configured for the switch or VLAN, do either of the following:

- **Try Using the Web Browser Interface:** If you can access the web browser interface, then an IP address is configured.
- **Try To Telnet to the Switch Console:** If you can Telnet to the switch, then an IP address is configured.
- **Using the Switch Console Interface:** From the Main Menu, check the Management Address Information screen by clicking on

  1. Status and Counters

  2. Switch Management Address Information

STP-Related Problems

Broadcast Storms and/or Duplicate MAC Addresses Appearing in the

Network. This can occur where STP is not detecting physical loops (redundant links).Where this exists, you should enable STP on all bridging devices in the loop in order for the loop to be detected.

Caution

If you enable STP, it is recommended that you leave the remainder of the STP parameter settings at their default values until you have had an opportunity to evaluate STP performance in your network. Because incorrect STP settings can adversely affect network performance, you should avoid making changes without having a strong understanding of how STP operates. To learn the details of STP operation, refer to the IEEE 802.1d standard.

STP Blocks a Link in a VLAN Even Though There Are No Redundant Links in that VLAN. In 802.1Q-compliant switches such as the Switch 4000M and Switch 2400M, STP blocks redundant physical links even if they are in separate VLANs. A solution is to use only one, multiple-VLAN link between the devices. Also, if ports are available, you can improve the bandwidth in this situation by using a port trunk. See “STP Operation with 802.1Q VLAN” on page 6-38.

VLAN-Related Problems

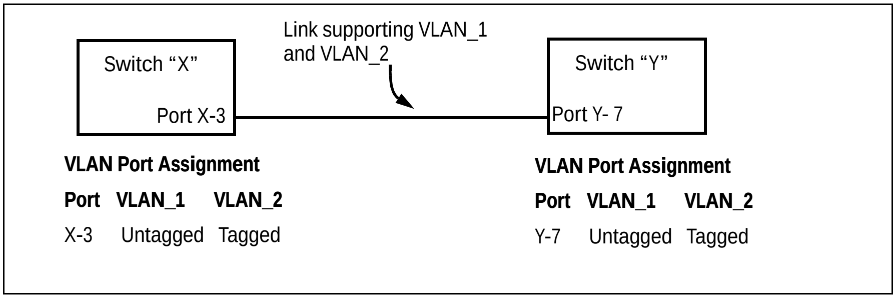
Monitor Port. When using the monitor port in a multiple VLAN environment, it can be useful to know how broadcast, multicast, and unicast traffic is tagged. The following table describes the tagging to expect.

	Within Same Tagged VLAN as Monitor Port	Within Same Untagged VLAN as Monitor Port	Outside of Tagged Monitor Port VLAN	Outside of Untagged Monitor Port VLAN
Broadcast	Tagged	Untagged	Untagged	Untagged
Multicast	Tagged	Untagged	Untagged	Untagged
Unicast Flood	Tagged	Untagged	Untagged	Untagged
Unicast Not to Monitor Port	Untagged	Untagged	Untagged	Untagged
Unicast to Monitor Port	Tagged	Untagged	N/A—Dropped	N/A—Dropped

None of the devices assigned to one or more VLANs on an 802.1Q-

compliant switch are being recognized. If multiple VLANs are being used on ports connecting 802.1Q-compliant devices, inconsistent VLAN IDs may have been assigned to one or more VLANs. For a given VLAN, the same VLAN ID must be used on all connected 802.1Q-compliant devices.

Link Configured for Multiple VLANs Does Not Support Traffic for One or More VLANs. One or more VLANs may not be properly configured as “Tagged” or “Untagged”. A VLAN assigned to a port connecting two 802.1Q-compliant devices must be configured the same on both ports. For example, VLAN_1 and VLAN_2 use the same link between switch “X” and switch “Y”.



VLAN Port Assignment

Port	VLAN_1	VLAN_2
X-3	Untagged	Tagged

VLAN Port Assignment

Port	VLAN_1	VLAN_2
Y-7	Untagged	Tagged

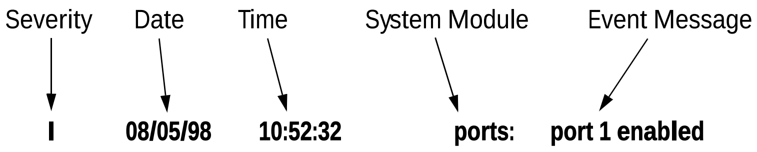
Figure 8-1. Example of Correct VLAN Port Assignments on a Link

1. If VLAN_1 is configured as “Untagged” on port 3 on switch “X”, then it must also be configured as “Untagged” on port 7 on switch “Y”.
2. Similarly, if VLAN_2 is configured as “Tagged on the link port on switch “A”, then it must also be configured as “Tagged” on the link port on switch “B”.

Duplicate MAC Addresses Across VLANs. Duplicate MAC addresses on different VLANs are not supported and can cause VLAN operating problems. There are no explicit events or statistics to indicate the presence of duplicate MAC addresses in a VLAN environment. However, one symptom that may occur is that a duplicate MAC address can appear in the Port Address Table of one port, and then later appear to be linked to another port. (This can also occur in a LAN where there are redundant paths between nodes and Spanning Tree is turned off.) For more information, refer to “VLAN Restrictions” on page 6-60.

Using the Event Log To Identify Problem Sources

The Event Log records operating events as single-line entries listed in chronological order, and serves as a tool for isolating problems. Each Event Log entry is composed of five fields:



```
I    08/05/98   10:52:32        ports:   port 1 enabled
```

Severity is one of the following codes:

- **I** (information) indicates routine events.
- **W** (warning) indicates that a service has behaved unexpectedly.
- **C** (critical) indicates that a severe switch error has occurred.
- **D** (debug) reserved for HP internal diagnostic information.

Date is the date in *mm/dd/yy* format that the entry was placed in the log.

Time is the time in *hh:mm:ss* format that the entry was placed in the log.

