# VERTICAL HORIZON
# VH-2402S
# FAST ETHERNET SWITCH

## MANAGEMENT GUIDE

**ENTERASYS**

**NETWORKS**™

9033645-01

 Only qualified personnel should perform installation procedures.

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# 1. MANAGEMENT OVERVIEW

## Configuration Options

For advanced management capability, the VH-SMGMT Vertical Horizon Management Module provides a menu-driven system configuration program. This program can be accessed by a direct or modem connection to the serial port on the Management Module (out-of-band), or by a Telnet connection over the network (in-band).

The Management Module is based on SNMP (Simple Network Management Protocol). This SNMP agent permits a switch stack to be managed from any PC in the network using in-band management software.

The Management Module also includes an embedded HTTP Web agent. This Web agent can be accessed using a standard Web browser from any computer attached to the network. Refer to the Web Management Guide for more information.

The system configuration program and the SNMP agent support management functions such as:

- Enable/disable any port
- Set the communication mode for any port
- Configure SNMP parameters
- Select RMON options
- Display system information or statistics
- Configure the switch to join a Spanning Tree
- Download system firmware
- Restart the system

## Required Connections

### Console Port (Out-of-Band) Connections

Attach a VT100 compatible terminal or a PC running a terminal emulation program to the serial port on the Management Module. Use the null-modem cable provided with this package, or use a null-modem connection that is compatible with the console port pin assignments shown in Appendix A of the VH-2402S User Guide.

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When attaching to a PC, set terminal emulation type to VT100, specify the port used by your PC (i.e., COM 1~4), and then set communications to 8 data bits, 1 stop bit, no parity, and 19200 bps (for initial configuration). Also be sure to set flow control to "none." (Refer to "Configuring the Serial Port" on page 19 for a complete description of configuration options.)

## Remote Management via the Console Port

### Configure the Switch Site

Connect the Management Module's DB9 serial port to the modem's serial port using standard cabling. For most modems which use a 25-pin port, you will have to provide an RS232 cable with a 9-pin connector on one end and a 25-pin connector on the other end. Set the modem at the switch's site to force auto-answer mode. The following is a sample initialization string: "ATQ1S0=1&D0&K0&W" as defined below:

Q1       : Inhibit result codes to DTE

S0=1   : Auto answer on first ring

D0       : Don't care DTR

K0       : Disables DTE/DCE flow control

W        : Write command to modem memory

### Configure the Remote Site

At the remote site, connect the PC's COM port (COM 1~4) to the modem's serial port. Set terminal emulation type to VT100, specify the port used by your PC (i.e., COM 1~4), and then set communications to 8 data bits, 1 stop bit, no parity, 19200 bps and no flow control.

## In-Band Connections

Prior to accessing the Management Module via a network connection, you must first configure it with a valid IP address, subnet mask, and default gateway using an out-of-band connection or the BootP protocol.

### Telnet Connection

Prior to accessing the Management Module via an in-band Telnet connection, you must first configure it with a valid IP address, subnet mask, and default gateway using an out-of-band connection or BootP protocol. After configuring the switch's IP parameters, you can access the on-board configuration program from anywhere within the attached network.

**Use the Network Configuration menu to specify the maximum number of simultaneous Telnet sessions that are supported by the system.**

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**In-Band Network Connection**

The on-board configuration program can be accessed using Telnet from any computer attached to the network. The switch and stack can also be managed by any computer using a Web browser (Internet Explorer 4.0 or above, or Netscape Navigator 4.0 or above), or from a network computer using network management software.

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# 2. VH-2402S USER INTERFACE

## Overview

Access is gained to the console menus by connecting a terminal to the console port (with a direct cable connection or over modems), or using Telnet to access the Management Module over the network. These menus allow you to reconfigure the switch, as well as to monitor the status and performance of the switch or the attached stack. The menus have a layout similar to the sample Main Menu shown in Figure 2-1. The information is divided into the following parts:

- Menu Name (includes access privileges)
- Selectable Items
- Screen Prompt for menu selections and entry of field parameters, and Message Area for display of parameters or error messages.
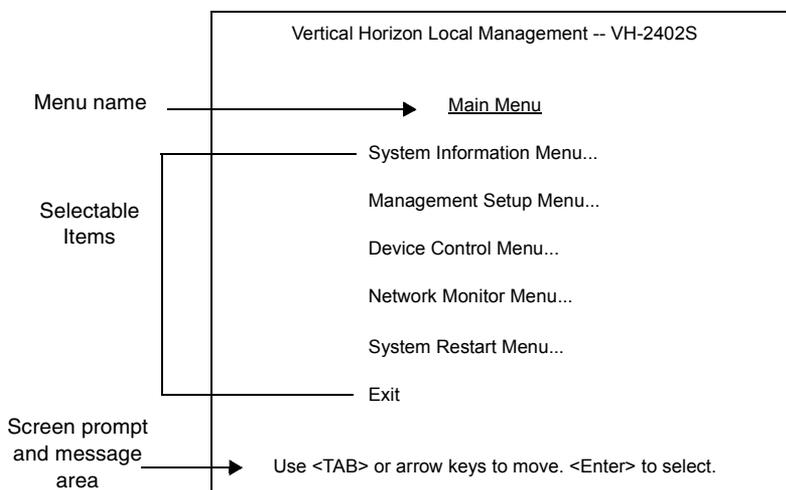


**Figure 2-1. Sample Main Menu**

# User Access

Once a direct connection to the serial port or a Telnet connection is established, the login screen for the on-board configuration program appears. You may need to press Enter a few times to display the screen.

The default user names are "admin" and "guest," with no passwords. The administrator has Read/Write access, which allows you to read and modify switch information. The guest has Read Only access to the management program, which allows you to view switch information, but not modify any operating parameters.

You should define a new administrator password, record it and put it in a safe place. From the Main Menu, select Management Setup Menu / Console Login Configuration, and enter a new password for the default administrator. Passwords can consist of up to 11 alphanumeric characters and are not case sensitive.

**A user is allowed three attempts to enter the correct password; on the third failed attempt the current connection is terminated.**

To use the console menus, do the following:

**1.** Use the cursor keys to highlight the desired option.

If the selected item is a submenu title, the submenu is displayed when you press the Enter key.

**2.** Follow the screen prompts to specify the parameter requested.

If the selected item is a parameter, the system displays a prompt for you to enter a new value. If the value entered is invalid, a message displays, requesting you to enter a valid value.

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# Factory Defaults

Table 2-1 lists the default settings for switch configuration parameters. Each parameter can be changed via the console menus or Telnet.

