



NETWORK PERIPHERALS
Bringing Workgroups Together

NuSwitch FE-224 Ethernet/Fast Ethernet Switching Hub

(With Enhanced Management Functions)

User's Guide

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 - ◆ Wenn das Leistungsverhalten des Geräts sich so verändert hat, daß Wartungsarbeiten erforderlich zu sein scheinen.
15. Das Gerät wird durch Ziehen des Netzsteckers ausgeschaltet. Das Gerät sollte deshalb in der Nähe der Steckdose installiert werden, und die Steckdose sollte leicht zugänglich sein.

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

Preface

In this Guide, “FE-224 Switching Hub” refers to the NuSwitch FE-224 Ethernet/Fast Ethernet Switching Hub.

About This Guide

Part 1 of this Guide explains how to:

- ◆ Install and connect the NuSwitch FE-224 Switching Hub.
- ◆ How to monitor and configure the FE-224 Switching Hub using the built-in console program.

Part 2 of this Guide:

- ◆ Supplements information in the *NuSight Network Management System for Windows User's Guide* if you are using NuSight for management.
- ◆ Supplements information in vendor documentation for the HP OpenView Network Management System if you are using that system for management.
- ◆ Explains how to manage the NuSwitch FE-224 Switching Hub using Network Peripherals' NuSight Network Management System for Windows or the HP OpenView Network Management System.

If you are not using either of these network management systems, disregard Part 2.

Who This Guide is For

This Guide is written for the network administrator or person in charge of setting up systems on a network. It assumes a working knowledge of VT-100 terminals, modems, and PCs.

Related Publications

- ♦ *NuSight Network Management System for Windows User's Guide*, if you are using the NuSight Network Management System for Windows or the HP OpenView Management System.
- ♦ Applicable network management documents supplied by your vendor, if you are using a network management application other than the NuSight Network Management System for Windows or the HP OpenView Management System.
- ♦ *Quick Installation Guide, NuModule FE-831/FE-833 Fast Ethernet Media Adapter for NuSwitch FE Series Products*, if you need to install an FE-831 or FE-833 Media Adapter in the FE-224 Switching Hub expansion slot.
- ♦ *Quick Installation Guide, NuSwitch RPS-600 for NuSwitch FE-Series Products*, if the Network Peripherals RSP-600 Redundant Power Supply is connected to the FE-224 Switching Hub.

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Network Peripherals offers lifetime technical support and remote diagnostics capabilities as part of the NuCare™ Service and Support Program for the FE-224 Switching Hub.

You must completely fill out and return the warranty registration card to take advantage this program. Return of materials is governed by Network Peripherals' Limited Warranty. For details regarding NuCare or return of materials, contact Network Peripherals Technical Support.

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Part 1— Installation, Configuration, and Hub Management

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Switching Hub Overview

This chapter provides an overview of the features of the FE-224 Switching Hub. It also covers supported network configurations and describes the various ways you can manage the FE-224 Switching Hub.

About the FE-224 Switching Hub

The FE-224 Switching Hub is an intelligent 10 Mbps and 100 Mbps switching hub. It has 24 switched 10Base-T ports each capable of 10 Mbps (half duplex) or 20 Mbps (full duplex) throughput.

Moreover, this switching hub provides for up to two optional switched Fast Ethernet ports capable of 100 Mbps (half duplex) or 200 Mbps (full duplex) throughput. One of the two ports is dedicated for 10Base-T/100Base-TX; the other port supports 10/100 Mbps UTP cable or 100 Mbps fiber-optic cable.

The optional 100Base-TX port or optional 100Base-FX port is available through a slide-in Network Peripherals module that can be purchased separately. Either of these modules can be installed in the expansion slot on the rear panel of the FE-224 Switching Hub. You can leave the slot empty, or install the appropriate module to gain another 100Mbps connection to a local server, for example.

Both the 10/100Base-TX and the 100Base-TX/FX ports can be used as high-speed power link ports. You can connect them to other FE-224 Switching Hubs, or to other Network Peripherals switching hubs such

as an FE-1200 or FE-210 and achieve throughput up to 400 Mbps (full duplex).

This product has one internal power supply and an external connector for a Network Peripherals redundant power supply (RPS). If the internal power supply fails and the RPS is connected, the RPS will provide system power automatically.

The FE-224 Switching Hub can be managed and configured through an SNMP-based network management system such as Network Peripherals NuSight Network Management System for Windows or HP OpenView Management System. It can also be managed and configured through the built-in console program.

Package Contents

- ◆ FE-224 Switching Hub
- ◆ Power Cord
- ◆ Warranty Card
- ◆ Mounting brackets and screws
- ◆ Category 5 Crossover cable
- ◆ Null modem adapter
- ◆ Release Notes for the FE-224 Ethernet/Fast Ethernet Switching Hub Software Upgrade
- ◆ NuSwitch FE-224 Ethernet/Fast Ethernet Switching Hub User's Guide
- ◆ Quick Installation Guide

Summary of Functions

A basic FE-224 Switching Hub has these functions:

- ◆ Twenty-four switched Ethernet ports
- ◆ Two switched Fast Ethernet ports: one dedicated switched port and one expansion slot for an FE-831 or FE-833 Media Adapter (both are capable of being used as power link ports)
- ◆ Parallel store and forward architecture
- ◆ Complete runt and CRC filtering
- ◆ Full-duplex system architecture
- ◆ Flow control (half duplex mode only)
- ◆ Virtual LAN support
- ◆ Spanning Tree Protocol support
- ◆ Power links
- ◆ Port monitoring
- ◆ SNMP agent support
 - ◇ In-band management through SNMP over IP protocol
 - ◇ Repeater, bridge, and private MIBs
 - ◇ Software upgradeable firmware
 - ◇ BOOTP
 - ◇ TFTP
- ◆ Out-of-band management
- ◆ Redundant power supply connection

Using the 100Base-TX/FX Ports

Fast Ethernet ports give you dedicated 100 Mbps high-speed connections. These ports are best used to connect to Fast Ethernet devices with high bandwidth requirements such as servers and other hubs. When connecting to a server, ensure that the server is using a Fast Ethernet 100Base-TX/FX Network Interface Card (NIC). Configuring a port to full duplex mode can also double the total bandwidth. Data grade (Category 5) UTP cable can run up to 100 meters (328 ft).

The 10/100 Mbps switching port tries to identify the network speed and duplex mode with its partner after connecting to the network, through auto-negotiation. The first stage in auto-negotiation is:

1. Detect 100 Mbps full-duplex mode.
2. Detect 100 Mbps half-duplex mode.
3. Detect 10 Mbps full-duplex mode.
4. Detect 10 Mbps half-duplex mode.

If the partner does not support auto-negotiation protocol, then an auto-sensing (parallel detection) process is initiated:

1. Detect 10/100 Mbps network speed.
2. Get the full/half duplex setting from the console program.

The two Fast Ethernet ports include one dedicated 10/100 Mbps switching port and one optional port that can be installed in the expansion slot in the rear panel. The expansion slot accommodates either the FE-831 or FE-833 Media Adapter with its port. The port on the FE-831 Media Adapter is 10Base-T/100Base-TX, providing the same switching port as a dedicated one. The port on the FE-833 Media Adapter is 100Base-FX running only in 100 Mbps and using fiber-optic

cable as the transmission medium. For details, refer to the FE-831/FE-833 Quick Installation Guide.

Configuration Example

An FE-224 Switching Hub can function effectively as a desktop workgroup switch, as discussed in this example.

In this example, servers are connected to the Fast Ethernet ports while 10Base-T hubs and bandwidth-hungry workstations are connected to the switched 10Base-T ports. When connected to other Network Peripherals intelligent switching hubs such as the FE-600+, FE-1200, or other FE-224s, the 100Base-TX ports and full duplex mode are enabled, you can maximize throughput. In addition to maximizing throughput in a desktop workgroup environment, the 10Base-T ports on the FE-224 Switching Hub can connect to other 10Base-T hubs.

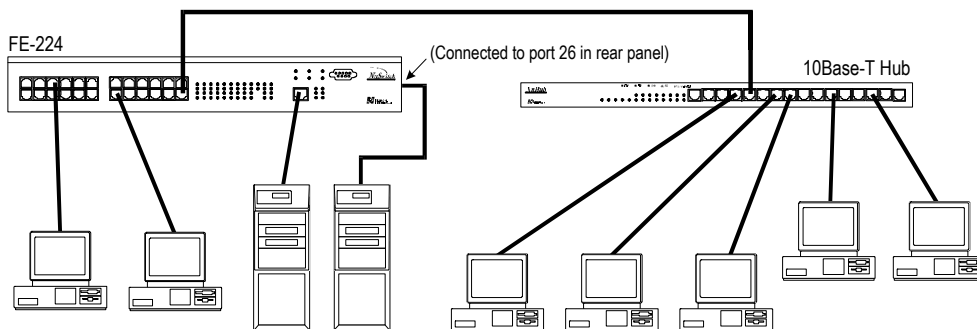


Figure 1. FE-224 Switching Hub as a Desktop Workgroup Switch

Unit Front Panel

The FE-224 Switching Hub front panel contains Ethernet ports, Fast Ethernet ports, a power link port, and status LEDs. It also contains a console port.

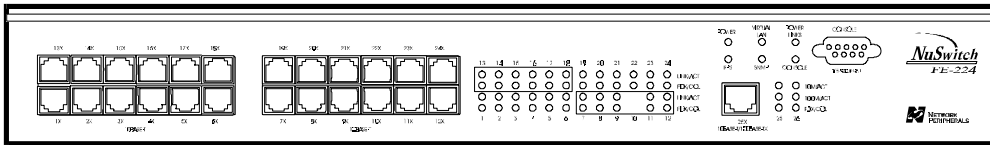


Figure 2. FE-224 Switching Hub Front Panel

Power Link Ports

The Power Link function available in the enhanced management option is a trunk feature that maximizes switch-to-switch performance by load-balancing traffic. The power link ports are used to connect to other Network Peripherals intelligent hubs (FE-1200 and FE-210) and have a maximum throughput of 200 Mbps per port, full-duplex Fast Ethernet.

Ports 25 and 26 can be used as the power link ports. Considering the auto-negotiation protocol, the total bandwidth can be as high as 400 Mbps.

10Base-T Ports

Ports 1-24 and port 25 are 10Base-T ports. Twenty-five network devices can be connected to these switched ports. Maximum segment length is 100 meters (328 ft.) over category 3, 4, or 5 UTP cable.

LEDs

The following table illustrates port-status displayed by LEDs on the front panel of the FE-224 Switching Hub:

Table 1. LED Display Status

LED	Color	Indicates
<i>System LEDs:</i>		
Power	Green	Internal power supply of hub is active.
	Blinking Green	Internal power supply of hub is inactive; connected RPS is supplying power.
RPS	Green	Active RPS is connected to hub.
Virtual LAN	Green	Virtual LAN function is enabled.
	Blinking green	Virtual LAN configuration is in process.
SNMP	Green	SNMP agent is ready.
	Blinking green	Hub is receiving an SNMP packet.
Power Links	Green	Power Link function is enabled.
	Blinking green	Configuration of power link is in progress.
Console	Green	RS-232 link is present.
	Blinking green	The console port is transmitting or receiving data.
<i>10Base-T port LEDs, Ports 1 to 24:</i>		
LINK/ACT	Green	Link is present.
	Blinking green	Port is transmitting or receiving.
FDX/COL	Green	Full duplex connection.
	Blinking amber	Collision detected.

Table 1. LED Display Status (continued)

LED	Color	Indicates
<i>10Base-T port LEDs, Ports 1 to 24:</i>		
LINK/ACT	Green	Link is present.
	Blinking green	Port is transmitting or receiving.
FDX/COL	Green	Full duplex connection.
	Blinking amber	Collision detected.
<i>10Base-T/100Base TX port LEDs, Ports 25 & 26 (optional 100Base-FX for port 26):</i>		
10M/ACT	Green	10Base-T link is present. For expansion slot, this LED is only valid if FE-831 Media Adapter is installed.
	Blinking green	Port is transmitting or receiving at 10 Mbps.
100M/ACT	Green	100Base-TX/FX link is present.
	Blinking green	Port is transmitting or receiving at 100 Mbps.
FDX/COL	Green	Full duplex connection
	Blinking amber	Collision detected.

Unit Rear Panel

In addition to the power connector, the FE-224 Switching Hub rear panel has an expansion slot to accommodate a slide-in module that contains a Fast Ethernet port, and a redundant power supply connector.

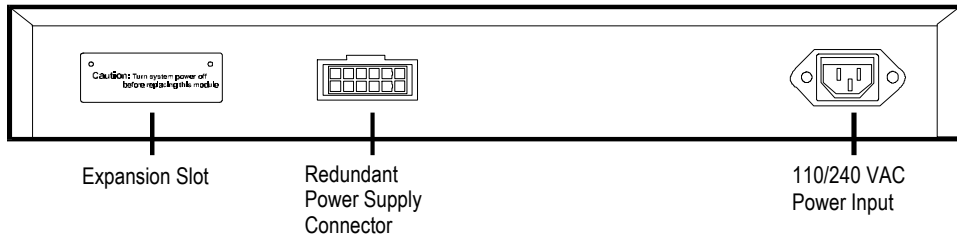


Figure 3. FE-224 Switching Hub Rear Panel

Expansion Slot

The expansion slot can be empty or accommodate one of the following:

- ◆ NuModule FE-831 Fast Ethernet Media Adapter, which provides the same function as the fixed 10Base-T/100Base-TX switching port (port 25)
- ◆ NuModule FE-833 Fast Ethernet Media Adapter, which uses multi-mode fiber-optic cable with an SC type of connector as the transmission medium. The full bandwidth is up to 200 Mbps (full duplex) with a wiring distance up to 2km.