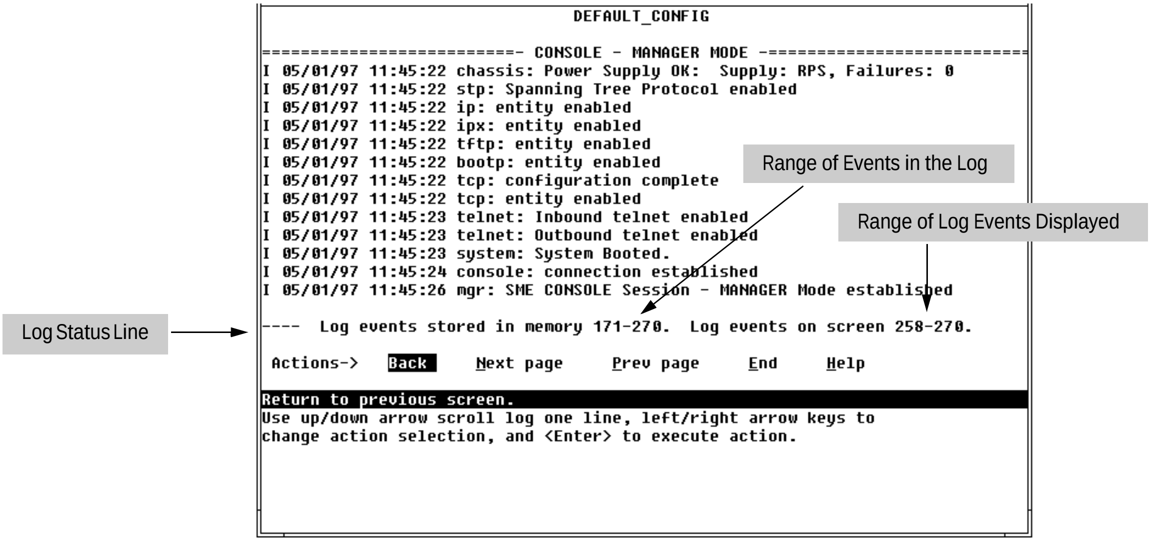
System Module is the internal module (such as “ports” for port manager) that generated the log entry. If VLANs are configured, then a VLAN name also appears for an event that is specific to an individual VLAN. Table 8-1 on page 8-9 lists the individual modules.

Event Message is a brief description of the operating event.

Table 8-1. Event Log System Modules

Module	Event Description	Module	Event Description
addrMgr	Address table	pagp	Port trunks
chassis	switch hardware	ports	Change in port status
bootp	bootp addressing	snmp	SNMP communications
console	Console interface	stp	Spanning Tree
dhcp	DHCP addressing	sys, system	Switch management
download	file transfer	telnet	Telnet activity
fault	Web browser interface alert log	tcp	Transmission control
igmp	IP Multicast	tftp	File transfer for new OS or config.
ip	IP-related	timep	Time protocol
ipx	Novell Netware	vlan	VLAN operations
ldbal	Load-balancing	Xmodem	Xmodem file transfer
mgr	Console management		

Entering and Navigating in the Event Log Display. From the Main Menu, select **Event Log**.



```
                                DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -===========================
I 05/01/97 11:45:22 chassis: Power Supply OK:  Supply: RPS, Failures: 0
I 05/01/97 11:45:22 stp: Spanning Tree Protocol enabled
I 05/01/97 11:45:22 ip: entity enabled
I 05/01/97 11:45:22 ipx: entity enabled
I 05/01/97 11:45:22 tftp: entity enabled
I 05/01/97 11:45:22 bootp: entity enabled
I 05/01/97 11:45:22 tcp: configuration complete
I 05/01/97 11:45:22 tcp: entity enabled
I 05/01/97 11:45:23 telnet: Inbound telnet enabled
I 05/01/97 11:45:23 telnet: Outbound telnet enabled
I 05/01/97 11:45:23 system: System Booted.
I 05/01/97 11:45:24 console: connection established
I 05/01/97 11:45:26 mgr: SME CONSOLE Session - MANAGER Mode established

----  Log events stored in memory 171-270.  Log events on screen 258-270.

 Actions->  Back     Next page    Prev page    End     Help

Return to previous screen.
Use up/down arrow scroll log one line, left/right arrow keys to
change action selection, and <Enter> to execute action.
```

Range of Events in the Log

Range of Log Events Displayed

Log Status Line

Figure 8-9. Example of an Event Log Display

To display various portions of the Event Log, either preceding or following the currently visible portion, use either the actions listed at the bottom of the display (**Next page**, **Prev page**, or **End**), or the keys described in the following table:

Table 8-2. Event Log Control Keys

Key	Action
[N]	Advance the display by one page (next page).
[P]	Roll back the display by one page (previous page).
[↓]	Advance display by one event (down one line).
[↑]	Roll back display by one event (up one line).
[E]	Advance to the end of the log.
[H]	Display Help for the event log.

The event log holds up to 1000 lines in chronological order, from the oldest to the newest. Each line consists of one complete event message. Once the log has received 1000 entries, it discards the current oldest line each time a new line is received. The event log window contains 14 log entry lines and can be positioned to any location in the log.

The log status line at the bottom of the display identifies where in the sequence of event messages the display is currently positioned.

The event log will be *erased* if any of the following occurs:

- The switch is reset using the Reset button.
- Power to the switch is interrupted.
- A new operating system is downloaded to the switch.

(The event log is not erased by using the **Reboot Switch** command in the Main Menu.)

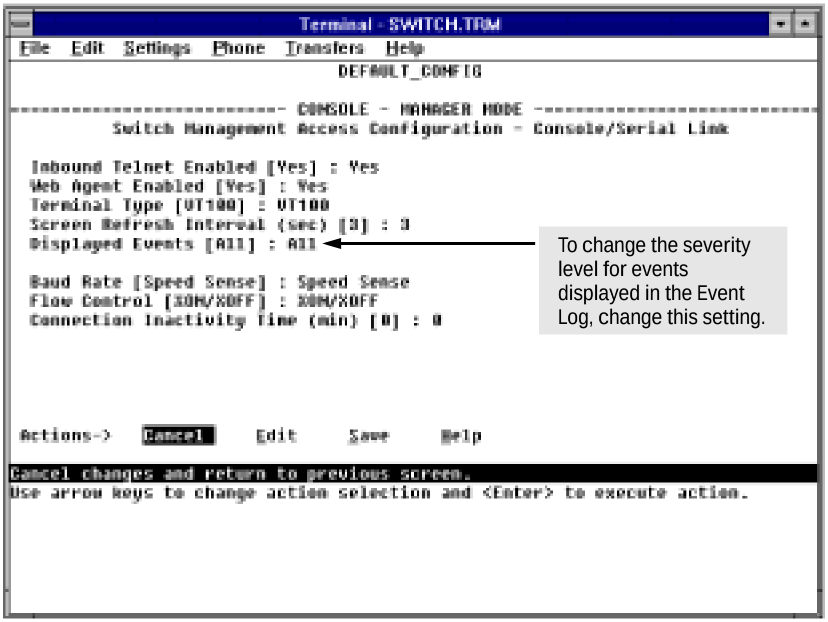
To Change the Severity Level of Messages Displayed in the Event Log

In its default setting, the Event Log displays all event levels. If you want to change the severity level for which events will be displayed in the Event Log, change the setting for the **Displayed Events** parameter in the Console/Serial Link screen. Options include:

Severity Level	Event Log Action
All (default)	Display all events.
None	Display no events.
Not INFO	Display all events except informational-only events.
Critical	Display only critical-level events.
Debug	Reserved for HP internal use only.