**Table 2-1.  Factory Default Settings**

| Parameter | Default Value |
|---|---|
| *Multicast Filtering* | |
| GMRP | Disabled |
| IGMP Multicast Filtering | Disabled |
| *Port Configuration* | |
| Flow Control | Disabled |
| Speed and Duplex | Auto |
| Admin | Enabled |
| Broadcast Storm Control | Enabled - 500 pps |
| *Port Priority* | |
| Default Ingress User Priority | 0 |
| *Spanning Tree Algorithm* | |
| Active Aging Time | 300 |
| Bridge Priority | 32768 |
| Forward Delay | 15 |
| Hello Time | 2 |
| Max Age | 20 |
| Path Cost | 4 - 1000Mbps ports<br>19 - 100Mbps ports<br>100 - 10Mbps ports |
| Port Priority | 128 |
| Spanning Tree Protocol | Enabled |
| *System Configuration* | |
| Management VLAN | All |
| BootP Enable | Disabled |
| Password | <none> |
| Screen Timeout | 10 min |
| Send Authentication Fail Traps | Enabled |
| SNMP Community Name | public, private |
| Terminal Baud Rate | Auto |
| User Names | admin, guest |

| Parameter | Default Value |
|-----------|---------------|
| *Virtual LANs* | |
| Acceptable VLAN Frame Type | All |
| Configurable PVID Tagging | Yes |
| GVRP | Disabled |
| Untagged VLAN Group Assignment | 1 |
| VLAN Ingress Filtering | False |
| VLAN Learning | SVL |

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## Main Menu

The Main Menu is the first screen seen after successfully logging into the system. Figure 2-2 shows the Main Menu and the accompanying table describes the Main Menu.

```
Vertical Horizon Local Management -- VH-2402S


                       Main Menu

            System Information Menu...

            Management Setup Menu...

            Device Control Menu...

            Network Monitor Menu...

            System Restart Menu...

            Exit


    Use <TAB> or arrow keys to move. <Enter> to select.
```
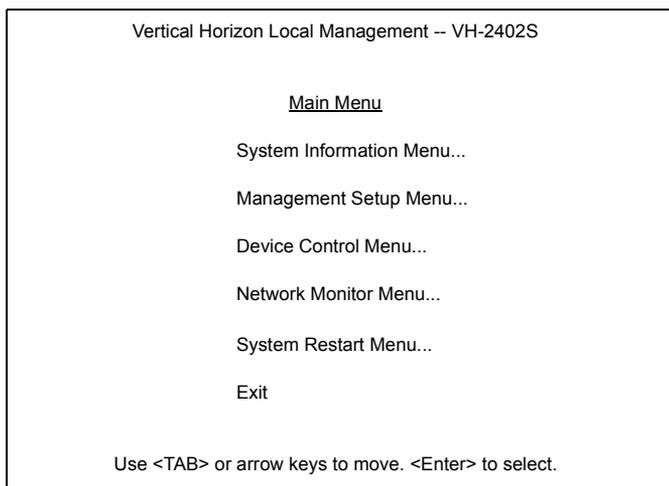
**Figure 2-2.  Main Menu**

| Selection | Description |
|---|---|
| *System Information Menu* | |
| System Information | Provides basic system description, including contact information. |
| Switch Information | Shows hardware/firmware version numbers, power status, and expansion modules used in the stack. |
| *Management Setup Menu* | |
| Network Configuration | Includes IP setup, Ping facility, HTTP (Web Agent) setup, Telnet configuration, and MAC address. |
| Serial Port Configuration | Sets communication parameters for the serial port, including management mode, baud rate, console time-out, and screen data refresh interval. |
| SNMP Configuration | Activates traps; and configures communities and trap managers. |
| Console Login Configuration | Sets user names and passwords for system access, as well as the invalid password threshold and lockout time. |
| TFTP Download | Downloads new version of firmware to update your system (in-band). |
| Configuration Save & Restore | Saves the switch configuration to a file on a TFTP server. This file can be later downloaded to restore the configuration. |
| Management Configuration | Specifies if management access to the switch is available from all VLANs or restricted to one VLAN. |

| Selection | Description |
| --- | --- |
| *Device Control Menu* | |
| Port Configuration | Enables any port, enables/disables flow control, and sets communication mode to auto-negotiation, full duplex or half duplex. |
| Port Information | Displays operational status, including link state, flow control method, and duplex mode. |
| Spanning Tree Configuration | Enables Spanning Tree Algorithm; also sets parameters for hello time, maximum message age, switch priority, and forward delay; as well as port priority and path cost. |
| Spanning Tree Information | Displays full listing of parameters for the Spanning Tree Algorithm. |
| Mirror Port Configuration | Sets the source and target ports for mirroring. |
| Port Trunking Configuration | Specifies ports to group into aggregate trunks. |
| IGMP Configuration | Configures IGMP multicast filtering. |
| BStorm Control Configuration | Allows you to enable broadcast storm control and set the packet-per-second threshold. |
| Extented Bridge Configuration | Displays/configures extended bridge capabilities provided by this switch, including support for traffic classes, GMRP multicast filtering, and VLAN extensions. |
| 802.1P Configuration | Configures default port priorities and queue assignments. |
| 802.1Q VLAN Base Information | Displays basic VLAN information, such as VLAN version number and maximum VLANs supported. |
| 802.1Q VLAN Current Table Information | Displays VLAN groups and port members. |
| 802.1Q VLAN Static Table Configuration | Configures VLAN groups via static assignments, including setting port members, or restricting ports from being dynamically added to a port by the GVRP protocol. |
| Port Assignment VLAN Configuration | Displays/configures port-specific VLAN settings, including PVID, ingress filtering, and 802.1Q trunks. |
| Multicast Router Port Information | Displays the ports on the switch attached to a neighboring multicast router/switch for each VLAN ID. |
| Static Multicast Router Port Cfg | Assigns ports that are attached to a neighboring multicast router/switch. |
| IGMP Member Port Configuration | Assigns ports that are attached to hosts who want to receive a specific multicast service. |
| Port Security Configuration | Allows you to enable and configure port security for the switch. |
| *Network Monitor Menu* | |
| Port Statistics | Displays statistics on network traffic passing through the selected port. |
| RMON Statistics | Displays detailed statistical information for the selected port such as packet type and frame size counters. |
| Unicast Address Table | Provides full address listing, as well as search and clear functions. |

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| Selection | Description |
| --- | --- |
| IP Multicast Registration Table | Displays all the multicast groups active on this switch, including multicast IP addresses and corresponding VLAN IDs. |
| Static Unicast Address Table Configuration | Used to manually configure host MAC addresses in the unicast table. |
| System Restart | Restarts system with options to use POST, or to retain factory defaults, IP settings, or user authentication settings. |
| Exit | Exits the configuration program. |