The management functions for either port are the same as for the fixed Fast Ethernet port.



NOTE: Before installing or removing a media adapter, disconnect all power to the FE-224 Switching Hub. Hot-swapping in the expansion slot is not supported.

Redundant Power Supply Connector

To prevent disruptions caused by a power supply failure, Network Peripherals provides the RPS-600 redundant power supply for your network devices. If the FE-224 Switching Hub internal power supply were to fail, the RPS-600 provides DC power to keep the FE-224 Switching Hub operating.

Remember to replace or repair the failed device as soon as possible.

Before connecting to RPS-600, users should calculate the overall DC power consumption carefully. The DC power consumption of the FE-224 Switching Hub is 7A@5.3VDC.

System Defaults

The following table shows factory defaults for the FE-224 Switching Hub.

Table 2. Factory Defaults

Function	Default Setting
Port State	Enabled
Flow Control	Enabled
Full Duplex (ports 1~24)	Disabled
(port 25, 26 with FE-831 Media Adapter)	Set by auto-detection
(port 26 with FE-833 Media Adapter)	Disabled
Port Speed (ports 1~24)	10 Mbps
(port 25, 26 with FE-831 Media Adapter)	Set by auto-detection
(port 26 with FE-833 Media Adapter)	100 Mbps
Port Auto-Negotiation (ports 1~24)	Not applicable
(port 25, 26 with FE-831 Media Adapter)	Enabled
(port 26 with FE-833 Media Adapter)	Not applicable
Spanning Tree	Disabled
If Spanning Tree is enable:	
Bridge priority	32768
Hello Time	2 sec.
Max Age	20 sec.
Forward Delay	15 sec.
Port level:	
Block on Link	Disabled
Port priority	128
Port path cost	
(100 Mbps)	10
(10 Mbps)	100
Password on console	None
Virtual LAN	Disabled
Power Link	Disabled
Port Monitor	Disabled
BOOTP	Disabled

Managing the FE-224

The FE-224 Switching Hub can be managed from a management console in-band or out-of-band.

In-Band Management

The FE-224 Switching Hub can also be managed through an SNMP manager (such as Network Peripherals NuSight Network Management System for Windows or the HP OpenView Management System). More information about using either of these management systems is contained in Part 2.

Out-of-Band Management

The console program built into the FE-224 Switching Hub is known as the VT100 interface. It can be accessed through the console port in the front panel of the hub. A direct connection to the console port is made using a null modem adapter and a standard serial cable to a workstation. A personal computer running terminal emulation software is usually the best way to manage the hub through the console port. Out-of-band management of the hub using SNMP is also possible through a direct or remote connection through a modem attached to the hub with a standard serial cable. For connection details, see Appendix A.

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2

Installation and Setup

This chapter explains how to install the FE-224 Switching Hub and provides a description of the various configurations supported by the NuSwitch.

Selecting a Location for the Switch

The FE-224 is suitable for use in the office where it can be mounted in a standard 19-inch equipment rack, or left free-standing. Alternatively, the unit can be rack-mounted in a wiring closet or equipment room. Mounting brackets and screws are included in the package.

When deciding where to locate the FE-224 Switching Hub, make sure that:

- ◆ You can comply with the cable guidelines discussed next.
- ◆ It is accessible after installation and cables can be connected easily.
- ◆ Cabling is away from sources of electrical noise such as radios, transmitters, broadband amplifiers, power lines, and fluorescent lighting fixtures.
- ◆ Water or moisture cannot enter the case of the hub.
- ◆ Air flow around the unit and through the vents in the sides of the case is not restricted. There should be a minimum clearance of 25mm (1 inch) on all sides.

- ◆ No objects are placed on top of the hub or stack.
- ◆ Hubs are not stacked more than four high if free-standing.

Cabling Guidelines

Figure 4 illustrates the essential rules for connecting Fast Ethernet hubs and provides examples of how these rules allow for large-scale 100Base-TX/FX networks.

The key 100Base-TX/FX rules are:

- ◆ Maximum UTP cable length is 100 meters (328 ft.) over category 5 cable for 100Base-TX.
- ◆ Maximum length of a multi-mode fiber cable is 2 kilometers (6560 ft.) for full duplex, or 412 meters (1351 ft.) for half duplex 100Base-FX.
- ◆ The connection between two switches permits a 100-meter-long cable. If the distance between two hubs is greater than 100 meters, use the FE-833 Media Adapter for 100Base-FX port or use the FE-200 series MicroSwitch to extend the distance. Each fiber-optic connection lets you extend the distance up to 2 kilometers.

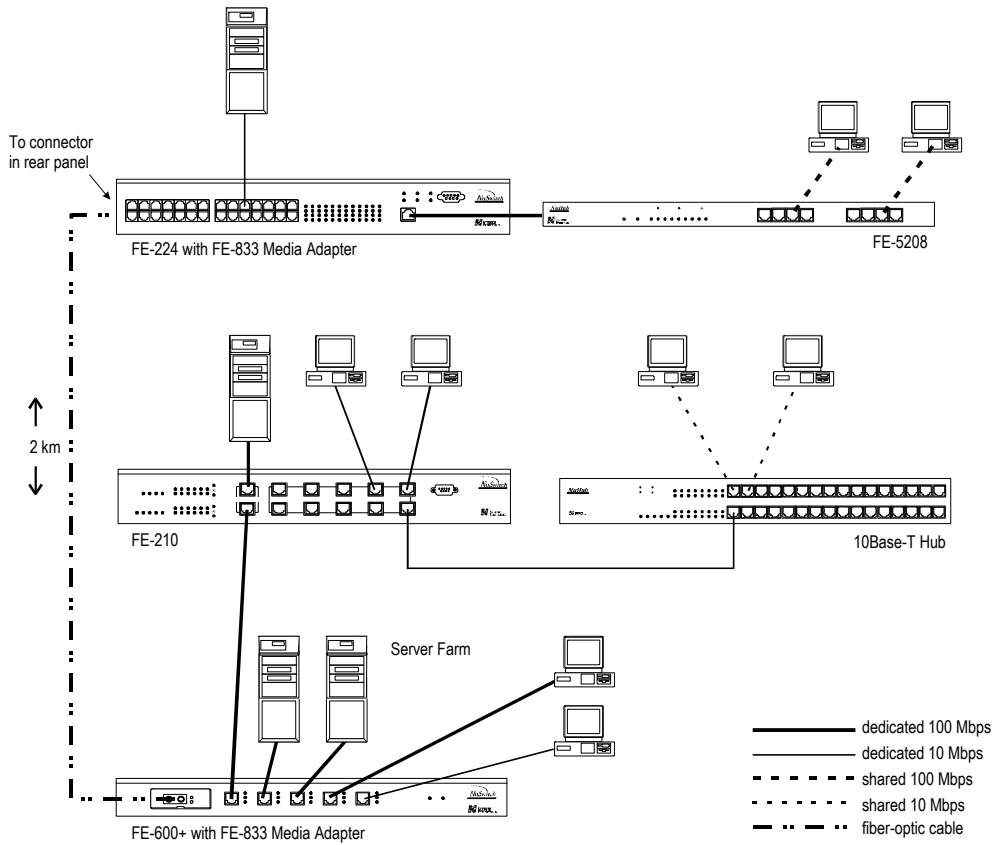


Figure 4. Cable Guidelines

Rack Mounting

The FE-224 Switching Hub is 1.5U high and fits most standard 19-inch racks. The mounting brackets supplied with the unit should be attached before installing the hub to the rack.



WARNING: Disconnect all cables from the switching hub before continuing. Remove all self adhesive pads from the underside of the unit if already fitted.

1. Place the unit right side up on a hard, flat surface with the front facing you.
2. Locate a mounting bracket over the mounting holes on one side of the unit as shown in Figure 5.
3. Insert the screws and fully tighten with a Phillips screwdriver.
4. Repeat the two previous steps for the other side of the unit.
5. Insert the unit into the 19-inch rack and secure with the screws included with the FE-224 Switching Hub. Ensure that the ventilation holes are not obstructed.
6. Connect the cables.

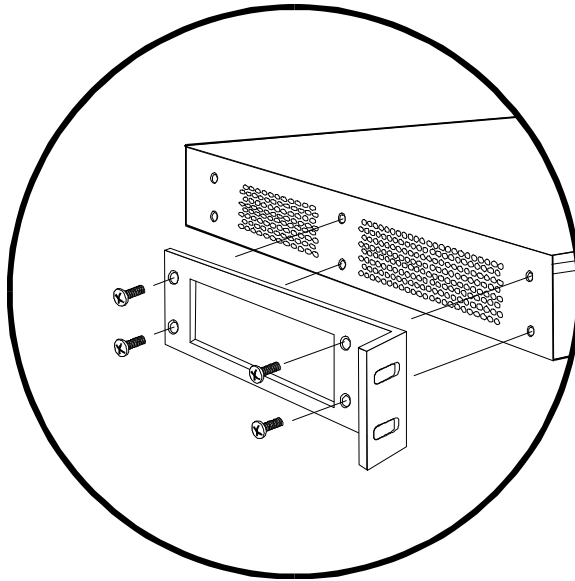


Figure 5. Connecting Mounting Brackets

Connecting a Terminal to the Console Port

The FE-224 Switching Hub console ports are set to:

- ◆ Baud - 9600
- ◆ Parity - None
- ◆ Data Bits - 8
- ◆ Stop Bit - 1

The terminal connected to the console port of the hub must be configured with the same settings. This procedure is described in the documentation supplied with the terminal.

Connection to the console port can be direct for local management or through a modem for remote management. A standard serial cable and

null modem adapter are used to connect to the console port. Connect the terminal as follows:

1. Connect one end of the serial cable to your terminal or PC and connect the other end of the cable to a null modem adapter and then to the console port of the FE-224 Switching Hub as shown in Figure 6.
2. Make sure that your terminal or terminal emulation package is set to 9600 baud, no parity, 8 data bits, and 1 stop bit.
3. Press the Enter key four times to start communications. If the settings are correct, the console program should appear on your terminal screen.

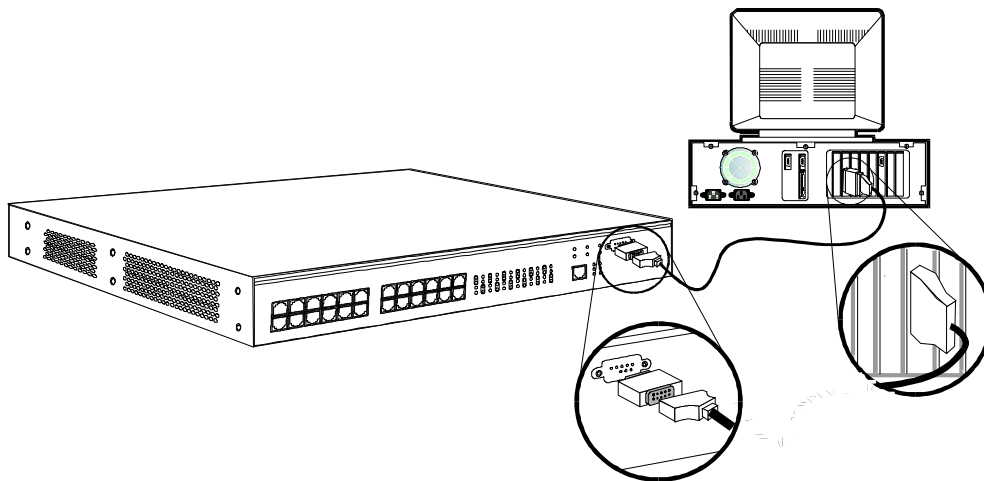


Figure 6. Connecting to a Terminal

Connecting to Another NuSwitch Switching Hub

When connecting the FE-224 Switching Hub to another Network Peripherals (NPI) switching hub, it is necessary to use a crossover cable to make the connection. For details on cable pin-outs for a crossover cable see Appendix A.

Power Link

You can use the Power Link function to connect the hub to another NuSwitch FE-224 or to an FE-210 or FE-1200 switching hub, which increases the efficiency of your network. Power links on the NuSwitch hubs divide the network traffic into two link paths. This is similar to having two paths to the same destination. The traffic flow is divided and leads to less congestion than if only one path is available. Power link ports are 10/100 Mbps, half or full duplex ports.

The Power Link function requires two crossover cables, as in the following figure. The two power link ports (25 and 26) on the FE-224 Switching Hub can provide a total bandwidth of up to 400 Mbps depending on the result of auto-negotiation.