1. From the Console Main Menu, Select...

   2. Switch Management Access Configuration (IP, SNMP, Console)...
   4. Console/Serial Link Configuration



```
                                  DEFAULT_CONFIG

========================- CONSOLE - MANAGER MODE -=========================
         Switch Management Access Configuration - Console/Serial Link

  Inbound Telnet Enabled [Yes] : Yes
  Web Agent Enabled [Yes] : Yes
  Terminal Type [VT100] : VT100
  Screen Refresh Interval (sec) [3] : 3
  Displayed Events [All] : All

  Baud Rate [Speed Sense] : Speed Sense
  Flow Control [XON/XOFF] : XON/XOFF
  Connection Inactivity Time (min) [0] : 0



 Actions->   Cancel     Edit     Save     Help

Cancel changes and return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

To change the severity level for events displayed in the Event Log, change this setting.

Figure 6-9. The Console/Serial Link Configuration Screen (Default Values)

2. Press E (for **Edit**). The cursor moves to the **Baud Rate** field.
3. Move the cursor to the **Displayed Events** field.
4. Use the Space bar to select the severity level you want for displayed Event Log messages, then press Enter.
5. When you have finished making changes in the Console/Serial Link screen, press Enter, then press S (for **Save**) to activate the change(s) you've made.
6. Return to the Main Menu.

Diagnostics

The switch's diagnostic tools include the following:

Feature	Switch Console	Web Browser Interface	Page
Link Test	Yes	Yes	8-13
Ping Test	Yes	Yes	8-13
Browse Config File	Yes	Yes	8-17
Command Prompt	Yes	No	8-18

Ping and Link Tests

The Ping test and the Link test are point-to-point tests between your switch and another IEEE 802.3-compliant device on your network. These tests can tell you whether the switch is communicating properly with another device.

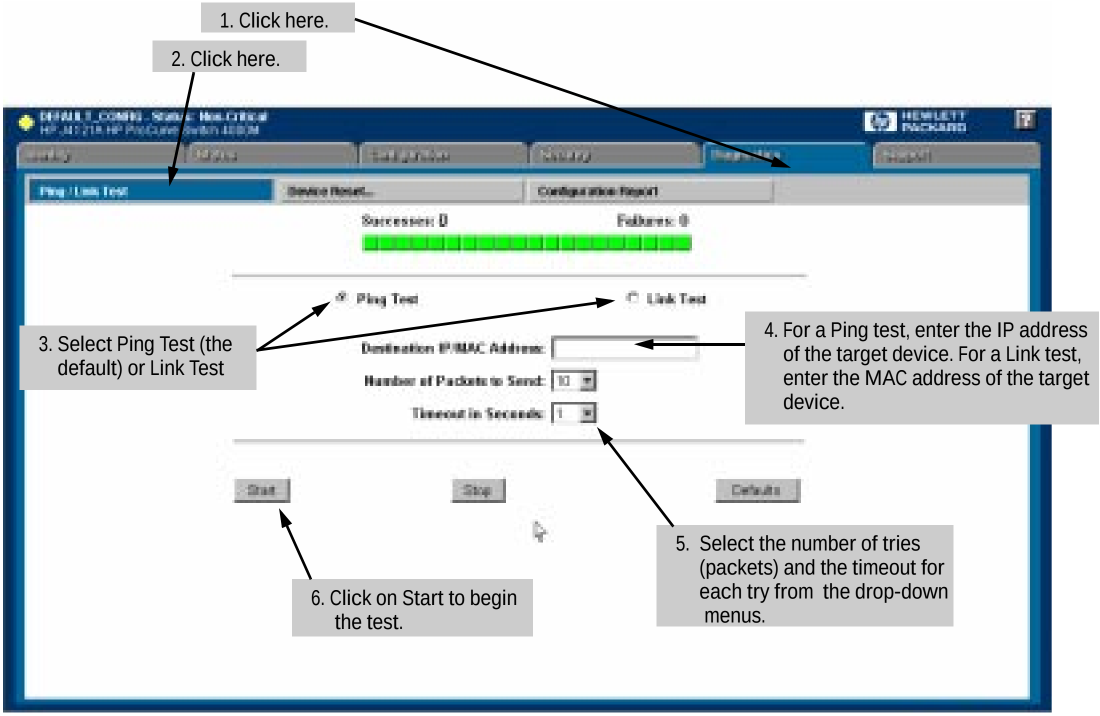
Note

To respond to a Ping test or a Link test, the device you are trying to reach must be IEEE 802.3-compliant.

Ping Test. This is a test of the path between the switch and another device on the same or another IP network that can respond to IP packets. ("Ping" is an acronym for "Packet INternet Groper".)

Link Test. This is a test of the connection between the switch and a designated network device on the same LAN (or VLAN, if configured). During the link test, IEEE 802.3 test packets are sent to the designated network device in the same VLAN or broadcast domain. The remote device returns the data to the switch, where it is compared to the data transmitted. If the received data matches the transmitted data, the test passes.

Executing Ping or Link Tests from the Web Browser Interface



Successes: 0

Failures: 0

Destination IP/MAC Address:

Number of Packets to Send: 10

Timeout in Seconds: 1

1. Click here.

2. Click here.

3. Select Ping Test (the default) or Link Test

4. For a Ping test, enter the IP address of the target device. For a Link test, enter the MAC address of the target device.

5. Select the number of tries (packets) and the timeout for each try from the drop-down menus.

6. Click on Start to begin the test.

Successes indicates the number of Ping or Link packets that successfully completed the most recent test.

Failures indicates the number of Ping or Link packets that were unsuccessful in the last test. Failures indicate connectivity or network performance problems (such as overloaded links or devices).

Destination IP/MAC Address is the network address of the target, or destination, device to which you want to test a connection with the switch. An IP address is in the X.X.X.X format where X is a decimal number between 0 and 255. A MAC address is made up of 12 hexadecimal digits, for example, 0060b0-080400.

Number of Packets to Send is the number of times you want the switch to attempt to test a connection.

Timeout in Seconds is the number of seconds to allow per attempt to test a connection before determining that the current attempt has failed.

To halt a Link or Ping test before it concludes, click on the Stop button. **To reset the screen** to its default settings, click on the Defaults button.

Executing Ping or Link Tests from the Console Interface

(To cancel a Ping or Link test that is in progress, press [Ctrl] [C].)

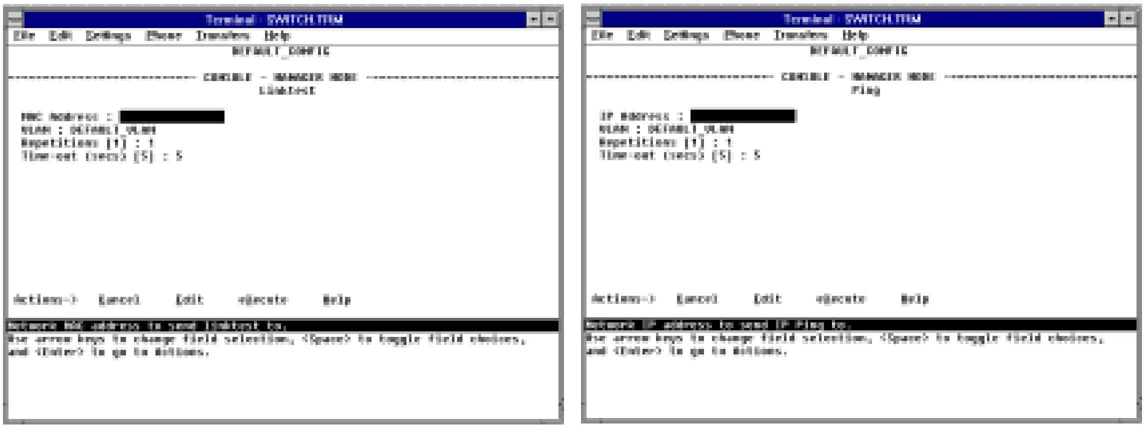
1. From the Main Menu, select:

   5. Diagnostics . . .

   1. Link Test

   or

   2. Ping Test