# System Information Menu

Use the System Information Menu to display a basic description of the switch, including contact information, and hardware/firmware versions.

```
Vertical Horizon Local Management -- VH-2402S



            System Information Menu

              System Information ...

              Switch Information ...




                     <OK>
      Use <TAB> or arrow keys to move. <Enter> to select.
```
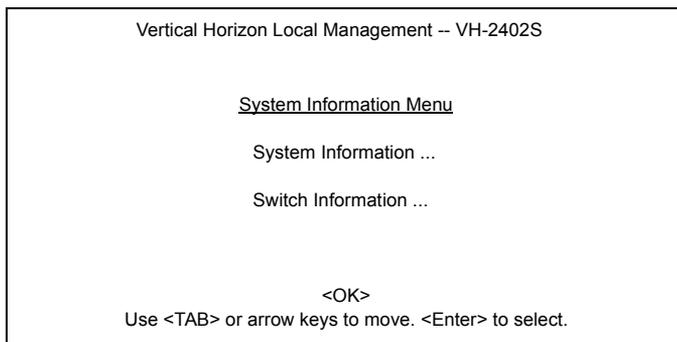
**Figure 2-3.  System Information Menu**

| Selection | Description |
| --- | --- |
| System Information | Provides basic system description, including contact information. |
| Switch Information | Shows hardware/firmware version numbers, power status, and expansion modules used in the stack. |

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## Displaying System Information

Use the System Information screen to display descriptive information about the switch, or for quick system identification as shown in the following figure and table.

```
              Vertical Horizon Local Management -- VH-2402S


                            System Information

System Description : Vertical Horizon VH-2402S

System Object ID   : 1.3.6.1.4.1.52.3.9.1.10.7

System Up Time     : 48067 (0 day, 1 hr, 2min, 34 sec)

System Name        : DEFAULT SYSTEM NAME

System Contact     : DEFAULT SYSTEM CONTACT

System Location    : DEFAULT SYSTEM LOCATION

               <APPLY>        <OK>        <CANCEL>
        Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-4.  System Information**

| Parameter | Description |
|-----------|-------------|
| System Description | System hardware description. |
| System Object ID | MIB II object identifier for switch's network management subsystem. |
| System Up Time | Length of time the current management agent has been running. (Note that the first value is 1/100 seconds.) |
| System Name[*] | Name assigned to the switch system. |
| System Contact[*] | Contact person for the system. |
| System Location[*] | Specifies the area or location where the system resides. |

**[*] Maximum string length is 99, but the screen only displays 45 characters. You can use the arrow keys to browse the whole string.**

## Displaying Switch Version and Module Information

Use the Switch Information screen to display hardware/firmware version numbers for the main board and agent module, as well as the power status and modules plugged into the system.

```
                Vertical Horizon Local Management -- VH-2402S



                        Switch Information : Unit 1

                               Main Board
                    Hardware Version      :    V3.0
                    Firmware Version      :    V1.11
                    Serial Number         :    89-34-33-22-11-00
                    Port Number           :    25
                    Internal Power Status :    Active
                    Redundant Power Status :   Inactive
                    Expansion Slot 1      :    1000Base-SX
                    Expansion Slot 2      :    Stacking


                               Agent Module
                    Hardware Version      :    V3.0 (801 CPU)
                    POST ROM Version      :    V1.10
                    Firmware Version      :    02.04.01.00
                    SNMP Agent            :    Master

                 <OK>    <PREV UNIT>      <NEXT UNIT>
                Use <TAB> or arrow keys to move. <Enter> to select
```

**Figure 2-5.  Switch Information**

| Parameter | Description |
|---|---|
| *Main Board* | |
| Hardware Version | Hardware version of the main board. |
| Firmware Version | System firmware version in ROM. |
| Serial Number | MAC address associated with the main board. |
| Port Number | Number of ports in this unit. |
| Internal Power Status | Power status for the switch. |
| Redundant Power Status | Redundant power status for the switch. |
| Expansion Slot 1 | Shows module type if inserted (100Base-FX, 1000Base-SX or 1000Base-LX). |
| Expansion Slot 2. | Shows module type if inserted (100Base-FX, 1000Base-SX, 1000Base-LX or Stacking). |
| *Agent Module* | |
| Hardware Version | Hardware version of the agent module. |
| POST ROM Version | Power-On Self-Test version number. |
| Firmware Version | Firmware version of the agent module. |
| SNMP Agent | Shows if this module is Master or Backup Master. |

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# Management Setup Menu

After initially logging onto the system, adjust the communication parameters for your console to ensure a reliable connection (Serial Port Configuration). Specify the IP addresses for the agent module (Network Configuration / IP Configuration), and then set the Administrator and User passwords (Console Login Configuration). Remember to record them in a safe place. Also set the community string which controls access to the on-board SNMP agent via in-band management software (SNMP Configuration). The items provided by the Management Setup Menu are described in the following sections.

```
            Vertical Horizon Local Management -- VH-2402S



                   Management Setup Menu

              Network Configuration ...
              Serial Port Configuration ...
              SNMP Configuration ...
              Console Login Configuration ...
              TFTP Download ...
              Configuration Save & Restore ...
              Management Configuration ...


                        <OK>
         Use <TAB> or arrow keys to move. <Enter> to select.
```
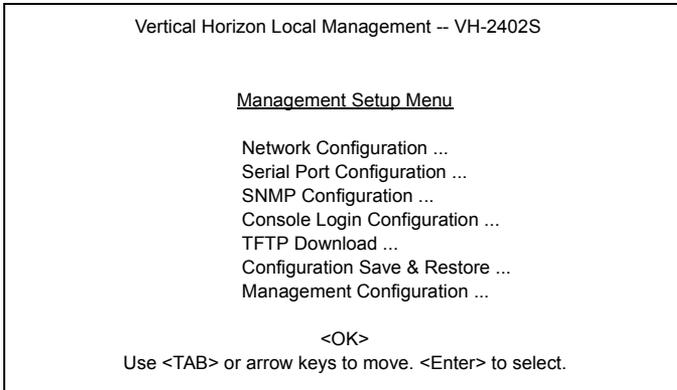
**Figure 2-6.  Management Setup Menu**

| Selection | Description |
|---|---|
| Network Configuration | Includes IP setup, Ping facility, HTTP (Web Agent) setup, Telnet configuration, and MAC address. |
| Serial Port Configuration | Sets communication parameters for the serial port, including management mode, baud rate, console time-out, and screen data refresh interval. |
| SNMP Configuration | Activates traps; and configures communities and trap managers. |
| Console Login Configuration | Sets user names and passwords for system access, as well as the invalid password threshold and lockout time. |
| TFTP Download | Downloads new version of firmware to update your system (in-band). |
| Configuration Save & Restore | Saves the switch configuration to a file on a TFTP server. This file can be later downloaded to restore the configuration. |
| Management Configuration | Specifies if management access to the switch is available from all VLANs or restricted to one VLAN. |

## Changing the Network Configuration

Use the Network Configuration menu to set the bootup option, configure the switch's Internet Protocol (IP) parameters, enable the on-board Web Agent, or to set the number of concurrent Telnet sessions allowed. The screen shown below is described in the following table.