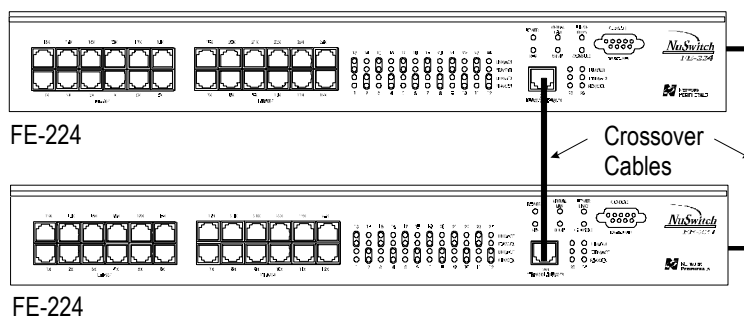


Figure 7. Power Link Connection

A power link port is not restricted to use with the Power Link function. For example, you can connect port 25 on the FE-224 Switching Hub to a standard Ethernet port in another hub (as in the following figure)

without enabling the Power Link function, and have a standard Ethernet connection.

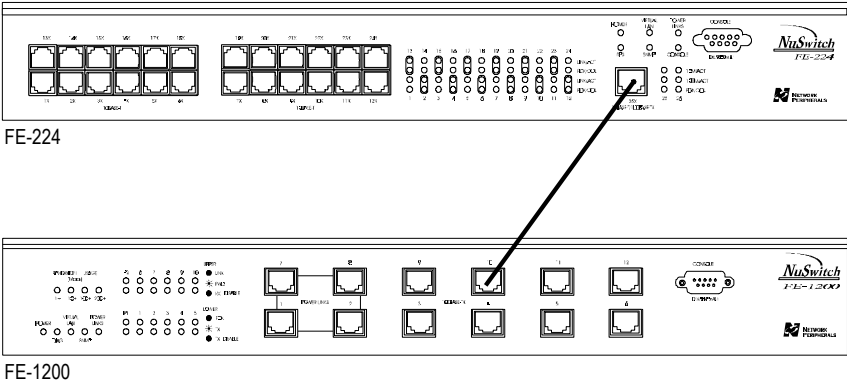


Figure 8. Using a Power Link Port Without the Power Link Function

Full Duplex

For an added performance boost, you can enable full duplex mode on the power link ports. As long as auto-negotiation on both ends of the connection is enabled, duplex mode will be decided automatically by the protocol.

If the protocol on either end of the connection is disabled, user settings will take effect for half-duplex mode. Remember to manually configure the connected devices for full duplex mode instead of auto-negotiation.

To configure the power link ports of the FE-224 Switching Hub, it is necessary to use the console program or an SNMP manager to change the default setting from half duplex. Note that all other ports on the FE-224 Switching Hub can also be configured as full duplex ports.



NOTE: Full duplex mode should only be enabled in point-to-point connection to a server, end-station, or another switch. It should be disabled when connected to a repeated segment.

Connecting to Other Ethernet Hubs

To connect to other Ethernet hubs you need a crossover cable. Before making the connection between the two hubs, you must determine the type of connection you require. On the FE-224 Switching Hub, both 100Base-TX/FX ports and twenty-four 10Base-T ports are available for connecting to Ethernet hubs. All ports can be configured further for full duplex operation.

100Base-TX 100 Mbps Connections

To make a 100Base-TX connection between two hubs (Figure 9), it would be necessary to select ports that are 100Base-TX ports. On the FE-224, ports 25 and 26 are 100Base-TX ports. (Port 26 is on the optional slide-in module in the rear panel of the FE-224 Switching Hub). Connect the ends of the crossover cable to the selected 100Base-TX ports on both Ethernet hubs.

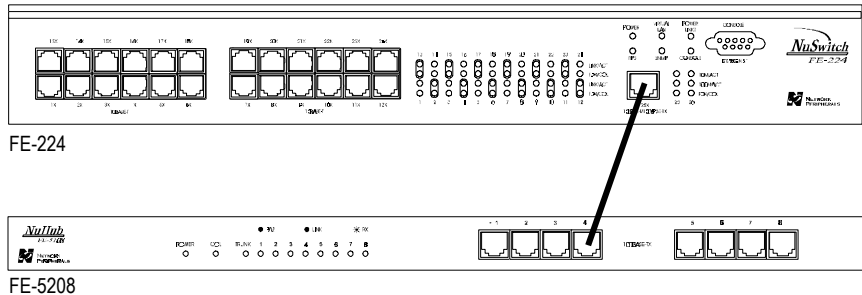


Figure 9. 100Base-TX Connection

100Base-FX 100 Mbps Connections

On the rear panel of the FE-224 Switching Hub, the expansion slot accommodates an FE-833 Media Adapter that contains a 100Base-FX port (Figure 10). When this Media Adapter is installed, the port becomes number 26. You need a multi-mode, SC type, crossover fiber-optic cable when connecting port 26 to other hubs. Plug in the ends of the fiber to the selected 100Base-FX ports on both Fast Ethernet

switches.

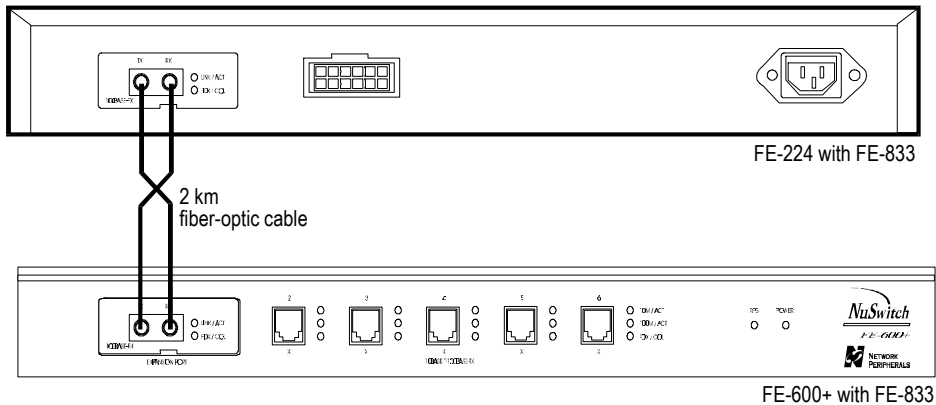


Figure 10. 100Base-FX Connection

Connecting to Workstations and Servers

All ports on the FE-224 Switching Hub can be connected to either workstations or servers. We recommend that you connect servers to the 100Base-TX/FX ports to take advantage of the 100 Mbps bandwidth and connect workstations to the 10Base-T ports (Figure 11). Be aware that it is necessary to have a 100Base-TX/FX NIC installed in your server or workstation to make a connection to the 100Base-TX/FX port on the hub.

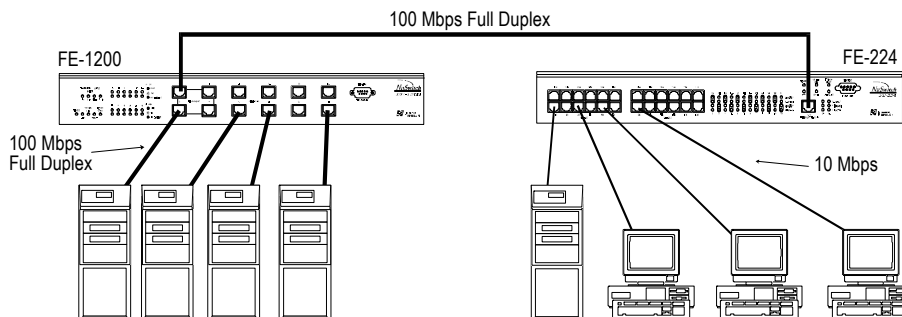


Figure 11. Server and Workstation Connections

Additionally, you can gain extra bandwidth by using a full duplex adapter on your workstation or server. If you intend to use the full duplex mode of your adapter, you must set ports on the hub to full duplex mode. To set the full duplex option of the hub, you need to access the management console program and select option 9 (Switching Port Configuration). For more information, see *Configuring the Ports* in Chapter 4.

Connecting to a Redundant Power Supply

A redundant power supply (RPS), model RPS-600, provides backup power for the FE-series switches. Its connector is at the rear panel of the FE-224 Switching Hub.

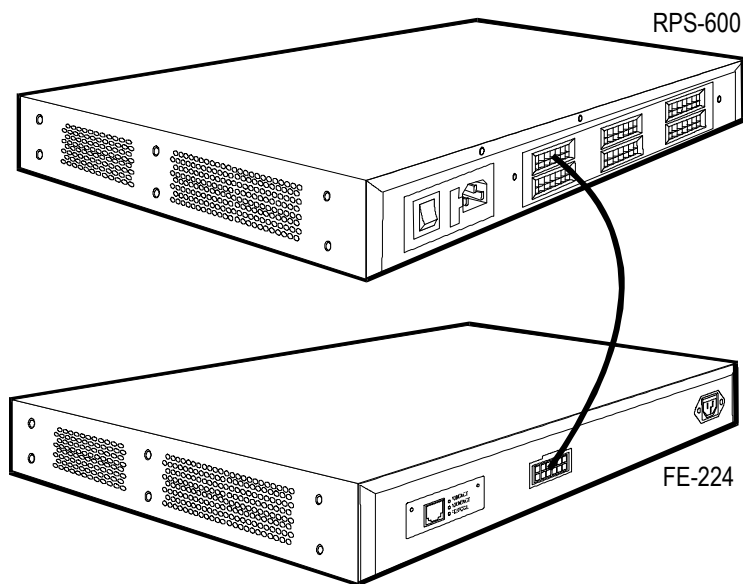


Figure 12. Redundant Power Connections

The DC power consumption of the FE-224 Switching Hub is 7A@5.3VDC. Before connecting switches to the RPS-600, you need to calculate the overall DC power consumption carefully.

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Management Preparations

This chapter explains how to configure a VT-100 terminal or a PC running terminal emulation software as a management console for use with the FE-224 Switching Hub management interface.

Management Methods

You can manage the FE-224 Switching Hub using one of the following methods:

- ◆ Through the console program built into the FE-224 Switching Hub and accessible through a VT100 terminal (or a workstation with VT100 terminal emulation software) connected to the hub's console port. This is a text mode user interface, and is described in Part 1.
- ◆ Over a network and using an SNMP-based network management system—such as NuSight Network Management System for Windows—installed on a network PC. The FE-224 Switching Hub is connected to the network through one of the hub's Ethernet ports (in-band management). This is typically a Windows user interface, and is described in Part 2.
- ◆ Through a PC and using an SNMP-based network management system such as NuSight Network Management System for Windows. The PC is connected to the FE-224 Switching Hub's console port (out-of-band management), and the FE-224 Switching Hub is connected to the network through one of the hub's Ethernet ports.

This method requires the Internet Protocol (IP). This is also typically a Windows user interface, and is described in Part 2.

Managing Through the Console Program

The menu-driven interface built into the FE-224 Switching Hub is called the console program. The console program—which runs in text mode—is accessed through a serial connection between a management console and the console (serial) port of the FE-224 Switching Hub. The management console used for the connection can be a VT-100 terminal or a PC running terminal emulation software.



NOTE: The attention sequence when connecting to the console port using a VT-100 emulator program is four Enter keystrokes. This causes the Console Program menu to display.

Alternatively, the console program can be accessed through a remote connection. In this setup, a modem is connected to the console (serial) port by an RS-232 cable. See Appendix A for connection details.

To access the console program:

1. Connect a terminal (or a PC with terminal emulation software) to the console port using a null modem adapter and a serial cable.
2. Set your terminal to the following settings:
 - ◆ Baud—9600
 - ◆ Parity—None
 - ◆ Data Bits—8
 - ◆ Stop Bit—1
3. At the terminal press the Enter key four times to access the console program. If your settings are correct you should see the Console

Program menu, or the password screen which will prompt you to enter a password. When accessing the console program for the first time, there is no need for a password and the Console Program menu is the first screen to appear.

4. If you see a password screen, type in the required password and press the Enter key to access the Console Program menu.

When installing the switching hub for the first time, you must configure the system as described in the following chapters.

Managing Over a Network

You can manage over the network using Network Peripherals' NuSight Network Management System for Windows or HP OpenView Management System, another vendor's SNMP-based network management system, or a basic SNMP network manager.

If you are using Network Peripherals' NuSight Network Management System for Windows or the HP OpenView Management System, you can install the management module for the FE-224 Switching Hub as described in Part 2 of this Guide. This application provides a graphical method of managing the hub.

If you are using a network management system other than the NuSight or HP OpenView system, you need to compile the three MIBs supplied by Network Peripherals, as described later in this section.

The FE-224 Switching Hub supports SNMP over IP (Internet Protocol). Both the NuSight or HP OpenView system can be run using IP.

IP Addresses

IP addresses have the format n.n.n.n where n is a decimal number between 0 and 255. An example IP address is: 168.168.8.100

IP addresses are made up of two parts:

- ♦ The first part (168.168 in the example) identifies the network on which the device resides. Network addresses are assigned by three

allocation organizations. Depending on your location, each allocation organization assigns a globally unique network number to each network that wishes to connect to the Internet.

- ♦ The second part (8.100 in the example) identifies the device within the network. Assigning unique device numbers is your responsibility.

If you are unsure of the IP addresses allocated to you, consult the allocation organization from which your IP addresses were obtained. If you do not have an address, see *Obtaining a Network Number* later in this chapter.