```
                               DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                                  Linktest

 MAC Address :
 VLAN : DEFAULT_VLAN
 Repetitions [1] : 1
 Time-out (secs) [5] : 5

Actions->   Cancel     Edit     eXecute     Help

Network MAC address to send linktest to.
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

```
                               DEFAULT_CONFIG

========================== CONSOLE - MANAGER MODE ==========================
                                    Ping

 IP Address :
 VLAN : DEFAULT_VLAN
 Repetitions [1] : 1
 Time-out (secs) [5] : 5

Actions->   Cancel     Edit     eXecute     Help

Network IP address to send IP Ping to.
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

Figure 7-10. Examples of Link Test and Ping Test Screens with VLANs Configured

2. Do one of the following:

   a. For a Link test, enter the MAC address of the target device. (This is a 12-digit hexadecimal number. For an example, see the screen on page 7-13.)

   b. For a Ping test, enter the IP address of the target device.

3. If the **VLAN** parameter does not appear, multiple VLANs are not configured; go to the next step. If the **VLAN** parameter appears, select it and use the Space bar to select the VLAN of the target device.

4. Select the **Repetitions** parameter and type in the number of times you want the test to be made.

5. Select **Time-out** and select the number of seconds to allow for each test.

The console displays the result of each test. For example, if a Link test succeeds, you will see

```
Linktest Command Successful.
```

If the Link test fails, you will see

```
Linktest Command Timed out.
```

If a Ping test succeeds, you will see a message indicating the target IP address is "alive", along with a test counter and elapsed time for each test. For example:

```
12.10.8.207 is alive, iteration 1, time = 1 ms
```

If a Ping test fails, you will see a message such as the following:

Ping Failed or **Target did not Respond**

Browse Configuration File

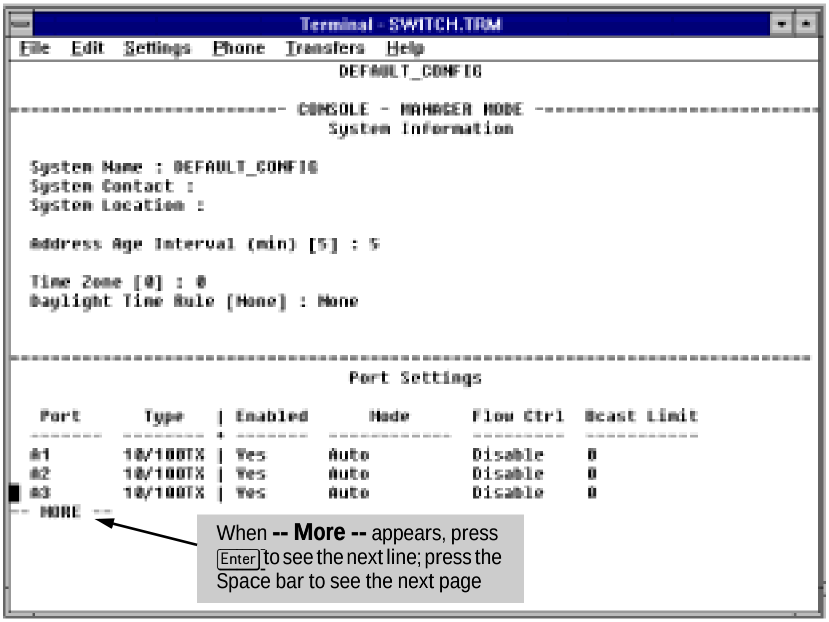
This command displays the switch configuration that is currently saved.

To display the configuration file:

1. From the Main Menu, select:

   5. Diagnostics

   3. Browse Configuration File



```
                              DEFAULT_CONFIG

-------------------------- CONSOLE - MANAGER MODE --------------------------
                            System Information

  System Name : DEFAULT_CONFIG
  System Contact :
  System Location :

  Address Age Interval (min) [5] : 5

  Time Zone [0] : 0
  Daylight Time Rule [None] : None


=============================================================================
                              Port Settings