```
Vertical Horizon Local Management -- VH-2402S


                     Network Configuration

        IP Configuration ...

        IP Connectivity Test (Ping) ...

        HTTP Configuration ...

        MAX Number of allowed Telnet sessions (1 -4) : 4

        MAC Address : 00-E0-29-52-28-00


     <APPLY>          <OK>           <CANCEL>
     Use <TAB> or arrow keys to move. <Enter> to select.
```
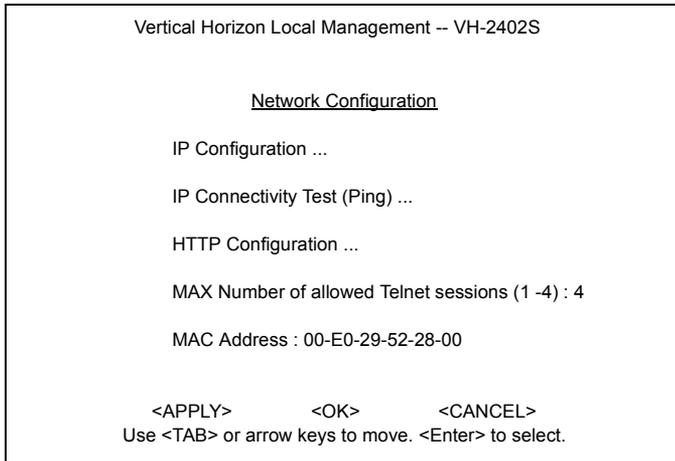
**Figure 2-7.  Network Configuration**

| Parameter | Description |
| --- | --- |
| IP Configuration | Screen used to set the bootup option, or configure the switch's IP parameters. |
| IP Connectivity Test | Screen used to test IP connectivity to a (Ping) specified device. |
| HTTP Configuration | Screen used to enable the Web Agent. |
| MAX Number of Allowed Telnet Sessions | The maximum number of Telnet sessions allowed to simultaneously access the agent module. |
| MAC Address | Physical address of the agent module. |

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## IP Configuration

Use the IP Configuration screen to set the bootup option, or configure the switch's IP parameters. The screen shown below is described in the following table.

```
Vertical Horizon Local Management -- VH-2402S


            Network Configuration: IP Configuration

                    Interface Type   : Ethernet
                    IP Address       : 10.1.0.1
                    Subnet Mask      : 255.255.0.0
                    Gateway IP       : 10.1.0.254
                    IP State         : USER-CONFIG



        Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-8. IP Configuration**

| Parameter | Default | Description |
| --- | --- | --- |
| Interface Type | Ethernet | Indicates IP over Ethernet. |
| IP Address | 10.1.0.1 | IP address of the stack you are managing when accessing the agent module over the network. The agent module supports SNMP over UDP/IP transport protocol. In this environment, all systems on the Internet, such as network interconnection devices and any PC accessing the agent module (or running management software) must have an IP address. |
| | | Valid IP addresses consist of four numbers, of 0 to 255, and separated by periods. Anything outside of this format will not be accepted by the configuration program. |
| Subnet Mask | 255.255.0.0 | Subnet mask of the agent you have selected. This mask identifies the host address bits used for routing to specific subnets. |
| Default Gateway | 0.0.0.0 | Gateway used to pass trap messages from the switch's agent to the management station. Note that the gateway must be defined if the management station is located in a different IP segment. |
| IP State | USER-CONFIG | Specifies whether IP functionality is enabled via manual configuration, or set by Boot Protocol (BOOTP). Options include: |
| | | USER-CONFIG - IP functionality is enabled based on the default or user specified IP Configuration. (This is the default setting.) |

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| Parameter | Default | Description |
|-----------|---------|-------------|
| | | BOOTP Get IP - IP is enabled but will not function until a BOOTP reply has been received. BOOTP requests will be periodically broadcast by the switch in an effort to learn its IP address. (BOOTP values can include the IP address, default gateway, and subnet mask.) |

## IP Connectivity Test (Ping)

Use the IP Connectivity Test to see if another site on the Internet can be reached. The screen shown below is described in the following table.

```
Vertical Horizon Local Management -- VH-2402S


Network Configuration: IP Connectivity Test (Ping)

        IP Address : 200.123.211.109

        Test Times : 1        Interval : 3

        Success   : 0        Failure  : 0


        [Start]


                        <OK>
    Use <TAB> or arrow keys to move, other keys to make changes.
```
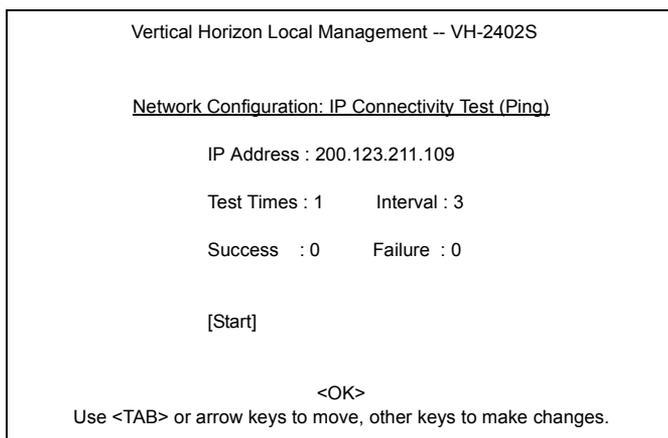
**Figure 2-9.  IP Connectivity Test**

| Parameter | Description |
|-----------|-------------|
| IP Address | IP address of the site you want to ping. |
| Test Times | The number of ICMP echo requests to send to the specified site. Range: 1~1000 |
| Interval | The interval (in seconds) between pinging the specified site. Range: 1~10 seconds |
| Success/Failure | The number of times the specified site has responded or not to pinging. |

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## HTTP Configuration

Use the HTTP Configuration screen to enable/disable the on-board Web agent, and to specify the TCP port that will provide HTTP service. The screen shown below is described in the following table.

```
         Vertical Horizon Local Management -- VH-2402S


         Network Configuration : HTTP Configuration

             HTTP Server        : ENABLED

             HTTP Port Number  : 80


          <APPLY>          <OK>          <CANCEL>
     Use <TAB> or arrow keys to move, <Space> to scroll options.
```

**Figure 2-10.  HTTP Configuration**

| Parameter | Description |
|---|---|
| HTTP Server | Enables/disables access to the on-board Web agent. |
| HTTP Port Number | Specifies the TCP port that will provide HTTP service.<br>Range : 0~65535<br>Default : Port 80<br>(Telnet Port 23 is prohibited.) |