If you are administering a network that has no connection to the outside world, you may not be aware of the network address. If you are not using IP for anything other than network management, you can use arbitrary addresses. We suggest you use Class C addresses in the range 215.x.y.z-220.x.y.z where x and y are numbers from 1-254. Remember that no two devices on a network can have the same address. If you later connect to the outside world, you must change all the arbitrary IP addresses to comply with those you have been allocated by the network allocation organization. If you do not do this, your outside communications will not operate.

A subnet mask is a filtering system for IP addresses. It allows you to further subdivide your network. You must use the proper subnet mask for proper operation of a network with subnets defined.

Using BOOTP to Assign an IP Address

If you are using IP and you have a BOOTP server set up correctly on your network, the IP address for the FE-224 Switching Hub will be assigned automatically and you can start managing the hub after enabling the BOOTP/RARP Switch. See *Configuring the System* in Chapter 4 for more information.

If you are using IP without a BOOTP server, you need to enter an IP address (including the subnet mask and default gateway, if necessary) for the FE-224 Switching Hub before the SNMP network management station can communicate with the hub.

If you need more information about IP, see *Managing Over the Network* in Chapter 3.

Obtaining a Network Number

The following tables show the three organizations responsible for allocating network numbers.

Table 3. USA Network Allocation

USA – InterNIC, Network Solutions	
Mailing Address:	InterNIC Registration Services 505 Huntmar Park Drive Herndon, VA 22070
Telephones:	+1 (800) 444 4345 (Toll Free) +1 (619) 455 4600 +1 (703) 742 4777
E-mail:	<i>hostmaster@rs.internic.net</i> for host, domain, network changes, and updates <i>action@rs.internic.net</i> for computer operations <i>mailserv@rs.internic.net</i> for automatic mail service <i>info@internic.net</i> for automatic mail service for general inquiries <i>refdesk@is.internic.net</i> for inquiries not handled by the services above

Table 4. Europe Network Allocation

RIPE	
Attention:	RIPE NCC Kruislaan 409 NL-1098 SJ Amsterdam, The Netherlands
Telephone:	+31 (20) 592 5065
Fax:	+31 (20) 592 5090
E-mail:	<i>mailto:ncc@ripe.net</i>

Table 5. Asia Network Allocation

Asia Pacific Network Information Center (APNIC-DOM)	
Attention:	Asia Pacific Network Information Center (APNIC-DOM) c/o Computer Center, University of Tokyo 2-11-16 Yayoi, Bunkyo-ku, Tokyo 113, Japan
Admin. Contact:	Nakayama, Masaya (MN89)
Telephone:	+81 (3) 3812 2111 ext. 2720
E-mail:	<i>nakayama@nic.ad.jp</i>
Technical Contact:	David Conrad (DC396)
Telephone:	+81 (3) 3580 3781 or +81 (3) 3580 3784
Fax:	+81 (3) 3580 3782
E-mail:	<i>davidc@apnic.net</i>

MIBs for Network Management Systems

Three Network Peripherals private MIBs (Management Information Bases) are provided with the Fe-224 Switching Hub for managing the hub through a network management system.

If you are using the NuSight or HP OpenView product, these MIBs are already in the NuSight management module that you install through the NuSight or HP OpenView platform. No separate compiling is necessary.

If you are using another network management system, you must install these three MIBs using that system platform. The MIBs are on the NuSight management module diskette that is shipped with every FE-224 Switching Hub. They have a file name extension of .mib, which any SNMP-compliant compiler can read.

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Console Program Essentials

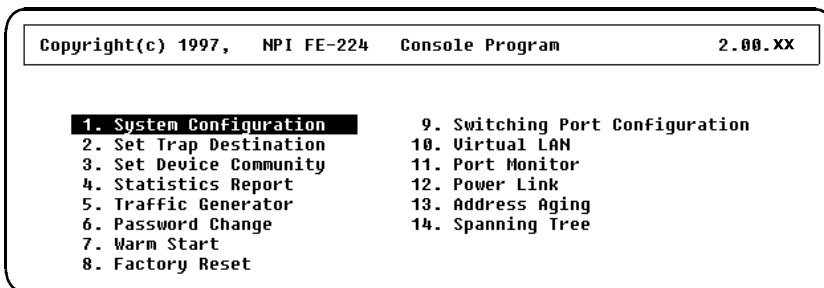
This chapter describes most of the FE-224 Switching Hub console program options and how to configure your system using them. Specifically, it describes the following tasks:

- ◆ Configuring the System, including password changing
- ◆ Configuring the Ports
- ◆ Configuring Spanning Tree Protocol
- ◆ Configuring SNMP Settings
- ◆ Address Aging
- ◆ Resetting the System

Virtual LANs, status and statistics monitoring, the traffic generator, and port monitoring are covered in the remaining chapters of Part 1.

Console Program Command Overview

Once you gain access to the built-in console program as described in Chapter 3, the Console Program menu appears.



The options available from this screen are:

System Configuration, which lets you configure the FE-224 Switching Hub. You can name the hub; specify the IP address, subnet mask, and default gateway addresses; check on up time for the hub; set a trap level; enable BOOTP/RARP; and view the hardware version and system power status.

Set Trap Destination, which lets you type in the IP addresses where SNMP traps are to be sent.

Set Device Community, which lets you define SNMP community names and to set access modes for these community names.

Statistics Report, which lets you see the statistics for each port on the FE-224 Switching Hub.

Traffic Generator, which is used for testing the FE-224 Switching Hub. You can use this screen to generate traffic from a specific switching port on the hub.

Password Change, which lets you change the password to the console program. When you use the console program for the first time, there is no password required. Use this screen if you wish to add a password to control access to the console program.

Warm Start, which is used to reboot the FE-224 Switching Hub.

Factory Reset, which resets the FE-224 Switching Hub to its factory default settings.

Switching Port Configuration, which is used to configure the individual switching ports. You can use this screen to name ports, enable or disable ports, enable or disable flow control, and enable or disable full duplex mode.

Virtual LAN, which is used to create or modify virtual LAN domains. You can create up to 12 domains for each FE-224 Switching Hub.

Port Monitor, which is used together with a network analyzer. This screen lets you configure up to four monitor ports.

Power Link, which is used when configuring a power link to an FE-210 or FE-1200 Switching Hub, or to another FE-224 Switching Hub. Use this screen to enable power link ports.

Address Aging, which is used to set the aging time for learned MAC addresses.

Spanning Tree, which lets you set and monitor the Spanning Tree Protocol parameters.



NOTE: Whenever you change the configuration, always allow a few seconds for the system to process the change. Do not turn off the FE-224 Switching Hub immediately after making changes; otherwise, you might lose the new settings.

Navigating the Console Program Screens

To do this...	Use this key...
Highlight an option.	↑ or ↓ Tab moves from one column to the other.
Select a highlighted option.	Enter
Toggle between options in a choice field.	Spacebar
Move to the next entry field or command.	Tab
Move one line up to the previous field.	↑
Move one line down to the next field.	↓
Go to the next screen in a series.	>
Go to the previous screen in a series.	<

A typical Console Program screen contains several types of fields, as shown in the following figure.

```
Name           : [NuSwitch FE-224           ]
Location        : [                         ]
IP Address       : [168.168.2.4       ]
MAC Address      : [00A0AE010204      ]
Subnet Mask      : [255.255.0.0       ]
Default Gateway  : [0.0.0.0           ]
Up Time         : [ 0 days, 00:01:20 ]
Trap Level (0 ~ 7) : [3]
BOOTP/RARP Switch : <0ff>
Hardware Version  : A1
System Power     : Internal
```

[Entry field]

Status field

<Choice field>

SAVE **EXIT**

Configuring the System

This section describes how to set parameters when the FE-224 Switching Hub is first installed, and how to change a password.

System Configuration Screen

When the FE-224 Switching Hub is installed for the first time, it uses the default values set at the factory, and you can change these values depending on your particular environment. With the Console Program menu displayed, select option 1 (System Configuration). The System Configuration screen appears.

Copyright(c) 1997, NPI FE-224 System Configuration 2.00.xx

Name : [NuSwitch FE-224]
Location : []
IP Address : [168.168.2.4]
MAC Address : 00A0AE010204
Subnet Mask : [255.255.0.0]
Default Gateway : [0.0.0.0]
Up Time : 0 days, 01:02:24
Trap Level (0 ~ 7) : [3]
BOOTP/RARP Switch : <Off>
Hardware Version : A1
System Power : Internal

SAVE EXIT

Parameters in this screen are described in the following paragraphs.

Name: Enter a unique name for this FE-224 Switching Hub, up to 32 alphanumeric characters. This name is used for reference purposes; you should use a descriptive name to help identify the purpose of the hub in relation to your network. For example, “Backbone Switch Bldg. 1” or “Finance Department Switch X.”

Location: Enter a brief description of where the FE-224 Switching Hub is located, up to 32 alphanumeric characters. Like the name, the location is descriptive and used for reference purposes. For example, “13th Floor.”

IP Address: Enter the unique IP address of this FE-224 Switching Hub. An IP address has the format n.n.n.n where n is an integer between 0 and 255. An example IP address is 199.182.70.253. The hub comes with a default Class B IP address of 168.168.xxx.xxx, where the last two integers are the decimal equivalent of the last two hexadecimal bytes assigned in the hub’s permanent MAC address. You can use this value as the hub IP address or specify a new one if there is an address duplication or the address does not match your network ID.

MAC Address: This status field shows the unique and permanent MAC address assigned to the FE-224 Switching Hub. (Each hub's MAC address is on a label affixed to the rear panel of the hub.) You cannot change the MAC address of your hub. An FE-224 Switching Hub comes with two other unique reserved MAC addresses:

- ♦ The Bridge Protocol Data Unit (BPDU) multicast MAC address, which is 01-80-C2-00-00-00, for use with the Spanning Tree Protocol.
- ♦ The built-in traffic generator target MAC address, which is 00-A0-AE-00-00-00).

These three IP addresses are registered as permanent static MAC address entries in the routing address tables for each switching port.

Subnet Mask: Specify the subnet mask to use with the FE-224 Switching Hub's IP address. The default subnet mask value is 255.255.0.0. Default subnet values for the three Internet address classes are as follows:

- ♦ Class A: 255.0.0.0
- ♦ Class B: 255.255.0.0
- ♦ Class C: 255.255.255.0

Default Gateway: Specify an IP address for a gateway or router. An entry in this field tells the FE-224 Switching Hub which device is responsible for the delivery of all IP packets sent by the hub. This address is required if the hub and the network management station are on different networks or subnets. The default value of this parameter is 0.0.0.0, which means no gateway exists and the network management station is on the same network.

Up Time: This status field shows how long the switching hub has been up since it was turned on or rebooted.

Trap Level: Use this parameter only when you are managing the FE-224 Switching Hub through an SNMP-based network management system such as Network Peripherals NuSight Network Management

System for Windows or HP OpenView Management System. Trap levels are proprietary to NuSight. This parameter lets you select a trap level from 1 to 7. Level 0 means no traps are sent. The default trap level is 3. For a more detailed description of different trap levels, see Appendix E.

BOOTP/RARP Switch: Use this parameter to enable or disable the BOOTP function of the FE-224 Switching Hub. If you have a BOOTP server on your network and BOOTP is enabled, an IP address will be automatically mapped to the hub when it is first turned on and the BOOTP switch is configured properly. In addition to mapping an IP address, BOOTP can assign the subnet mask and default gateway. Using a BOOTP server avoids the trouble of having to configure devices individually.

Hardware Version: This status field shows the hardware version of the FE-224 Switching Hub. This information is helpful when troubleshooting or upgrading new software.

System Power: This status field shows the currently active source of power for the FE-224 Switching Hub. The power source can be either the internal power supply or the optional RPS-600 Redundant Power Supply.

After making the necessary changes, select SAVE then EXIT. Any changes you make take effect only when you save them before exiting this screen.

Password Change

When installing the switching hub for the first time, you might want to restrict access to the management console by requiring network administrators to use a password to access the program. To do this, select option 6 (Password Change) from the Console Program menu. The Password Change screen appears.

Copyright(c) 1997, NPI FE-224 Password Change 2.00.xx

Current Password : []

New Password : []

Confirm Password : []

SAVE EXIT

Parameters in this screen are described in the following paragraphs.

Current Password: If you change a password, you need to enter the current password in the Current Password field before typing in a new password.

New Password: When the FE-224 Switching Hub is installed for the first time, enter the password in this field. A password can be up to eight alphanumeric characters with no spaces between them.

Confirm Password: Confirm the new password by retyping it in the Confirm Password field. After making these entries, select SAVE then EXIT.

Configuring the Ports

This section describes configuring of the twenty-four 10Base-T Ethernet ports and the two 10Base-T/100Base-TX auto-negotiation ports.

After configuring the FE-224 Switching Hub's system parameters and password, you can configure the hub's individual ports. Before configuring a port, check the factory defaults listed in the following table to determine whether it is necessary to change them.