   Port      Type      | Enabled    Mode          Flow Ctrl    Bcast Limit
  -------  ---------  + -------   ------------  ---------   -----------
  A1       10/100TX   | Yes       Auto          Disable      0
  A2       10/100TX   | Yes       Auto          Disable      0
  A3       10/100TX   | Yes       Auto          Disable      0
-- MORE --
```

When **-- More --** appears, press Enter to see the next line; press the Space bar to see the next page

Figure 7-11. Example of the Browse Configuration Display

2. When **-- MORE --** appears in the display, press Enter to see the next line of the configuration, or press the Space bar to display the next page of the configuration.

To halt a configuration listing, press Q (for Quit) and then press any key to return to the Diagnostics menu.

Using the Command Prompt

These commands are primarily for the expert user and for diagnostics purposes. Selecting **Command Prompt** from the Diagnostics Menu presents a command prompt from which you can enter the following commands:

List of Commands Available at the Command Prompt			
Browse	Help	Page	Version
Config	History	Ping	Vlan
Date	Get	Print	WalkMIB
Time	Put	Redo	Xget
Delete	LinkTest	GetMIB	Xput
Kill	Log	SetMIB	romversion

To get a definition of these commands and their syntax, enter **Help** at the command prompt. When you see **-- MORE --** at the bottom of the screen:

- To advance the display one line at a time, use [Enter].
- To advance the display one screen at a time, use the Space bar.
- To stop the help listing, press [Q].
- To exit from the command prompt, type **exit** and press [Enter].

How To Use the Command Prompt:

1. From the Main Menu select:

   5. Diagnostics ...

   4. Command Prompt

2. One of the following appears:

   - If VLANs are configured, you will see a prompt similar to the following:

     Select VLAN : DEFAULT_VLAN

     Use the Space bar to select the VLAN in which you want to execute a command, then press [Enter] to display the command prompt. The text in the prompt will match the name of the VLAN you select.

   - If no VLANs are configured, the command prompt appears near the bottom of the screen. For example:

     DEFAULT_CONFIG:

     The text in the prompt matches the System Name parameter. In the above example, the factory default configuration name appears because no system name is configured.

3. Type in the command you want to execute and press [Enter]. For example, to set the time to 9:55 a.m. you would execute the following command:

   DEFAULT_CONFIG: time 9:55 [Enter]

How To Exit from the command prompt:

Type **exit** and press [Enter] to return to the Diagnostics Menu.

File Transfers

Overview

You can download new switch software (operating system—OS) and upload or download switch configuration files. These features are useful for acquiring periodic switch software upgrades and for storing or retrieving a switch configuration.

Downloading an Operating System (OS)

HP periodically provides switch operating system (OS) updates through the Network City website (http://www.hp.com/go/network_city) and the HP FTP Library Service. For more information, see the support and warranty booklet shipped with the switch. After you acquire the new OS file, you can use one of the following methods for downloading the operating system (OS) code to the switch:

- The TFTP feature (**Download OS**) command in the Main Menu of the switch console interface (page A-2)
- HP's SNMP Download Manager included in HP TopTools for Hubs & Switches
- A switch-to-switch file transfer
- Xmodem transfer method

Note

Downloading a new OS does not change the current switch configuration. The switch configuration is contained in a separate file that can also be transferred, for example, for archive purposes or to be used in another switch of the same model. See "Transferring Switch Configurations" on page A-9.

Using TFTP To Download the OS File

This procedure assumes that:

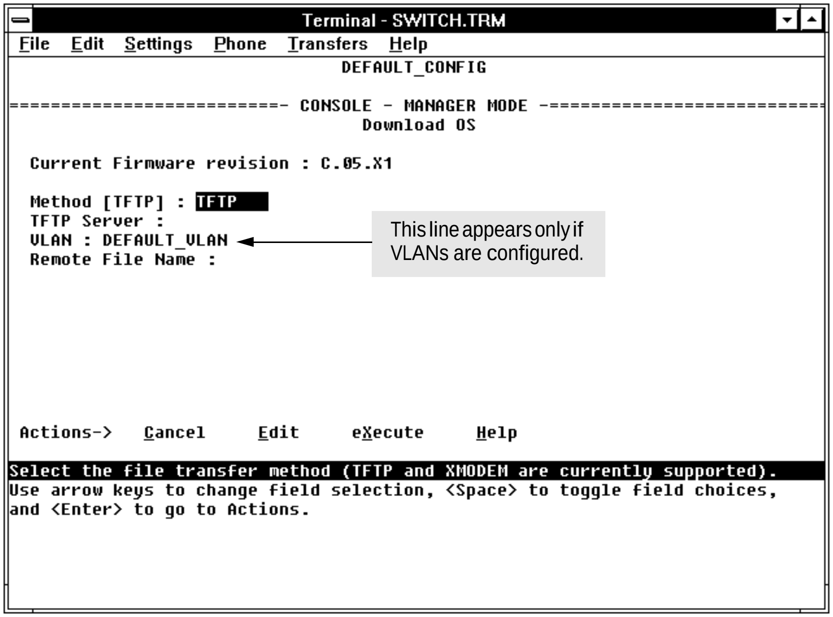
- An OS file for the switch has been stored on a TFTP server accessible to the switch. (The OS file is typically available from HP's electronic services—see the support and warranty booklet shipped with the switch.)
- The switch is properly connected to your network and has already been configured with a compatible IP address and subnet mask.
- The TFTP server is accessible to the switch via IP.

Before you use the procedure, do the following:

- Obtain the IP address of the TFTP server in which the OS file has been stored.
- If VLANs are configured on the switch, determine the name of the VLAN in which the TFTP server is operating.
- Determine the name of the OS file stored in the TFTP server for the switch (for example, A_01_01.swi).

Note *If your TFTP server is a Unix workstation, ensure that the case (upper or lower) that you specify for the filename in the switch console Download OS screen is the same case as the characters in the OS filenames on the server.*

1. In the console Main Menu, select **Download OS** to display this screen:

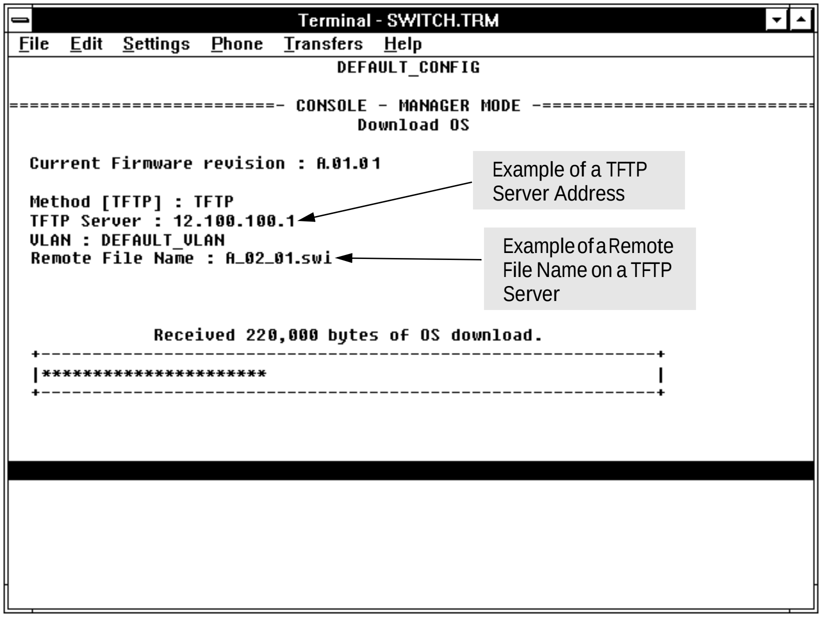