## Configuring the Serial Port

You can access the on-board configuration program by attaching a VT100 compatible device to the switch's serial port. (For more information on connecting to this port, see "Required Connections" on page 1.) The communication parameters for this port can be accessed from the Serial Port Configuration screen shown below and described in the following table.

```
Vertical Horizon Local Management -- VH-2402S


                    Serial Port Configuration

          Management Mode          : CONSOLE MODE

          Baudrate                 : 19200
          Databits                 : 8
          Stopbits                 : 1
          Parity                   : NONE
          Time-Out (in minutes)    : 10
          Auto Refresh (in seconds) : 5



       <APPLY>         <OK>          <CANCEL>
     Use <TAB> or arrow keys to move, <Space> to scroll options.
```

**Figure 2-11.  Serial Port Configuration**

| Parameter | Default | Description |
|-----------|---------|-------------|
| Management Mode | Console Mode | Indicates that the console port settings are for direct console connection. |
| Baud Rate | Auto | The rate at which data is sent between devices. |
| | | Options : 2400, 4800, 9600, 19200 bps, and Auto detection |
| Databits | 8 bits | Sets the databits of the RS-232 port. |
| | | Options : 7, 8 |
| Stopbits | 1 bit | Sets the stop bits of the RS-232 port. |
| | | Options : 1, 2 |
| Parity | none | Sets the parity of the RS-232 port. |
| | | Options : none/odd/even |
| Time-Out | 10 minutes | If no input is received from the attached device after this interval, the current session is automatically closed. |
| | | Range : 0 - 100 minutes; 0: disabled |
| Auto Refresh | 5 seconds | Sets the interval before a console session will auto refresh the console information, such as Spanning Tree Information, Port Configuration, Port Statistics, and RMON Statistics. |
| | | Range : 5-255 seconds; 0: disabled |

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## Assigning SNMP Parameters

Use the SNMP Configuration screen to display and modify parameters for the Simple Network Management Protocol (SNMP). The switch includes an on-board SNMP agent which monitors the status of its hardware, as well as the traffic passing through its ports. A computer attached to the network, called a Network Management Station (NMS), can be used to access this information. Access rights to the on-board agent are controlled by community strings. To communicate with the switch, the NMS must first submit a valid community string for authentication. The options for configuring community strings and related trap functions are described in the following sections.

```
Vertical Horizon Local Management -- VH-2402S



            SNMP Configuration

      Send Authentication Fail Traps : ENABLED

      SNMP Communities ...

      IP Trap Managers ...



      <APPLY>         <OK>         <CANCEL>
   Use <TAB> or arrow keys to move, <Space> to scroll options.
```

**Figure 2-12.  SNMP Configuration**

| Parameter | Description |
|---|---|
| Send Authentication Fail Traps | Issue a trap message to specified IP trap managers whenever authentication of an SNMP request fails. (The default is enabled.) |
| SNMP Communities | Assigns SNMP access based on specified strings. |
| IP Trap Managers | Specifies management stations that will receive authentication failure messages or other trap messages from the switch. |

### Configuring Community Names

The following figure and table describe how to configure the community strings authorized for management access. Up to 5 community names may be entered.

```
Vertical Horizon Local Management -- VH-2402S


    SNMP Configuration : SNMP Communities


                    Community Name      Access        Status

    1.  public                        READ ONLY    ENABLED
    2.  private                       READ/WRITE   ENABLED
    3.
    4.
    5.



        <APPLY>          <OK>           <CANCEL>
    Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-13.  SNMP Communities**

| Parameter | Description |
|---|---|
| Community Name | A community entry authorized for management access. |
|  | Maximum string length : 20 characters |
| Access | Management access is restricted to Read Only or Read/Write. |
| Status | Sets administrative status of entry to enabled or disabled. |

**Note: The default community strings are "public" with Read Only access, and "private" with Read/Write access.**

## Configuring IP Trap Managers

The following figure and table describe how to specify management stations that will receive authentication failure messages or other trap messages from the switch. Up to 5 trap managers may be entered.

```
            Vertical Horizon Local Management -- VH-2402S


             SNMP Configuration : IP Trap Managers

               IP Address          Community Name   Status
             1. 10.1.0.23          public           DISABLED
             2.
             3.
             4.
             5.


           <APPLY>          <OK>          <CANCEL>
       Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-14.  IP Trap Managers**

| Parameter | Description |
|-----------|-------------|
| IP Address | IP address of the trap manager. |
| Community Name | A community specified for trap management access. |
| Status | Sets administrative status of selected entry to enabled or disabled. |

## Console Login Configuration

Use the Management Setup: Console Login Configuration to restrict management access based on specified user names and passwords, or to set the invalid password threshold and timeout. There are only two user types defined, ADMIN (Administrator) and GUEST, but you can set up to five different user names and passwords. Only Administrators have write access for parameters governing the switch. You should therefore assign a user name and password to the default Administrator as soon as possible, and store it in a safe place. (If for some reason your password is lost, or you cannot gain access to the System Configuration Program, contact Enterasys Technical Support for assistance.) The parameters shown on this screen are indicated in the following figure and table.

```
        Vertical Horizon Local Management -- VH-2402S


                    Console Login Configuration

                Password Threshold        : 3
                Lock-out Time (in minutes) : 0

                User Type    User Name      Password
                -------------------------------------------------
            1.  ADMIN :      admin
            2.  GUEST :      guest
            3.
            4.
            5.


              <APPLY>          <OK>          <CANCEL>
          Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-15.  Console Login Configuration**

| Parameter | Default | Description |
|---|---|---|
| Password Threshold | 3 | Sets the password intrusion threshold which limits the number of failed logon attempts. |
| | | Range : 0~65535 |
| Lock-out Time | 0 | The time (in seconds) the management console will be disabled, due to an excessive number of failed logon attempts. |
| | | Range : 0~65535 |
| Admin* | name: admin password: null | Administrator has access privilege of Read/Write for all screens. |
| Guest* | name: guest password: null | Guest has access privilege of Read Only for all screens. |

**\* Passwords can consist of up to 11 alphanumeric characters and are not case sensitive.**

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## Downloading System Software

### Using TFTP Protocol to Download Over the Network

Use the TFTP Download menu to load software updates into the switch. The download file should be an VH-2402S file from Enterasys; otherwise the agent will not accept it. The success of the download operation depends on the accessibility of the TFTP server and the quality of the network connection. After downloading the new software, the agent will automatically restart itself. Parameters shown on this screen are indicated in the following figure and table.