Table 6. Port Configuration Default Settings

Port State	Enabled
Flow Control (ports 1-24)	Enabled
Full Duplex (ports 1-24)	Disabled
(port 25, 26 with FE-831 Media Adapter)	Set by auto-detection
(port 26 with FE-833 Media Adapter)	Disabled
Port Speed (ports 1-24)	10 Mbps
(port 25, 26 with FE-831 Media Adapter)	Set by auto-detection
(port 26 with FE-833 Media Adapter)	100 Mbps
Port Auto-Negotiation (ports 1-24)	Not applicable
(port 25, 26 with FE-831 Media Adapter)	Enabled
(port 26 with FE-833 Media Adapter)	Not applicable

Switching Port Configuration

To configure the 10Base-T Ethernet ports, select option 9 (Switching Port Configuration) from the Console Program menu. The Switching Port Configuration screen for port 1 appears.


```
Copyright(c) 1997,  NPI FE-224  Switching Port Configuration  2.00.xx

Port Number          :  1

Port Name            : [PORT 1      ]
Port Type            :  10Base-T
Port Link State      :  Down
Port Enable          : <Enable >
Port Flow Control    : <Enable >
Port Full Duplex     : <Disable>

SAVE  EXIT  '<','>' : Prev/Next Port
```

For port 25 (and port 26 if present), a slightly different Port Configuration screen appears.

```
Copyright(c) 1997,  NPI FE-224  Switching Port Configuration  2.00.xx

Port Number          :  26

Port Name            : [PORT 26      ]
Port Type            :  100Base-TX
Port Link State      :  Down
Port Enable          : <Enable >
Port Flow Control    : <Enable >
Port Full Duplex     :  Disable
Port Speed           :  100Mbps
Port Auto-Negotiation : <Enable >
Partner Auto-Negotiation Capability : Not Supported
Connection Status    :  Parallel Detection

SAVE  EXIT  '<','>' : Prev/Next Port
```

Parameters in these screens are described in the following paragraphs.

Port Number: This status field shows the number of the currently selected port. To select another port use the < or > key to move to the previous or next port.

Port Name: Enter a unique name for the selected port, up to 12 alphanumeric characters. This name is used for reference purposes.

Port Type: This status field shows the type of port currently selected, either 10Base-T, 100Base-TX, or 100Base-FX. If the Media Adapter for port 26 has not been installed, the Switching Port Configuration screen reports port type “Not Present” for that port and omits all remaining parameters.

Port Link State: This status field shows the current status of the link, Down or Up, between the selected port and the connected node.

Port Enable: Use this field to enable or disable the selected port. A disabled port does not transmit any packets to the connected segment, nor forward any received packets to the switching backplane.

Port Flow Control: Use this field to enable or disable flow control for the port. Flow control minimizes dropped packets by sending out collision signals when the port’s receiving buffer is full. Note that flow control is only available in half-duplex mode. The default is Enable.

Port Full Duplex: This field is a choice field when auto-negotiation is disabled, and a status field when auto-negotiation is enabled. When auto-negotiation is disabled, use this field to enable or disable full duplex mode for the port. Full duplex transmissions effectively double your bandwidth by carrying out transmission and receipt of packets at the same time. To make full duplex mode work properly, both ends of the link should be configured to full duplex mode

Port Speed: This status field applies only to ports 25 and 26. It shows the current speed of port 25 or 26. For Fast Ethernet, port speed can be either 100Mbps or 10Mbps depending on auto-negotiation.

Port Auto-Negotiation: This field applies only to port 25, and to port 26 if the FE-831 Media Adapter is installed. Use it to enable or disable auto-negotiation. Auto-negotiation decides the port speed and duplex mode of the port on link-up. For more information about a 10Base-T/100Base-TX port, see Chapter1.

Partner Auto-Negotiation Capability: This status field applies to port 25. It shows the detected auto-negotiation capability of the partner. If the partner has no such capability, the auto-sensing process will be initiated to detect the network speed.

Connection Status: This status field applies to port 25. It shows the connection status of the port. There are three types of status:

Auto-Negotiation—when the port auto-negotiation capability of both ends is enabled

User Mode—when port auto-negotiation is disabled.

Parallel Detection—when partner auto-negotiation capability is not supported.

Negotiating—when auto-negotiation is in process.

After making your choices, select SAVE then EXIT.

Power Links

When connecting two Network Peripherals NuSwitch hubs, you can use the Power Link function of the hubs to increase bandwidth efficiency. This feature can operate in half duplex mode or full duplex mode.

To avoid forming a loop in your bridged network, you should configure power links and associated Spanning Tree Protocol parameters before enabling ports 25 and 26 or connecting cables to these ports. (Spanning Tree Protocol parameters are described in the next section.)

To configure power links, select option 12 (Power Link) from the Console Program menu. The first Power Link screen appears.

Copyright(c) 1997, NPI FE-224 Power Link	2.00.xx
Power Link Switch : < Disable > SAVE EXIT	

Power Link Switch: Use this field to specify how the Power Link function is to be used. Press the Spacebar to toggle through the options. The default is power links disabled. Choose Auto-Setting if you want the FE-224 Switching Hub to determine which 10Base-T ports are load balanced to each power link port. Choose User-Setting if you want to “manually” configure 10Base-T port load balancing combinations.

When you choose Auto-Setting, the following screen appears.

Copyright(c) 1997, NPI FE-224 Power Link	2.00.xx						
Power Link Switch : <Auto-Setting> <table style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 5px;">Power Link Port =====</th> <th style="text-align: left; padding: 5px;">Range =====</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px; vertical-align: top;">P25</td> <td style="padding: 5px; vertical-align: top;">P1, P2, P3, P4, P5, P6 P7, P8, P9, P10, P11, P12</td> </tr> <tr> <td style="padding: 5px; vertical-align: top;">P26</td> <td style="padding: 5px; vertical-align: top;">P13, P14, P15, P16, P17, P18 P19, P20, P21, P22, P23, P24</td> </tr> </tbody> </table> SAVE EXIT		Power Link Port =====	Range =====	P25	P1, P2, P3, P4, P5, P6 P7, P8, P9, P10, P11, P12	P26	P13, P14, P15, P16, P17, P18 P19, P20, P21, P22, P23, P24
Power Link Port =====	Range =====						
P25	P1, P2, P3, P4, P5, P6 P7, P8, P9, P10, P11, P12						
P26	P13, P14, P15, P16, P17, P18 P19, P20, P21, P22, P23, P24						

Parameters in this screen are described in the following paragraphs.

Power Link Switch: Use this switch as described earlier following the first Power Link screen.

Power Link Port: The two power link ports are always 25 and 26. Switched Ethernet ports 1-12 will use port 25 as the link path to remote target destinations, and switched Ethernet ports 13-24 will use port 26 as the link path to remote target destinations.

Range: Switched Ethernet ports 1-12 are always allocated to port 25 for outbound traffic, and switched Ethernet ports 13-24 are always allocated to port 26 when in the Auto-Setting mode.

When you choose User-Setting, the following screen appears.

Copyright(c) 1997, NPI FE-224 Power Link

2.00.xx

Power Link Switch : <User-Setting>

Port	PL Port	Port	PL Port	Port	PL Port
1.	<P25>	9.	<P25>	17.	<P26>
2.	<P25>	10.	<P25>	18.	<P26>
3.	<P25>	11.	<P25>	19.	<P26>
4.	<P25>	12.	<P25>	20.	<P26>
5.	<P25>	13.	<P26>	21.	<P26>
6.	<P25>	14.	<P26>	22.	<P26>
7.	<P25>	15.	<P26>	23.	<P26>
8.	<P25>	16.	<P26>	24.	<P26>

SAVE

EXIT

Parameters in this screen are described in the following paragraphs.

Power Link Switch: Use this switch as described earlier following the first Power Link screen.

Port: These are the 24 available 10Base-T Ethernet ports which can be load balanced to one of the two power link ports.

PL Port: Specify which of the two power link ports you want to use as the link path to remote destinations. Press the Spacebar to toggle between port 25 and 26.

After making your choices, select SAVE then EXIT.

Configuring Spanning Tree Protocol

The FE-224 Switching Hub implements the spanning tree algorithm to detect and preserve an active bridged local area network topology. Bandwidth-sapping traffic loops are inhibited by blocking certain ports. This algorithm is based on IEEE 802.1d, Spanning Tree Protocol. Fault tolerance is supported with redundant bridges by maintaining a secondary bridge path as backup. If the first bridge path should fail, the secondary bridge path takes over.

Setting Parameters

To access the Spanning Tree screen, select option 14 (Spanning Tree) from the Console Program menu. The Spanning Tree screen appears.

Copyright(c) 1997, NPI FE-224 Spanning Tree		2.00.xx
Port Number	: 1	Port Name : PORT 1
Bridge Level		
Spanning Tree	: <Disable>	
Bridge Priority	: [32768] (0 ~ 65535)	Root Path Cost : 0
Hello Time	: [200] ((100 ~ 1000)*10ms)	
Max Age	: [2000] ((600 ~ 4000)*10ms)	
Forward Delay	: [1500] ((400 ~ 3000)*10ms)	
Port Level		
Block On Link	: <Disable>	
Port State	: Forwarding	
Port Priority	: [128] (0 ~ 255)	
Port Path Cost	: [100] (1 ~ 65535)	
SAVE		EXIT
'<','>' : Prev/Next port		

Parameters in this screen are described in the following paragraphs.

Port Number: This status field shows the currently selected port number. Use the < or > key to move to the previous or next port number.

Port Name: This status field shows the port name specified when the port was configured (see *Configuring the Ports* earlier in this chapter).

Spanning Tree: Use this field to enable or disable the Spanning Tree function of the FE-224 Switching Hub.

Bridge Priority: Enter a value from 0-65535. This value allows the network administrator to influence the choice of root bridge and the designated bridge. A lower numerical value for bridge priority makes the bridge more likely to be the root. Lowest priority is 0.

Hello Time: Enter the time interval between issues of configuring Bridge Protocol Data Units (BPDU). Bridges use BPDUs to calculate the spanning tree. Hello time can range from 100-1000 in 10ms units (1-10 seconds in 1/100-second increments). Typically, setting parameters to a value equal to a whole number of seconds will suffice.

Max Age: Enter the period after which received protocol information is discarded. The FE-224 Switching Hub stores received and calculated BPDU parameters in memory. The stored configuration information for each port is aged and discarded if no update activity has occurred when this limit is reached. Maximum age can range from 600-4000 in 10ms units (6-40 seconds in 1/100-second increments).

Forward Delay: Enter the amount of time the spanning tree algorithm spends in each intermediate port state during a transition from blocking to forwarding. The default is 15 seconds. This value is also used as a short aging time value for all dynamic MAC entries in the address tables, during a topology change of the active bridged local area network, as specified by the root bridge. Forward delay can range from 400-3000, in 10ms units (4-30 seconds in 1/100-second increments).

Block on Link: Use this field to specify the Spanning Tree Protocol action that will occur on a port when a link state changes from Down to Up. If you choose Enable (the default), the port immediately enters the Blocking state and follows the state machine to decide whether it will

block data or continue forwarding it. If you choose Disable, the port continues to forward and transmit data without delay as part of the spanning tree. (Appendix C lists states).

The Enable setting is useful for ports whose links connect to other parts of the bridged local area network where multiple, redundant paths back to the root bridge might exist.

The Disable setting is useful only for end stations connected directly to the FE-224 Switching Hub. When the end station is turned on or restarted, connections to various network services are not delayed by the Spanning Tree Protocol configuration steps needed to assure a stable, loop-free network.

Port State: This status field shows the operating state of the port. The five possible states are Blocking, Listening, Learning, Forwarding, and Disabled.

Port Priority: Enter a value from 0-255. This allows the network administrator to influence the choice of port when a bridge has two ports connected in a loop. A lower numerical value gives that port a higher priority.

Port Path Cost: Enter a value from 1-65535. This represents the cost value to be added to the root path cost field in a configuration BPDU received on this port so the cost of the path to the root through this port can be determined.

Root Path Cost: This status field represents the cost of the path to the root from this bridge. It is equal to the sum of the designated cost and path cost parameters specified for the root port. When the bridge is the root this parameter is 0.

After making your choices, select SAVE then EXIT.

Relationship to POST

If the Spanning Tree Protocol is enabled and the Power On Self Test (POST) runs, the software is ready for building a spanning tree.

To discover a local topology, the software follows the state machine defined according to the IEEE 802.1d standards document, as diagrammed below (see the standards document for more details):

Enabled → Blocking → Listening → Learning → Forwarding

The software first enables all switching ports to execute the spanning tree boot process.

Afterwards, the software processes the listening and learning states and builds a tree on all linked ports. Notice that there is no traffic being forwarded by any port at this time. After a period equal to the “Forward Delay x 2” value, the sequence diagrammed above is completed and all designated ports revert to the “Forwarding” state.

To set the “Forward Delay x 2” value, use the Spanning Tree screen as described earlier in this section.

Configuring SNMP Settings

This section applies only if you are using an SNMP program to manage the network.

Set Device Community

Each network management system comes with selectable community names associated with an access right (access mode) to a particular managed device. Only network management stations having the same community names as those stored in a managed device can receive SNMP packets from the device.

The FE-224 Switching Hub comes with default community names specified. You can change any of these community names and also set an access right (read-only or read-and-write) for each. Before the network management system can retrieve data from the FE-224 Switching Hub, it must at least supply one of the community names that you specify. To set community names, select option 3 (Set Device Community) from the Console Program menu. The Set Device Community screen appears.

Copyright(c) 1997, NPI FE-224 Set Device Community2.00.xx

	Community Name		Access Mode	
1.	[public	]	<RW	>
2.	[proxy	]	<RW	>
3.	[private	]	<RW	>
4.	[regional	]	<RW	>
5.	[core	]	<RW	>

SAVEEXIT

Parameters in this screen are described in the following paragraphs.