```
                              DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -==========================
                               Download OS

  Current Firmware revision : C.05.X1

  Method [TFTP] : TFTP
  TFTP Server :
  VLAN : DEFAULT_VLAN
  Remote File Name :




 Actions->   Cancel     Edit     eXecute     Help

Select the file transfer method (TFTP and XMODEM are currently supported).
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

This line appears only if VLANs are configured.

Figure 8-1. Example of the Download OS Screen (Default Values)

2. Press E (for **Edit**).
3. Ensure that the **Method** field is set to **TFTP** (the default).
4. In the **TFTP Server** field, type in the IP address of the TFTP server in which the OS file has been stored.
5. If the **VLAN** field appears, use the Space bar to select the VLAN in which the TFTP server is operating (The VLAN field appears only if multiple VLANs are configured in the switch.)
6. In the **Remote File Name** field, then type the name of the OS file. If you are using a UNIX system, remember that the filename is case-sensitive.
7. Press Enter, then X (for **eXecute**) to begin the OS download. The following screen then appears:



```
                              DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -==========================
                                Download OS

  Current Firmware revision : A.01.01

  Method [TFTP] : TFTP
  TFTP Server : 12.100.100.1
  VLAN : DEFAULT_VLAN
  Remote File Name : A_02_01.swi


              Received 220,000 bytes of OS download.
  +-------------------------------------------------------------+
  |**********************                                       |
  +-------------------------------------------------------------+
```

Example of a TFTP Server Address

Example of a Remote File Name on a TFTP Server

Figure 8-2. Example of the Download OS Screen During a Download

8. A "progress" bar indicates the progress of the download. When the entire operating system has been received, all activity on the switch halts and the following messages appear:

   Transfer completed

   Validating and writing system software to FLASH...

   After the system flash memory has been updated with the new operating system, the switch reboots itself and begins running with the new operating system.

9. To confirm that the operating system downloaded correctly:

   a. From the Main Menu, select

      Status and Counters

         General System Information

   b. Check the **Firmware revision** line.

Using the SNMP-Based HP Download Manager

Included with your switch is the HP TopTools for Hubs & Switches CD ROM (available Fall 1998). The HP Download Manager is included with HP TopTools and enables you to initiate a firmware (OS) download over the network to the switch. This capability assumes that the switch is properly connected to the network and has been discovered by HP TopTools. For further information, refer to the documentation and online Help provided with HP TopTools.

Switch-to-Switch Download

If you have two or more Switch 4000Ms and/or Switch 2400Ms networked together, you can download the OS software from one switch to another by using the Download OS feature in the switch console interface. (The Switch 4000M and the Switch 2400M use the same OS.) To do so:

1. From the switch console Main Menu in the switch to receive the download, select **7. Download OS** screen.
2. Ensure that the **Method** parameter is set to **TFTP** (the default).
3. In the **TFTP Server** field, enter the IP address of the remote Switch 4000M or 2400M containing the OS you want to download.
4. Enter "**os**" for the **Remote File Name**. (Type "**os**" in lowercase characters.)
5. Press [Enter], then [X] (for **eXecute**) to begin the OS download.
6. A "progress" bar indicates the progress of the download. When the entire operating system has been received, all activity on the switch halts and the following messages appear:

   Validating and writing system software to FLASH...

   Transfer completed

   After the system flash memory has been updated with the new operating system, the switch reboots itself and begins running with the new operating system.
7. To confirm that the operating system downloaded correctly:
   a. From the Main Menu, select

      Status and Counters
         General System Information

   b. Check the **Firmware revision** line.

Using Xmodem to Download the OS File

This procedure assumes that:

- The switch is connected via the Console RS-232 port on a PC operating as a terminal. (Refer to the Installation Guide you received with the switch for information on connecting a PC as a terminal and running the switch console interface.)
- The switch operating system (OS) is stored on a disk drive in the PC.
- The terminal emulator you are using includes the Xmodem binary transfer feature. (For example, in the Windows 3.1 terminal emulator, you would use the **Send Binary File** option in the **Transfers** dropdown menu.)

To Perform the OS Download:

1. From the console Main Menu, select

   7. Download OS

2. Press [E] (for **Edit**).
3. Use the Space bar to select **XMODEM** in the **Method** field.
4. Press [Enter], then [X] (for **eXecute**) to begin the OS download. The following message then appears:

   Press enter and then initiate Xmodem transfer
   from the attached computer.....

5. Execute the terminal emulator command(s) to begin Xmodem binary transfer.

   The download can take several minutes, depending on the baud rate used for the transfer.

6. When the download finishes, the switch automatically resets itself and begins running the new OS version.
7. To confirm that the operating system downloaded correctly:
   a. From the Main Menu, select

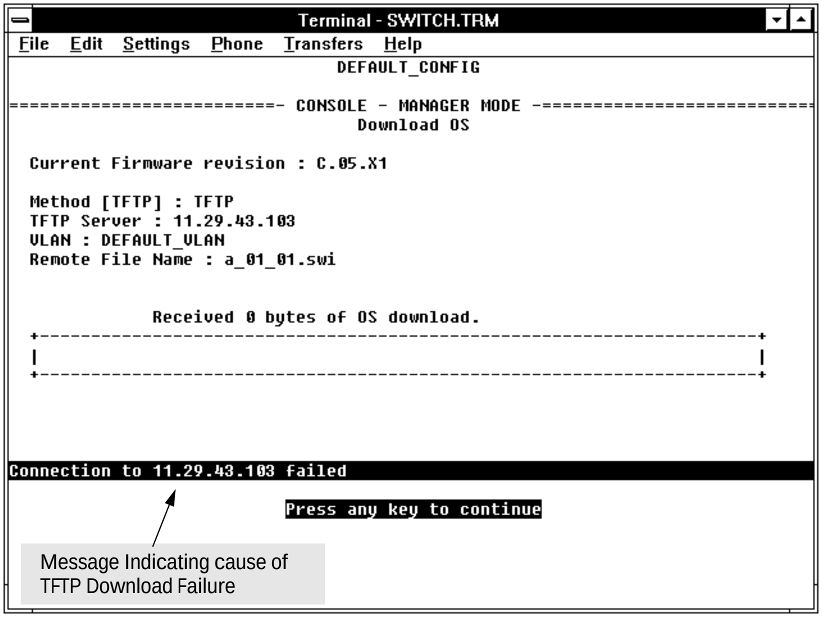
      1. Status and Counters

         1. General System Information

   b. Check the **Firmware revision** line.