```
            Vertical Horizon Local Management -- VH-2402S



                            TFTP Download

                 Download Server IP : 0.0.0.0

                 Agent Software Upgrade        : ENABLED
                       Download Filename       : agent-v2.41
                       Download Mode           : PERMANENT



                 [Process TFTP Download]
                 Download Status : Complete

              <APPLY>         <OK>          <CANCEL>
           Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-16.  TFTP Download**

| Parameter | Description |
|---|---|
| Download Server IP | IP address of a TFTP server. |
| Agent Software Upgrade | Indicates that the switch is enabled for software upgrades. |
| Download Filename | The binary file to download to the agent module. |
| Download Mode | Indicates that the download is to permanent flash ROM. |
| [Process TFTP Download] | Issues a request to the TFTP server to download the specified file. |
| Download Status | Indicates if a download is "Complete" or "In Progress." |

## Saving the System Configuration

Use the Configuration Save & Restore menu to save the switch configuration settings to a file on a TFTP server. The file can be later downloaded to the switch to restore the switch's settings. The success of the operation depends on the accessibility of the TFTP server and the quality of the network connection. Parameters shown on this screen are indicated in the following figure and table.

```
        Vertical Horizon Local Management -- VH-2402S


                     Configuration Upload


        Upload Server IP        :
        Upload Filename         :

     [Process TFTP Upload]
     Upload status   : Complete

                    Configuration Download


        Download Server IP      :
        Download Filename       :

     [Process TFTP Download]
     Download status : Complete

          <APPLY>          <OK>          <CANCEL>
     Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-17.  Configuration Save & Restore**

| Parameter | Description |
|---|---|
| *Configuration Upload* | |
| Upload Server IP | IP address of a TFTP server. |
| Upload Filename | The name of the file to contain the switch configuration settings. |
| [Process TFTP Upload] | Issues a request to upload the configuration settings to the specified file on the TFTP server. |
| Upload Status | Indicates if an upload is "Complete" or "In Progress." |
| *Configuration Download* | |
| Download Server IP | IP address of a TFTP server. |
| Download Filename | The name of the file that contains the switch configuration settings you wish to restore. |
| [Process TFTP Download] | Issues a request to the TFTP server to download the specified file. |
| Download Status | Indicates if a download is "Complete" or "In Progress." |

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## Configuring Management Access

Use the Management Configuration menu to define which VLAN has management access to the switch. Parameters shown on this screen are indicated in the following figure and table.

```
Vertical Horizon Local Management -- VH-2402S


       Management Configuration


   Management VLAN        : ALL

   VLAN                   : 1




        <APPLY>        <OK>        <CANCEL>
     Use <TAB> or arrow keys to move, <Space> to scroll options.
```

**Figure 2-18.  Management Configuration**

| Parameter | Default | Description |
|---|---|---|
| Management VLAN | All | Select ALL to give all VLANs access to switch management, or ONE to restrict access to a specified VLAN. If you select just one VLAN, you must specify its VLAN ID on the following line. |
| VLAN | 1 | Specifies the VLAN ID that has access to switch management. |

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# Configuring the Switch

The Device Control menu is used to control a broad range of functions, including port configuration, Spanning Tree support for redundant switches, port mirroring, multicast filtering, and Virtual LANs. Each of the setup screens provided by these configuration menus is described in the following sections.

```
+-------------------------------------------------------------------------+
|                                                                         |
|              Vertical Horizon Local Management -- VH-2402S              |
|                                                                         |
|                                                                         |
|                          Device Control Menu                            |
|                                                                         |
|   Port Configuration ...          Extended Bridge Configuration ...     |
|   Port Information ...             802.1P Configuration ...              |
|   Spanning Tree Configuration ...  802.1Q VLAN Base Information ...      |
|   Spanning Tree Information ...    802.1Q VLAN Current Table Information ... |
|   Mirror Port Configuration ...    802.1Q VLAN Static Table Configuration ... |
|   Port Trunking Configuration ...  Port Assigment VLAN Configuration ... |
|   IGMP Configuration ...           Multicast Router Port Information ... |
|   BStorm Control Configuration ... Static Multicast Router Port Cfg ...  |
|   Port GARP Configuration ...      IGMP Member Port Configuration ...    |
|   Port GMRP Configuration ...      Port Security Configuration ...       |
|                                                                         |
|                                  <OK>                                   |
|              Use <TAB> or arrow keys to move. <Enter> to select.        |
|                                                                         |
+-------------------------------------------------------------------------+
```

**Figure 2-19.  Device Control Menu**

| Selection | Description |
|---|---|
| Port Configuration | Sets communication parameters for ports. |
| Port Information | Displays current port settings and port status. |
| Spanning Tree Configuration | Configures the switch, its ports and modules to participate in a local Spanning Tree. |
| Spanning Tree Information | Displays the current Spanning Tree configuration for the switch, its ports and modules. |
| Mirror Port Configuration | Sets the source and target ports for mirroring. |
| Port Trunking Configuration | Specifies ports to group into aggregate trunks. |
| IGMP Configuration | Configures IGMP multicast filtering. |
| BStorm Control Configuration | Allows you to enable broadcast storm control and set the packet-per-second threshold. |
| Port GARP Configuration* | Configures generic attribute settings used in the spanning tree protocol, VLAN registration, multicast filtering. |
| Port GMRP Configuration* | Configures GMRP multicast filtering. |
| Extended Bridge Configuration | Displays/configures extended bridge capabilities provided by this switch, including support for traffic classes, and VLAN extensions. |
| 802.1P Configuration | Configures default port priorities and queue assignments. |

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| Selection | Description |
| --- | --- |
| 802.1Q VLAN Base Information | Displays basic VLAN information, such as VLAN version number and maximum VLANs supported. |
| 802.1Q VLAN Current Table Information | Displays VLAN groups and port members. |
| 802.1Q VLAN Static Table Configuration | Configures VLAN groups via static assignments, including setting port members, or restricting ports from being dynamically added to a port by the GVRP protocol. |
| Port Assignment VLAN Configuration | Displays/configures port-specific VLAN settings, including PVID, ingress filtering, and 802.1Q trunks. |
| Multicast Router Port Information | Displays the ports on the switch attached to a neighboring multicast router/switch for each VLAN ID. |
| Static Multicast Router Port Cfg | Assigns ports that are attached to a neighboring multicast router/switch. |
| IGMP Member Port Configuration | Assigns ports that are attached to hosts who want to receive a specific multicast service. |
| Port Security Configuration | Allows you to enable and configure port security for the switch. |

**\* Not implemented in the current firmware release.**

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## Configuring Port Parameters

Use the Port Configuration menus to set or display communication parameters for any port or module on the switch.