Community Name: Enter a community name of your choice, up to 15 alphanumeric characters.

Access Mode: Press the Spacebar to toggle to the desired access right (access mode) for a particular community name. Access modes are RW (read-write) or R_Only (read-only). Members of a read-only community can access and view information at their workstations but cannot change settings.

After making your choices, select SAVE then EXIT.

Set Trap Destination

To manage a network properly, you should regularly monitor the status of the network. Traps are a method of monitoring significant events that happen in a managed device. Along with the status and statistics reporting, traps are invaluable for troubleshooting. For example, a trap might record errors and packet overflows that signal network congestion.

Traps should be sent to a network management system or management console. To set the trap destination of the FE-224 Switching Hub, select option 2 (Set Trap Destination) from the Console Program menu. The Set Trap Destination screen appears.

Copyright(c) 1997, NPI FE-224Set Trap Destination2.00.xx

	IP Address	MAC Address	Attribute	Community Name
1.	[0.0.0.0]	000000000000	<Dynamic >	[]
2.	[0.0.0.0]	000000000000	<Dynamic >	[]
3.	[0.0.0.0]	000000000000	<Dynamic >	[]
4.	[0.0.0.0]	000000000000	<Dynamic >	[]
5.	[0.0.0.0]	000000000000	<Dynamic >	[]
6.	[0.0.0.0]	000000000000	<Dynamic >	[]
7.	[0.0.0.0]	000000000000	<Dynamic >	[]
8.	[0.0.0.0]	000000000000	<Dynamic >	[]
9.	[0.0.0.0]	000000000000	<Dynamic >	[]
10.	[0.0.0.0]	000000000000	<Dynamic >	[]

SAVEEXIT

Parameters in this screen are described in the following paragraphs.

IP Address: Enter the IP address of the network management station that will receive traps from the FE-224 Switching Hub.

Attribute: Press the Spacebar to toggle to the desired attribute. Permanent means the specified IP address is permanently saved in the FE-224 Switching Hub's memory until you change it. Dynamic means that the IP address can be erased when the FE-224 Switching Hub receives an SNMP packet and learns a new IP address.

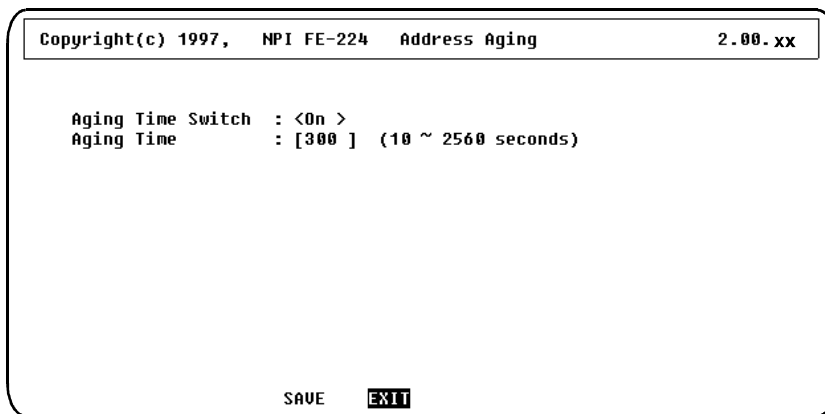
Community Name: Enter the community name of the network management system. This name should be one of the same community names entered in the Set Device Community screen.

After making your choices, select SAVE then EXIT.

Address Aging

You can change the address aging time used by the FE-224 Switching Hub. A maximum of 4,096 addresses can be learned and stored by a port's routing address table. The FE-224 Switching Hub can deactivate learned addresses when they are not used for port access within the period specified by the Aging Time parameter. (Aged addresses remain in the address table but are deactivated.)

To configure this parameter, select option 13 (Address Aging) from the Console Program menu. The Address Aging screen appears.



```
Copyright(c) 1997,  NPI FE-224  Address Aging                2.00.xx

Aging Time Switch   : <On >
Aging Time          : [300] (10 ~ 2560 seconds)

SAVE  EXIT
```

Parameters in this screen are described in the following paragraphs.

Aging Time Switch: Use this field to turn the Address Aging function on or off. Press the Spacebar to toggle this field.

Aging Time: Enter the number of seconds, from 10-2560, to use for the address aging time. This count begins when an address was last learned, not when it was first entered in the address table. The default aging time is 300 seconds.

Keep in mind that the aging time does not apply to addresses learned on ports within a virtual LAN. These addresses are processed as static addresses, thus they do not get aged out.

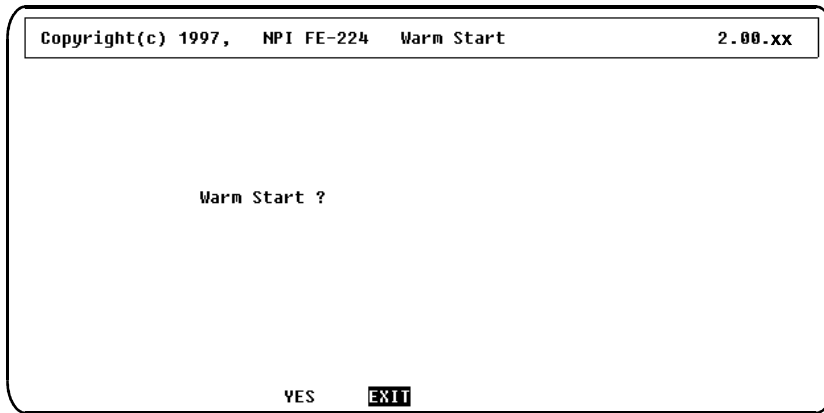
After configuring the parameters, select SAVE then EXIT.

Resetting the System

There are two types of system resetting: warm start and factory reset. A warm start resets the FE-224 Switching Hub and puts changes into effect if you have just entered any, or keeps the current settings if you have not entered changes. A factory reset starts the FE-224 Switching Hub again and returns the configuration to the factory default settings.

Warm Start

After you have entered all desired configuration changes, you must reset the FE-224 Switching Hub to make the changes take effect. To do this, select option 7 (Warm Start) from the Console Program menu. The Warm Start screen appears.

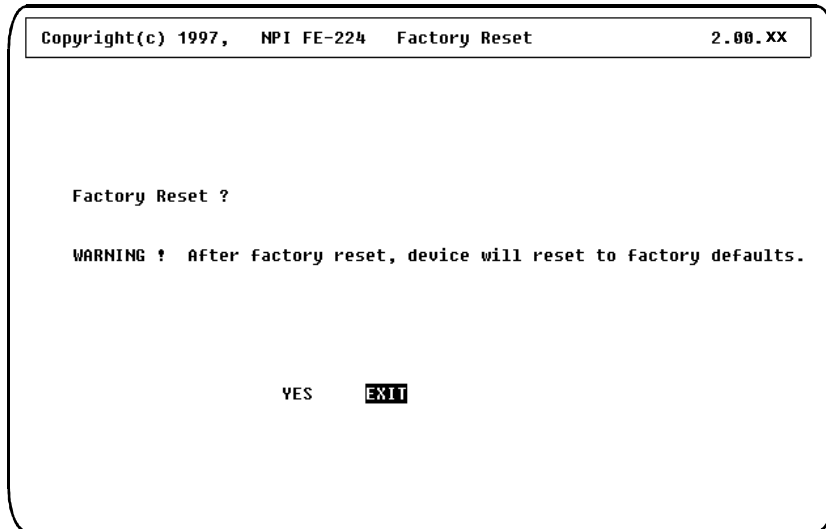


To perform a warm start, select YES. A reminder that the system will restart is displayed. Wait for approximately 30 seconds, then press the Enter key four times to return to the Console Program menu.

Factory Reset

A factory reset starts the FE-224 Switching Hub again and returns the hub to factory settings (system defaults). For a list of the factory settings, see Chapter 1.

To perform a factory reset, select option 8 (Factory Reset) from the Console Program menu. The Factory Reset screen appears.



To perform a factory reset, select YES. A reminder that the system will reset is displayed. Wait for approximately 30 seconds, then press the Enter key four times to return to the Console Program menu. The factory settings are now in effect.

To leave this screen and leave the current configuration intact, select EXIT. The Console Program menu returns.

N

Virtual LANs

This chapter gives some background on virtual LANs and explains how to configure them with the FE-224 Switching Hub.

Value of Virtual LANs

Virtual LANs let you logically segment your network into multiple broadcast domains. In this approach, data transmitted by one member of a virtual LAN is forwarded only to the other members in that virtual LAN, rather than to all stations on the physical network. Thus, broadcast traffic—commonly originated by servers that advertise their presence and services to other network devices—is limited to the one broadcast domain from which it originated. For example, on a 26-port FE-224 Switching Hub as in Figure 13, you can group ports 1-12, 25, and 26 into one domain and ports 13-24, 25, and 26 into another domain. Network access is thus restricted to ports in the same domain. A port can be in more than one domain, ports 25 and 26 in this example. Ports in both domain 1 (LAN A) and domain 2 (LAN B) can therefore access ports 25 and 26 which are connected to the network servers.

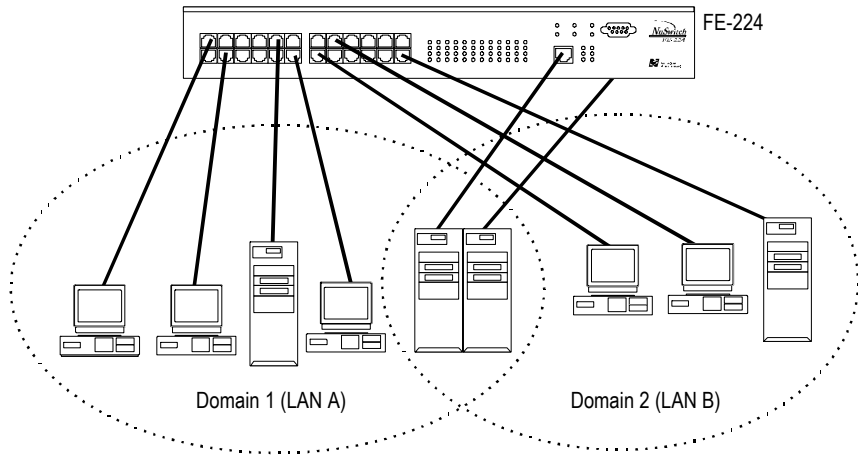


Figure 13. One Switching Hub in a Virtual LAN

In Figure 14, ports on the FE-1200 NuSwitch hub are divided into two domains with a server and an FE-224 Switching Hub present in both domains. The server can therefore be accessed by workstations in both domain 1 (LAN A) and domain 2 (LAN B). The FE-224 Switching Hub also has a defined sub-domain (domain 3). Ports not in domain 3 (LAN C) can also be accessed by all resources in domain 1 (LAN A) and domain 2 (LAN B), but ports in domain 3 (LAN C) are isolated from the other domains.

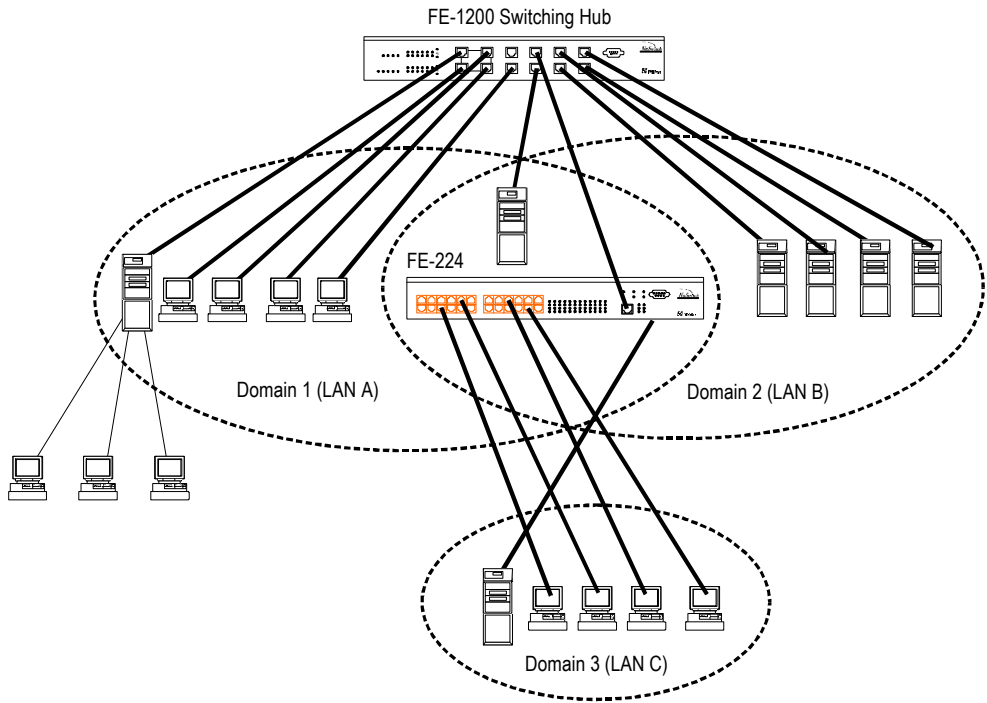


Figure 14. Multiple Switching Hubs in a Virtual LAN

Configuring Virtual LANs

The Virtual LAN function on Network Peripherals hubs can be especially useful to a system administrator when you want to restrict access to some services, while providing shared access to others. Keep in mind that MAC addresses learned from within a virtual LAN are stored in all switching port address tables as static entries. The address aging parameter has no effect on these entries.