Troubleshooting TFTP Downloads

If a TFTP download fails, the Download OS screen indicates the failure.



```
                              DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -==========================
                                Download OS

  Current Firmware revision : C.05.X1

  Method [TFTP] : TFTP
  TFTP Server : 11.29.43.103
  VLAN : DEFAULT_VLAN
  Remote File Name : a_01_01.swi


              Received 0 bytes of OS download.
  +-----------------------------------------------------------------------+
  |                                                                       |
  +-----------------------------------------------------------------------+




Connection to 11.29.43.103 failed

                           Press any key to continue
```

Message Indicating cause of TFTP Download Failure

Figure 8-3. Example of Message for Download Failure

To find more information on the cause of a download failure, examine the messages in the switch’s Event Log. (See “Event Log” on page 8-8.)

Some of the causes of download failures include:

- Incorrect or unreachable address specified for the **TFTP Server** parameter. This may include network problems.
- Incorrect VLAN.
- Incorrect name specified for the **Remote File Name** parameter, or the specified file cannot be found on the TFTP server. This can also occur if the TFTP server is a Unix machine and the case (upper or lower) for the filename on the server does not match the case for the filename entered for the **Remote File Name** parameter in the Download OS screen.
- One or more of the switch’s IP configuration parameters are incorrect.

- For a Unix TFTP server, the file permissions for the OS file do not allow the file to be copied.
- Another console session (through either a direct connection to a terminal device or through Telnet) was already running when you started the session in which the download was attempted.

Note

If an error occurs in which normal switch operation cannot be restored, the switch automatically reboots itself. In this case, an appropriate message is displayed in the copyright screen that appears after the switch reboots. You can display the same information by selecting the **Command Prompt** option from the Diagnostics menu and executing the History command.

Transferring Switch Configurations

You can use the following commands to transfer Switch 4000M and Switch 2400M configurations between the switch and a PC or Unix workstation.

Command	**Function**
Get	Download a switch configuration file from a networked PC or Unix workstation using TFTP.
Put	Upload a switch configuration to a file in a networked PC or Unix workstation using TFTP.
XGet	Uses an Xmodem-compatible terminal emulation program to download a switch configuration file from a PC or Unix workstation connected to the switch's console port.
XPut	Uses an Xmodem-compatible terminal emulation program to upload a switch configuration to a file in a PC or Unix workstation connected to the switch's console port.

Using Get and Put To Transfer a Configuration Between the Switch and a Networked PC or Unix Workstation

To use Get or Put, you need the following:

- The IP address of the remote PC or Unix workstation that is acting as a TFTP server
- The name assigned to the configuration file you will use on the remote PC or Unix workstation

Note

For the "Put" operation, most UNIX TFTP servers require that a file of the same name already exists in the server's TFTP directory, and that the file has "write" permissions.

Get or Xget overwrites the switch's current configuration with the downloaded configuration. The switch then automatically reboots itself.

1. From the Main Menu select

   5. Diagnostics...

      4. Command Prompt

2. At the command prompt, execute the following commands:

To upload a configuration to a file on a PC or Unix workstation:

put *IP_address* CONFIG *remote_file*

To download a configuration from a file on a PC or Unix workstation:

get *IP_address* CONFIG *remote_file*

where: ***IP address*** is the address of the PC or Unix workstation in which the configuration is stored (**get**) or is to be stored (**put**).

remote_file is the name of the configuration file in the PC or Unix workstation

Using XGet and XPut To Transfer a Configuration Between the Switch and a PC or Unix Workstation

The PC or workstation must be operating as a VT100 or ANSI terminal and connected directly to the switch's console port. Also, the PC or workstation must be running an Xmodem-compatible terminal emulation program. If a manager password has been set, you must log on to the switch using that password in order to execute the Xget or Xput commands.

Note XGet overwrites the switch's current configuration with the downloaded configuration. The switch then automatically reboots itself.

To use XGet or XPut, you need the name assigned to the configuration file on the PC or workstation.

1. On the PC or workstation, start the Xmodem-compatible terminal emulation program, then follow the instructions provided with the program to prepare for a file transfer.
2. From the switch's Main Menu select:

   5. Diagnostics...

   Command Prompt
3. At the command prompt, execute one of the following commands:

   To upload a configuration to a file on a PC or Unix workstation:

   xput config *remote_file* [pc/unix]

   To download a configuration from a file on a PC or Unix workstation:

   xget config *remote_file* [pc/unix]

where: ***remote_file*** is the name of the file in which the configuration is stored or is to be stored.

[pc/unix] is one of the following optional values:

unix (the default) specifies the Unix file format.

pc specifies the PC file format.

If the PC or workstation does not respond to an XPut or XGet command, the command times out and control returns to the **Command Prompt** line.

MAC Address Management

Overview

The switch assigns MAC addresses in these areas:

- For management functions:
  - One Base MAC address assigned to the switch
  - Additional MAC address(es) corresponding to any VLANs you configure in the switch
- For internal switch operations: One MAC address per port

MAC addresses are assigned at the factory. The switch automatically implements these addresses for VLANs and ports as they are added to the switch

The Base and VLAN MAC Addresses

These addresses appear in the Management Address Information screen. Also, the Base MAC address appears on a label on the front of the switch.

Note

The Base MAC address is used by the first (default) VLAN in the switch. This is usually the VLAN named “DEFAULT_VLAN” unless the name has been changed (by using the VLAN Names screen).