```
            Vertical Horizon Local Management -- VH-2402S


              Port Configuration : Unit 1 Port 1-12

            Port    Type      Admin     Flow      Speed and
                                        Control   Duplex
            --------------------------------------------------------------
              1.  10/100TX   ENABLED   ENABLED   10-HALF
              2.  10/100TX   ENABLED   ENABLED   100-FULL
              3.  10/100TX   ENABLED   ENABLED   AUTO
              4.  10/100TX   ENABLED   ENABLED   AUTO
              5.  10/100TX   ENABLED   ENABLED   10-FULL
              6.  10/100TX   ENABLED   ENABLED   100-HALF
              7.  10/100TX   ENABLED   ENABLED   AUTO
              8.  10/100TX   ENABLED   ENABLED   AUTO
              9.  10/100TX   ENABLED   ENABLED   AUTO
             10.  10/100TX   ENABLED   ENABLED   AUTO
             11.  10/100TX   ENABLED   ENABLED   AUTO
             12.  10/100TX   ENABLED   ENABLED   AUTO

  <APPLY> <OK> <CANCEL> <PREV Unit> <NEXT UNIT> <PREV PAGE> <NEXT PAGE>
          Use <TAB> or arrows keys to move. <Space>  to  scroll options.
```

**Figure 2-20.  Port Configuration**

| Parameter | Default | Description |
|---|---|---|
| Type | | Shows port type as:<br>10/100TX  : 10Base-T / 100Base-TX<br>100FX      : 100Base-FX<br>1000SX    : 1000Base-SX<br>1000LX    : 1000Base-LX |
| Admin | ENABLED | Allows you to disable a port due to abnormal behavior (e.g., excessive collisions), and then re-enable it after the problem has been resolved. You may also disable a port for security reasons. |
| Flow Control | DISABLED | Used to enable or disable flow control. Flow control can eliminate frame loss by "blocking" traffic from end stations or segments connected directly to the switch when its buffers fill. Back pressure is used for half duplex and IEEE 802.3x for full duplex. Note that flow control should not be used if a port is connected to a hub. |
| Speed and Duplex | AUTO | Used to set the current port speed, duplex mode, and auto-negotiation. (Auto-negotiation is not available for 100Base-FX ports.) |

## Viewing the Current Port Configuration

The Port Information screen displays the port type, status, link state, and flow control in use, as well as the communication speed and duplex mode. To change any of the port settings, use the Port Configuration menu. The parameters shown in the following figure and table are for the RJ-45 ports.

```
                Vertical Horizon Local Management -- VH-2402S


                    Port Information : Unit 1 Port 1-12

      Port    Type    Operational  Link     FlowControl       Speed and
                                             InUse            Duplex InUse
    --------------------------------------------------------------------------------
        1.   10/100TX    YES       DOWN    ----------------  ----------------
        2.   10/100TX    YES       DOWN    ----------------  ----------------
        3.   10/100TX    YES       UP      802.3x            100-FULL
        4.   10/100TX    YES       DOWN    ----------------  ----------------
        5.   10/100TX    YES       DOWN    ----------------  ----------------
        6.   10/100TX    YES       UP      NONE              100-HALF
        7.   10/100TX    YES       UP      802.3x            100-FULL
        8.   10/100TX    YES       UP      BACK_PRESSURE 10-FULL
        9.   10/100TX    YES       UP      BACK_PRESSURE 10-FULL
       10.   10/100TX    YES       UP      BACK_PRESSURE 10-FULL
       11.   10/100TX    YES       UP      BACK_PRESSURE 10-FULL
       12.   10/100TX    YES       UP      BACK_PRESSURE 10-FULL

        <OK> <PREV Unit> <NEXT UNIT> <PREV PAGE> <NEXT PAGE>
            Use <TAB> or arrows keys to move. <Enter> to select.
```

**Figure 2-21.  Port Information**

| Parameter | Description |
|---|---|
| Type | Shows port type as: |
| | 10/100TX  : 10Base-T / 100Base-TX<br>100FX       : 100Base-FX<br>1000SX     : 1000Base-SX<br>1000LX     : 1000Base-LX |
| Operational | Shows if the port is functioning or not. |
| Link | Indicates if the port has a valid connection to an external device. |
| FlowControl InUse | Shows the flow control type in use. Flow control can eliminate frame loss by "blocking" traffic from end stations connected directly to the switch. Back pressure is used for half duplex and IEEE 802.3x for full duplex. Note that flow control should not be used if a port is connected to a hub. |
| Speed and DuplexInUse | Displays the current port speed and duplex mode used. |

## Using the Spanning Tree Algorithm

The Spanning Tree Algorithm can be used to detect and disable network loops, and to provide backup links between switches, bridges or routers. This allows the switch to interact with other bridging devices (that is, an STA-compliant switch, bridge or router) in your network to ensure that only one route exists between any two stations on the network. For a more detailed description of how to use this algorithm, refer to Appendix A, "Spanning Tree Concepts" on page 85.

```
Vertical Horizon Local Management -- VH-2402S


Spanning Tree Configuration : Selection Menu

        STA Bridge Configuration ...

        STA Port Configuration ...


                    <OK>
    Use <TAB> or arrow keys to move. <Enter> to select.
```
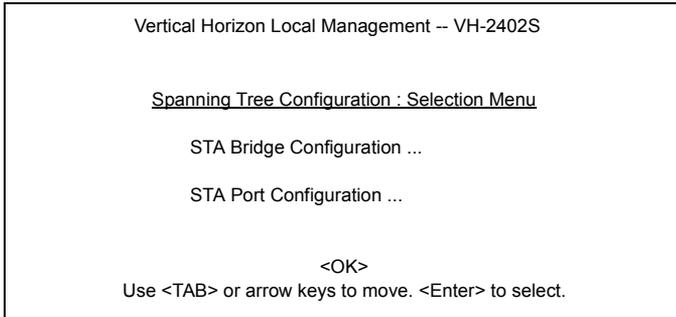
**Figure 2-22.  Spanning Tree Configuration**

### Configuring Bridge STA

The following figure and table describe Bridge STA configuration.