To access the Virtual LAN screen, select option 10 (Virtual LAN) from the Console Program menu. The Virtual LAN screen appears.

Copyright(c) 1997, NPI FE-224 Virtual LAN		2.00.xx	
Virtual LAN : <Enable >		Domain Number : 2	
Port No. =====	Member =====	Port No. =====	Member =====
1, 2, 13, 14	<Yes>	9, 10, 21, 22	<No >
3, 4, 15, 16	<Yes>	11, 12, 23, 24	<Yes>
5, 6, 17, 18	<No >	25	<Yes>
7, 8, 19, 20	<No >	26	<No >
SAVE Refresh EXIT '<','>' : Prev/Next Domain			

Parameters in this screen are described in the following paragraphs.

Virtual LAN: Use this field to enable or disable the Virtual LAN function. Press the Spacebar to toggle between Enable and Disable.

Domain Number: This is a status field that shows the current domain number. Each can support up to 12 domains. To move to the previous or next domain press the < or > key.

Port No.: This is a status field that shows the valid sets of ports that can be assigned to the current domain. You can assign more than one set to a single domain but you cannot assign individual ports in a set. For example, even if you need only ports 6 and 7 in domain 2, all four of the ports in the respective sets (5-6-17-18 plus 7-8-19-20) will be assigned to domain 2.

Member: Use this field to select the set of ports that will be in the domain. Press the ↑ and ↓ keys to move from set to set and press the Spacebar to toggle between Yes or No. Sets marked Yes are part of the current domain.

Refresh: This command forces the FE-224 Switching Hub to relearn all MAC addresses.



NOTE: If moving workstation connections from one port to another is unavoidable, the Refresh command allows the hub to relearn the MAC addresses within a virtual LAN, without requiring a warm start. When virtual LANs are involved, you should always perform a Refresh when you move workstation connections.

After defining your domains, select SAVE then EXIT.

N

6

Status Monitoring and Statistics

This chapter describes how to use the Console Program for checking statistics, checking network connections with the Traffic Generator function, and monitoring ports.

Statistics Reporting

To view statistics on the FE-224 Switching Hub, select option 4 (Statistics Report) from the Console Program menu. The Statistics Report screen appears.

Copyright(c) 1997, NPI FE-224		Statistics Report		2.00.xx	
Port Number : 1		Port Name : PORT 1			
FOR UNIT					
1. Total Good Frames	0	3. Total Bad Frames	0		
2. Total Good Bytes	0	4. Total Collisions	0		
FOR PORT					
1. Rx Good Frames	0	8. Tx Good Frames	0		
2. Rx Good Bytes (k)	0	9. Tx Good Bytes (k)	0		
3. Reject Frames	0	10. Discard Frames	0		
4. Long Frames	0	11. Lost Frames	0		
5. CRC Errors	0	12. Collisions	0		
6. Alignment Errors	0	13. Last MAC Address	000000000000		
7. RUNTS	0				
Clear_All_Counters		Clear_Port_Counters		EXIT ' < ',' > ' : Prev/Next Port	

Each displayed statistics value is the accumulated count since the switching hub was turned on or reset. All numbered items in this screen are status fields.

Port Number: This is a status field that shows the selected port on the FE-224 Switching Hub.

Port Name: This is a status field that shows the port name that was specified during switching port configuration, described in Chapter 4.

There are two main sections in the Statistics Report screen. The For Unit section shows statistics for the entire FE-224 Switching Hub. The For Port section shows statistics for the selected port. To move to the previous or next port, press the < or > key.

For Unit

The items in this section are explained in the following paragraphs.

- 1. Total Good Frames:** The number of good frames that passed through all ports of the FE-224 Switching Hub. Good frames are from 64-1518 bytes with no cyclic redundancy check (CRC) or alignment errors.
- 2. Total Good Bytes:** The size, in bytes, of all good frames that have been received through all ports of the FE-224 Switching Hub.
- 3. Total Bad Frames:** The number of bad frames that have been received on all ports of the FE-224 Switching Hub. Bad frames are those that did not meet the requirements of good frames, but are without collision.
- 4. Total Collisions:** The number of collisions that occurred on all segments connected to all ports of the FE-224 Switching Hub. Collisions are normal on half duplex links in an Ethernet network. They occur when two or more network devices attempt packet

transmission at the same time. When a collision occurs, these devices back off automatically and retry transmission later.

For Port

This section displays statistics for the selected port (see Port Number). Items in this section are explained in the following paragraphs.

- 1. Rx Good Frames:** The number of good frames that have been received on the selected port. Good frames are from 64-1518 bytes with no cyclic redundancy check (CRC) or alignment errors.
- 2. Rx Good Bytes (k):** The size, in kilobytes, of all good frames received and forwarded by the selected port.
- 3. Reject Frames:** The number of discarded frames that are received on the selected port. These frames are discarded at the receiving port because of frame filtering.
- 4. Long Frames:** The number of long frames that are received in the selected port. Long frames are frames longer than 1518 bytes (including FCS), and with a duration less than 5 ms.
- 5. CRC Errors:** The number of frames with cyclic redundancy check (CRC) errors that are received on the selected port.
- 6. Alignment Errors:** The number of alignment errors received on the selected port. An alignment error occurs when a received frame is not an integral number of bytes.
- 7. RUNTS:** The number of interrupted frames received on the selected port. Runts are frames with incorrect sizes or formats that are typically the result of collisions.
- 8. Tx Good Frames:** The number of good frames that have been transmitted in the selected port. Good frames are from 64-1518 bytes, including the CRC.
- 9. Tx Good Bytes (k):** The size, in kilobytes, of all good frames transmitted on the selected port.

10. Discard Frames: The number of frames received through the switching backplane that are not transmitted on the selected port. The frames are discarded at the transmitting port because of a management function such as a virtual LAN.

11. Lost Frames: The number of lost frames received on the selected port. Lost frames result from the lack of internal receive buffer space.

12. Collisions: The number of collisions that occurred on the segment connected to the selected port.

13. Last MAC Address: The MAC address of the last node that transmitted a frame received on the selected port.

Clear_All_Counters and **Clear_Port_Counters** are selectable commands that let you reset the counters for the entire FE-224 Switching Hub or the selected port.

Checking Network Connections

The Traffic Generator function lets you generate raw Ethernet data frames on the FE-224 Switching Hub by transmitting the frames through a specific port. This function is used to test the quality of the network connection. If all sent frames are received by the other station on the network, it means that there is a good connection. You can check the number of frames received by a NuSwitch hub by monitoring the statistics of the port used for the network connection. This function can be used together with a network analyzer to check your network connections to end stations.

To use the Traffic Generator function, select option 5 (Traffic Generator) from the Console Program menu. The Traffic Generator screen appears.


```

Port Number      : 1          Port Name : PORT 1

Send Rate        : [100]      (1 ~ 100 pps)
Frame Size       : [60 ]      (60 ~ 1514 bytes)
Number of Frames : [1000 ]    (0 ~ 99999)
Frame Data Type  : <         All Zeros      >

```

Note: Please save configuration first, then execute start.

SAVE START/STOP **EXIT** '<','>' : Prev/Next Port

Parameters in this screen are described in the following paragraphs.

Port Number: This status field shows the selected port on the FE-224 Switching Hub.

Port Name: This status field shows the port name specified when the port was configured, as described in Chapter 4.

Send Rate: Specify the number of frames to be transmitted per second. You can specify from 1-100 packets per second (pps).

Frame Size: Specify the frame size to be used, from 60-1514 bytes (excluding the CRC).

Number of Frames: Specify the number of frames to be transmitted, from 0-99999. If you specify 0, frames will be continuously sent until you stop the transmission or exit this screen.

Frame Data Type: This field lets you select the type of data the raw Ethernet will contain. Press the Spacebar to toggle among the types. You can select one of four different frame data types:

- ◆ All zeros
- ◆ All 0xFF

- ◆ Increments from 0x00 to 0xFF
- ◆ Decrements from 0xFF to 0x00

Any changes to the configuration take effect only if you select SAVE before selecting START/STOP. If you want to resume sending under the old settings, select START/STOP without selecting SAVE. To leave the Traffic Generator screen, select EXIT.

Monitoring Ports

The Port Monitor function is used together with a network analyzer. This screen is for setting the monitor and monitored ports. Up to four pairs of monitor-and-target ports can be enabled. Correspondingly, you can connect up to of four network analyzers to four ports on the FE-224 Switching Hub. When configuring this function, keep the following in mind:

- YES: 1 monitor port → 1 target port
- YES: Many monitor ports → 1 target port
- NO: 1 monitor port → Many target ports

To set a monitor port, select option 11 (Port Monitor) from the Console Program menu. The Port Monitor screen appears.

Copyright(c) 1997, NPI FE-224 Port Monitor			2.00.xx																				
Port Monitor : <Disable> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 5px;"></th> <th style="text-align: left; padding: 5px;">Monitor Port</th> <th style="text-align: left; padding: 5px;">Target Port</th> <th style="text-align: left; padding: 5px;">Switch</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">1.</td> <td style="padding: 5px;">< 1></td> <td style="padding: 5px;">< 2></td> <td style="padding: 5px;"><Disable></td> </tr> <tr> <td style="padding: 5px;">2.</td> <td style="padding: 5px;">< 2></td> <td style="padding: 5px;">< 3></td> <td style="padding: 5px;"><Disable></td> </tr> <tr> <td style="padding: 5px;">3.</td> <td style="padding: 5px;">< 3></td> <td style="padding: 5px;">< 4></td> <td style="padding: 5px;"><Disable></td> </tr> <tr> <td style="padding: 5px;">4.</td> <td style="padding: 5px;">< 4></td> <td style="padding: 5px;">< 5></td> <td style="padding: 5px;"><Disable></td> </tr> </tbody> </table> SAVE EXIT					Monitor Port	Target Port	Switch	1.	< 1>	< 2>	<Disable>	2.	< 2>	< 3>	<Disable>	3.	< 3>	< 4>	<Disable>	4.	< 4>	< 5>	<Disable>
	Monitor Port	Target Port	Switch																				
1.	< 1>	< 2>	<Disable>																				
2.	< 2>	< 3>	<Disable>																				
3.	< 3>	< 4>	<Disable>																				
4.	< 4>	< 5>	<Disable>																				

Parameters in this screen are described in the following paragraphs.

Port Monitor: Use this field to enable or disable the Port Monitor function of the FE-224 Switching Hub. Press the Spacebar to toggle between Enable and Disable.

Monitor Port: Select the port you want to be a monitor port. The monitor port connects to a network analyzer probe and functions as a network analyzer. Using the Port Monitor screen just shown as an example, monitor port 1 receives a copy of all packets received or transmitted by target port 2.



NOTE: A monitor port cannot receive traffic from a client or server. Therefore, any traffic generated on this segment will not be transmitted onto the FE-224 Switching Hub backplane.

Target Port: Select a port to be monitored by the monitor port (network analyzer). Only one target port can be monitored at any one time. Using the Port Monitor screen just shown as an example, target port 2 forwards to monitor port 1 a copy of all packets it receives or transmits.

Switch: Enable or disable the port monitor group. Press the Spacebar to toggle between Enable and Disable.

After making your choices, select SAVE then EXIT.

N

A

Cable Pin-Outs

This appendix gives pin-out, pin assignment, and connection information for network cable and RS-232 serial cable required for the FE-224 Switching Hub.

Network Cable

Straight-Through Cable

Pin		Pin
1	←————→	1
2	←————→	2
3	←————→	3
6	←————→	6

Crossover Cable

Pin		Pin
1	←————→	3
2	←————→	6
3	←————→	1
6	←————→	2

Cable Selection

Connection Type	Cable Type
Switch-to-switch	Crossover
End-station-to-switch	Straight through
Hub-to-switch	Crossover

RS-232 Cable

The FE-224 Switching Hub provides one RS-232 console port for direct console management and out-of-band management.

Pin	Description
1	DCD (Data Carrier Detect)
2	RX (Receive)
3	TX (Transmit)
4	DTR (Data Terminal Ready)
5	GND (Ground)
6	DSR (Data Set Ready)
7	RTS (Request To Send)
8	CTS (Clear To Send)
9	N/A

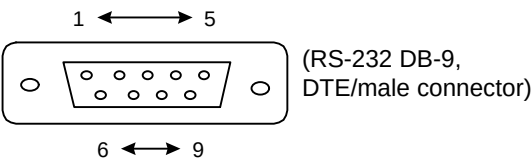


Figure 15. Pin-Out and Pin-Assignment of Console Port

When connecting a terminal directly to the FE-224 Switching Hub, use either a null modem cable or a null modem adapter on a serial (straight through) cable.

When connecting a terminal remotely to the FE-224 Switching Hub, use just a serial (straight through) cable; no null modem adapter is necessary.