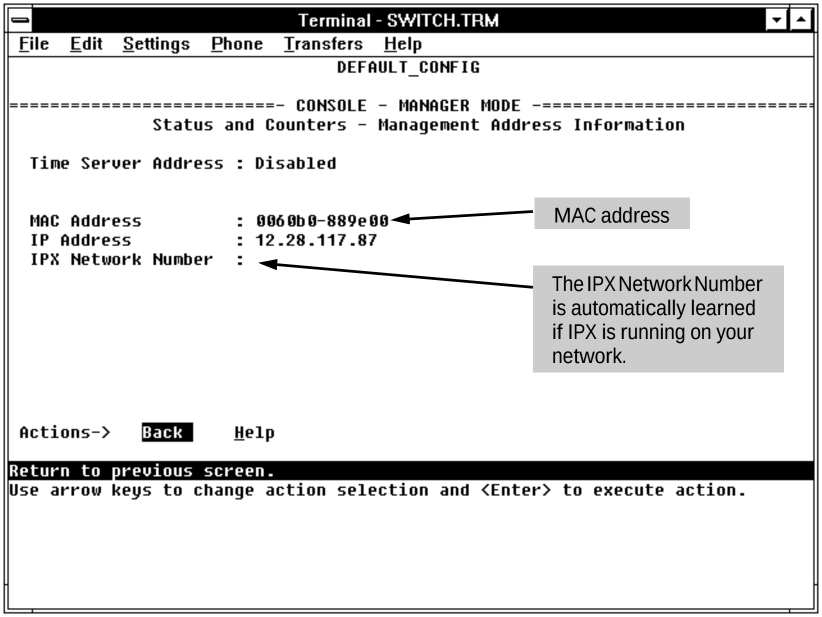
To display (in hexadecimal format) the switch’s Base MAC address and the MAC Addresses Assigned to any VLANs Configured:

1. From the Main Menu, Select

   1. Status and Counters

   2. Switch Management Address Information

   If multiple VLANs are not configured, this screen appears. If multiple VLANs are configured, each VLAN is listed with its corresponding address data.



```
                              DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -===========================
              Status and Counters - Management Address Information

  Time Server Address : Disabled


  MAC Address         : 0060b0-889e00
  IP Address          : 12.28.117.87
  IPX Network Number  :







 Actions->   Back     Help

Return to previous screen.
Use arrow keys to change action selection and <Enter> to execute action.
```

MAC address

The IPX Network Number is automatically learned if IPX is running on your network.

Figure B-1. Example of the Management Address Information Screen

The Port MAC Addresses

These MAC addresses are used internally by such features as Flow Control and the Spanning Tree Protocol. Determining the MAC address assignments for individual ports can sometimes be useful when diagnosing switch operation. To display these addresses, use the **walkmib** command at the command prompt

1. From the Main Menu, Select

   5. Diagnostics

   4. Command Prompt

2. If multiple VLANs are configured, use the Space bar to select a VLAN.

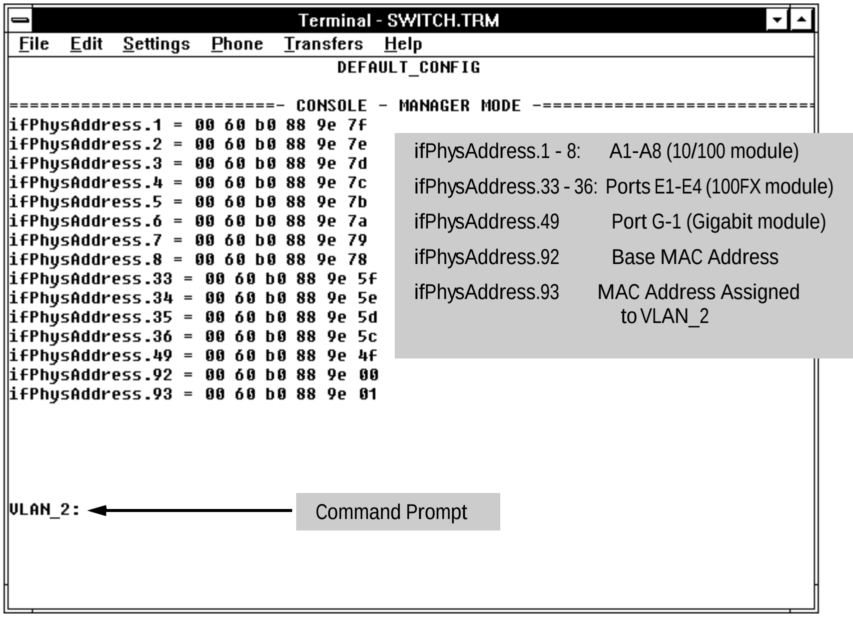
Note

This procedure displays the MAC addresses for all ports and existing VLANs in the switch, regardless of which VLAN you select.

3. Type the following command to display the MAC address for each port on the switch.

   walkmib ifPhysAddress

   MAC addresses are listed for all ports on the switch. Eight consecutive values are reserved for each slot, regardless of how many ports are actually installed in the slot. For example, with the ten-port 10/100 module, the four-port 100FX module, and the one-port Gigabit module installed in a Switch 4000M, the above command gives the following result:



```
                              DEFAULT_CONFIG

==========================- CONSOLE - MANAGER MODE -===========================
ifPhysAddress.1 = 00 60 b0 88 9e 7f
ifPhysAddress.2 = 00 60 b0 88 9e 7e
ifPhysAddress.3 = 00 60 b0 88 9e 7d
ifPhysAddress.4 = 00 60 b0 88 9e 7c
ifPhysAddress.5 = 00 60 b0 88 9e 7b
ifPhysAddress.6 = 00 60 b0 88 9e 7a
ifPhysAddress.7 = 00 60 b0 88 9e 79
ifPhysAddress.8 = 00 60 b0 88 9e 78
ifPhysAddress.33 = 00 60 b0 88 9e 5f
ifPhysAddress.34 = 00 60 b0 88 9e 5e
ifPhysAddress.35 = 00 60 b0 88 9e 5d
ifPhysAddress.36 = 00 60 b0 88 9e 5c
ifPhysAddress.49 = 00 60 b0 88 9e 4f
ifPhysAddress.92 = 00 60 b0 88 9e 00
ifPhysAddress.93 = 00 60 b0 88 9e 01




VLAN_2:
```

ifPhysAddress.1 - 8:	A1-A8 (10/100 module)
ifPhysAddress.33 - 36:	Ports E1-E4 (100FX module)
ifPhysAddress.49	Port G-1 (Gigabit module)
ifPhysAddress.92	Base MAC Address
ifPhysAddress.93	MAC Address Assigned to VLAN_2

Command Prompt

Figure B-2. Example of Port MAC Address Assignments on the Switch 4000M

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