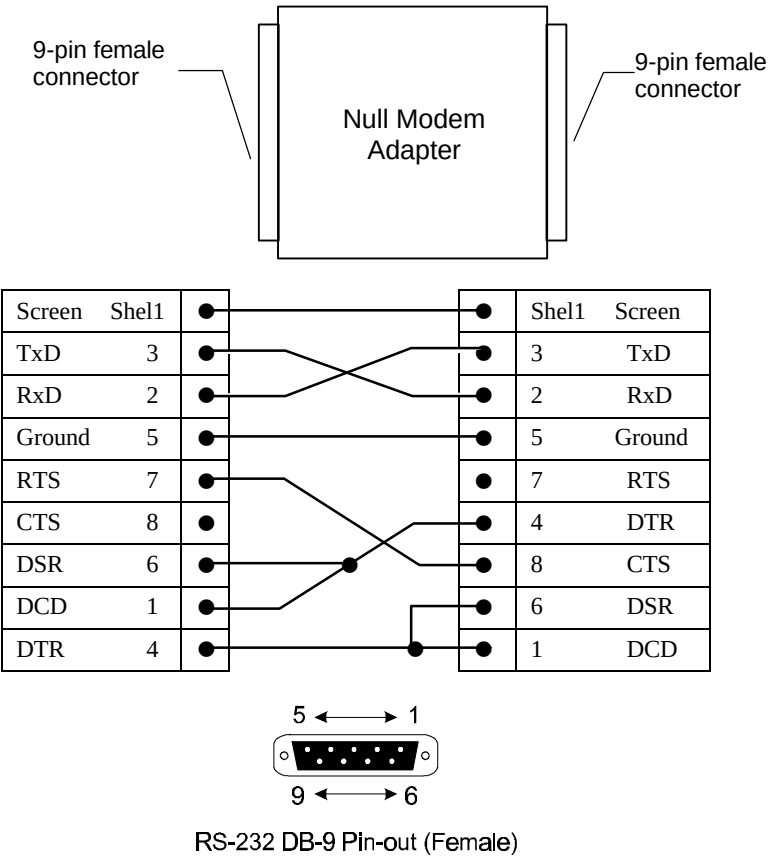
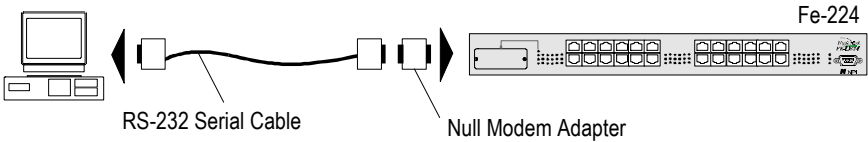


Figure 16. Pin-Out and Pin-Assignment of Null Modem Adapter

The hub’s console connector is wired as for a DTE, and is ready to be connected to a modem (DCE) directly.

The RS-232 serial cable is a straight-through cable which is used to connect a remote out-of-band SNMP management station to the FE-224 Switching Hub (Figure 17).

Connecting to a Terminal (DTE)



Connecting to a Modem (DCE)

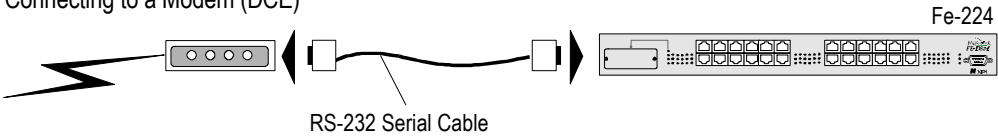


Figure 17. Out-of-Band Connections

N

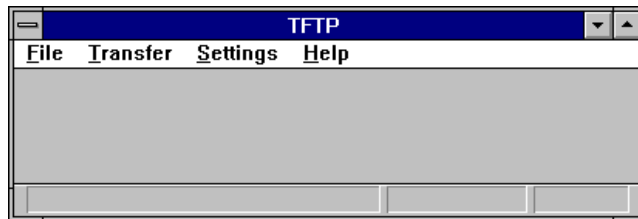
B

Upgrading the Software

The FE-224 Switching Hub software can be upgraded using TFTP (Trivial File Transfer Protocol). If you have the NuSight platform or the HP OpenView platform installed, you can use the RPC utility instead. This appendix explains how to use TFTP; for directions on RPC, see the appropriate NuSight or HP OpenView document.

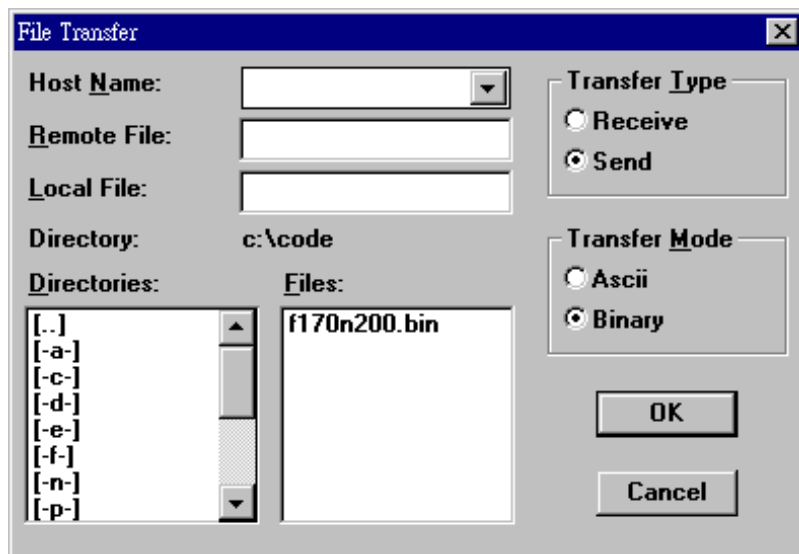
TFTP is found in most TCP/IP packages. Software upgrading is done through a station connected to one of the ports on the FE-224 Switching Hub.

The following screen examples are from NetManage Inc. “Chameleon” TFTP software. When TFTP is accessed, the following screen appears:



The following steps describe how to upgrade the software using TFTP.

1. Select Transfer from the TFTP menu bar. A File Transfer dialog box appears.



2. In the Host Name field, type the IP address of the FE-224 Switching Hub.
3. For Transfer Type, select Send.
4. For Transfer Mode, select Binary.
5. In the Remote File field, type the file name "FE-224.bin," or the file name specified in the upgrade instructions from Network Peripherals.
6. In the Local File field, type the name of the new software upgrade binary file, including its pathname. Be careful to select the correct filename from the correct directory. Any mistake will cause an unrecoverable error.

7. Alternatively, you can select the file and correct directory from the Directories scroll box.
8. Select OK to begin the file transfer. The FE-224 Switching Hub begins the upgrade process. During this process, system LEDs cycle on and off. If the FE-224 Switching Hub discovers an invalid file during the upgrade process, the upgrade stops.



NOTE: Do not turn off the FE-224 Switching Hub while system LEDs are cycling

When the upgrade is completed, the FE-224 Switching Hub restarts.

The configuration in effect when the upgrade began is retained. If you want to return to the default settings, perform a factory reset as described in Chapter 4.

N

C

POST Diagnostics

When the FE-224 Switching Hub is turned on for the first time, it runs a Power-On Self-Test (POST) diagnostics routine. The operations that comprise this routine are shown in Table C-1. If any test item in the table fails, one of the components on the FE-224 Switching Hub might be defective and the hub must be returned to your dealer for repair or replacement.



NOTE: Normally, when an error is detected, the POST stops and an LED blinks continuously. If an EEPROM fails, however, an LED blinks five times before continuing with the POST.

Table 6. POST Diagnostic Routine Operations

Test Item	Pass	Fail
LED	1. Turn all LEDs on. 2. Turn all green LEDs on. 3. Turn all amber LEDs on.	1. LED display incorrect
DRAM	Flash port LEDs sequentially, one row at a time	1. LED flashing halt. 2. System halt.
Flash RAM	1. Flash POWER-LINK LED. 2. Turn on SNMP LED.	1. Flash POWER-LINK LED. 2. Flash CONSOLE LED. 3. Flash SNMP LED. 4. System halt.
EEPROM	1. Flash POWER-LINK LED 2. Turn on RPS LED	1. Flash POWER-LINK LED. 2. Flash CONSOLE LED. 3. Flash RPS LED 5 times.
NIC	1. Flash POWER-LINK LED 2. Turn on POWER LED	1. Flash POWER-LINK LED. 2. Flash CONSOLE LED. 3. Flash POWER LED. 4. System halt.
PHY	1. Flash CONSOLE LED 2. Turn on Virtual LAN LED	1. Flash CONSOLE LED 2. Flash Virtual LAN LED 3. System halt
NuCleus	1. Flash CONSOLE LED 2. Turn on SNMP LED	1. Flash CONSOLE LED 2. Flash SNMP LED 3. System halt

After the POST is completed, the software is ready for building a spanning tree if Spanning Tree Protocol is enabled (see *Configuring Spanning Tree Protocol* in Chapter 4).



D

Technical Specifications

This appendix lists the design and operating specifications of the FE-224 Switching Hub.

Physical

445mm long x 358mm wide x 66mm high (17½ x 14 x 2½ inches)

5.5 kg (12 lbs.)

Electrical

Power: 100 to 240 VAC, 50/60Hz

Power Consumption: 50W

DC Power Consumption: 7A@5.3VDC

Electromagnetic

FCC Part 15, Subpart B, Class A

EN 55022 (CISPR 22: 1985), Class A

Safety: UL 1950, CSA 950, EN 60950, TUV

Environmental

Operating/Storage temperature: 0°C to 50°C / -10°C to 65°C

Operating humidity: <95% (non-condensing)

Port Characteristics

One 10Base-T/100Base-TX auto-negotiation switching port

Twenty-four 10Base-T switching ports

One expansion slot for NuModule FE-831 or FE-833 Media Adapter

25 RJ-45 connectors, and one RJ-45 or SC-type connector when an FE-831 or FE-833 Media Adapter is installed

4K MAC address learning table per 100Base-TX/FX port

4K MAC address learning table for every four of the 24 fixed 10Base-T ports

Automatic self learning at full wire speed

Parallel store and forward switching

Error filtering

Management

In-band and out-of-band SNMP network management using Network Peripherals NuSight Network Management System for Windows or HP OpenView Network Management System, or other SNMP managers.

Indicators

For each port: Link present, traffic detected (LINK/ACT); full duplex connection, collision detected (FDX/COL).

For the FE-224 Switching Hub: Power, RPS (Redundant Power Supply), Virtual LAN, SNMP, Power Links, and Console LEDs.

Booting and Configuration

Software is downloadable.

Configuration is stored in NVRAM.

Industry Standards Complied With

IEEE 802.1 standards document of 10Base-T

IEEE 802.3u standards document for 100Base-TX/FX

IEEE 802.1d standards document

RFC 1213, MIB for Network Management of TCP/IP-Based Internets (MIB-II)

RFC 1493, Definitions of Managed Objects for Bridges (Bridge MIB)

N

E

Traps

This appendix lists the trap definitions that Network Peripherals assigns to trap levels used by the SNMP agent in the FE-224 Switching Hub. Though trap levels 0 and 7 are not included in the table below, you can set them the same as other levels. Level 0 indicates no traps will be sent; level 7 means all traps will be sent. Trap definitions in this appendix comply with the IEEE 802.1d standards document.

Table 7. Trap Definitions

Level	Trap	Description
2	001	Become the new root of a spanning tree.
	002	Spanning tree topology change.
	512	The power supply of the FE-224 Switching Hub is changed.
	659	Power Link has detected a loop.
3	256	The FE-224 Switching Hub was successfully reset.
	257	A factory reset of the FE-224 Switching Hub was successful.
	532	Duplex mode of a switching port was changed.
	533	The speed of a switching port was changed.
	534	Flow Control status of the switching port is changed..
	561	Set a collision address in the static address table.
	562	Set address encountered a collision in setting static address.

Table 7. Trap Definitions (continued)

Level	Trap	Description
(3)	592	Enable the Filter function.
	593	Disable the Filter function.
	595	Set a collision address in the filter table.
	596	Set an address collision with reserved address.
	608	Enable the Port Monitor function.
	609	Disable the Port Monitor function.
	624	Enable the Virtual LAN function.
	625	Disable the Virtual LAN function.
	640	Enable the Power Link function.
	641	Disable the Power Link function.
	644	Operation mode was changed in the Power Link function.
	645	Reconfigure range for the Power Link function.
	648	Reconfigure user setting range for the Power Link function.
	656	User-setting mode was changed in the Power Link function.
	658	Power Link status changed from stable to unstable.

Table 7. Trap Definitions (continued)

Level	Trap	Description
(4)	288	Enable a port.
	289	Disable a port.
	544	The address tables pack-count has been changed.
	560	The static tables pack-count has been changed.
	612	Enable the Port Monitor function of a monitor group.
	613	Disable the Port Monitor function of a monitor group.
	657	Power Link status changed from unstable to stable.
5	514	The monitoring port received a configuration BPDU.
	614	There is an operation error for the Port Monitor function.
	646	Port monitor configuration changed for the parallel link function.
	647	Virtual LAN configuration was changed for the parallel link function.
6	292	The link state of a port has been changed from down to up.
	293	The link state of a port has been changed from up to down.
	610	The Port Monitor function is active on the specific port.
	611	The Port Monitor function is removed from the specific port.
	626	The Virtual LAN function is active on the specific port.
	627	The Virtual LAN function is removed from the specific port.

N

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