```
Vertical Horizon Local Management -- VH-2402S


Spanning Tree Configuration : Bridge STA Configuration


        Spanning Tree Protocol      : ENABLED

        Priority                    : 32768

        Hello Time (in seconds)     : 2

        Max Age (in seconds)        : 20

        Forward Delay (in seconds) : 15


        <APPLY>          <OK>          <CANCEL>
    Use <TAB> or arrow keys to move, <Space> to scroll options,
```
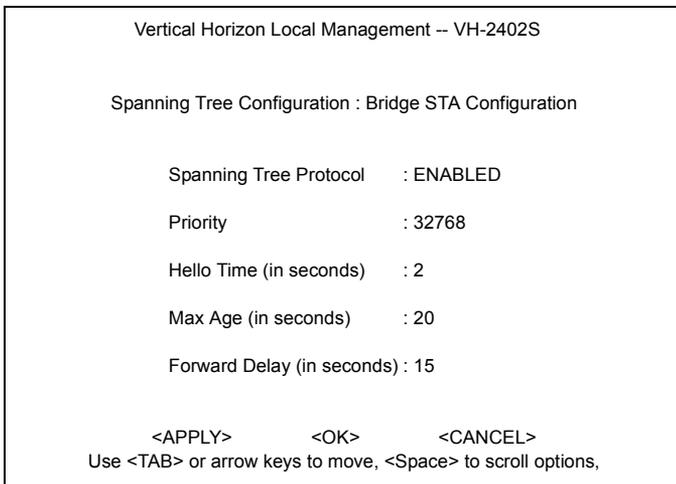
**Figure 2-23.  Bridge STA Configuration**

| Parameter | Default | Description |
|---|---|---|
| Spanning Tree Protocol | Enabled | Enable this parameter to participate in an STA compliant network. |
| Priority | 32,768 | Device priority is used in selecting the root device, root port, and designated port. The device with the highest priority becomes the STA root device. However, if all devices have the same priority, the device with the lowest MAC address will then become the root device. |
| | | Enter a value from 0 - 65535. Remember that the lower the numeric value, the higher the priority. |
| Hello Time | 2 | Time interval (in seconds) at which the root device transmits a configuration message. |
| | | The minimum value is1. The maximum value is the lower of 10 or [(Max. Message Age / 2) -1]. |
| Max (Message) Age | 20 | The maximum time (in seconds) a device can wait without receiving a configuration message before attempting to reconfigure. All device ports (except for designated ports) should receive configuration messages at regular intervals. Any port that ages out STA information (provided in the last configuration message) becomes the designated port for the attached LAN. If it is a root port, a new root port is selected from among the device ports attached to the network. |
| | | The minimum value is the higher of 6 or [2 x (Hello Time + 1)]. The maximum value is the lower of 40 or [2 x (Forward Delay - 1)]. |
| Forward Delay | 15 | The maximum time (in seconds) the root device will wait before changing states (i.e., listening to learning to forwarding). This delay is required because every device must receive information about topology changes before it starts to forward frames. In addition, each port needs time to listen for conflicting information that would make it return to a blocking state; otherwise, temporary data loops might result. |
| | | The maximum value is 30. The minimum value is the higher of 4 or [(Max. Message Age / 2) + 1]. |

## Configuring STA for Ports or Modules

The following figure and table describe STA configuration for ports or modules. (Note that the Spanning Tree Configuration screen for the expansion slots also indicates module type.)

```
               Vertical Horizon Local Management -- VH-2402S

          Fast forwarding mode of all ports : [Enable]   [Disable]
          Spanning Tree Port Configuration : Unit 1 Port 1-12

               Port    Type    Priority   Cost    FastForwarding

               ----------------------------------------------------
               1      10/100TX    128      19      ENABLED
               2      10/100TX    128      19      ENABLED
               3      10/100TX    128      19      ENABLED
               4      10/100TX    128      19      ENABLED
               5      10/100TX    128      19      ENABLED
               6      10/100TX    128      19      ENABLED
               7      10/100TX    128      19      ENABLED
               8      10/100TX    128      19      ENABLED
               9      10/100TX    128      19      ENABLED
               10     10/100TX    128      19      ENABLED
               11     10/100TX    128      19      ENABLED
               12     10/100TX    128      19      ENABLED

 <APPLY> <OK> <CANCEL> <PREV UNIT> <NEXT UNIT> <PREV PAGE> <NEXT PAGE>
             Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-24.  Spanning Tree Port Configuration**

| Parameter | Default | Description |
|---|---|---|
| Fast forwarding mode of all ports | ENABLED | Allows you to enable or disable fast forwarding for all ports on the switch. |
| Type | | Shows 10/100TX, 100FX, 1000LX or 1000SX port. |
| Priority | 128 | Defines the priority for the use of a port in the STA algorithm. If the path cost for all ports on a switch are the same, the port with the highest priority (i.e., lowest value) will be configured as an active link in the spanning tree. Where more than one port is assigned the highest priority, the port with lowest numeric identifier will be enabled. |
| | | The range is 0 - 255. |
| (Path) Cost | 100/19/4 | This parameter is used by the STA algorithm to determine the best path between devices. Therefore, lower values should be assigned to ports attached to faster media, and higher values assigned to ports with slower media. (Path cost takes precedence over port priority.) |
| | | The default and recommended range is: |
| | | Ethernet: 100 (50~600) Fast Ethernet: 19 (10~60) Gigabit Ethernet: 4 (3~10) |
| | | The full range is 1 - 65535. |

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| Parameter | Default | Description |
|---|---|---|
| FastForwarding | ENABLED | This parameter is used to enable/disabled the Fast Spanning Tree mode for the port. In this mode, ports skip the Blocked, Listening and Learning states and proceed straight to Forwarding. |
| | | FastForwarding enables end-node workstations and servers to overcome time-out problems when the Spanning Tree Algorithm is implemented in a network. Therefore, FastForwarding should only be enabled for ports that are connected to an end-node device. |

### Viewing the Current Spanning Tree Configuration

The Spanning Tree Information screen displays a summary of the STA information for the overall bridge or for a specific port or module. To make any changes to the parameters for the Spanning Tree, use the Spanning Tree Configuration menu.

```
            Vertical Horizon Local Management -- VH-2402S


            Spanning Tree Information : Selection Menu


                STA Bridge Information  ...

                STA Port Information ...


                            <OK>
            Use <TAB> or arrow keys to move. <Enter> to select.
```
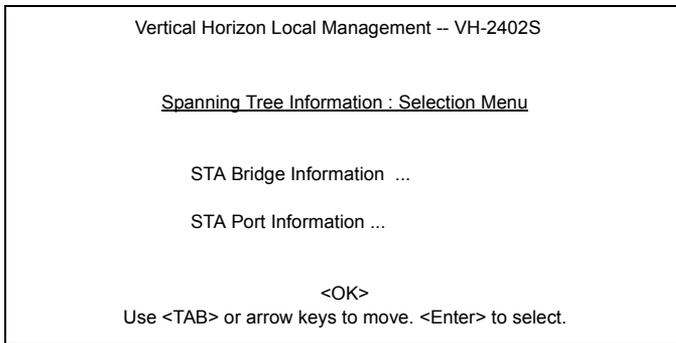
**Figure 2-25.  Spanning Tree Information**

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**Displaying the Current Bridge STA**

The parameters shown in the following figure and table describe the current Bridge STA Information.

```
┌──────────────────────────────────────────────────────────────┐
│            Vertical Horizon Local Management -- VH-2402S       │
│                                                                │
│                                                                │
│          Spanning Tree Information : Bridge STA Information    │
│                                                                │
│                                                                │
│      Priority                    : 32768                       │
│      Hello Time (in seconds)     : 2                           │
│      Max Age (in seconds)        : 20                          │
│      Forward Delay (in seconds)  : 15                          │
│      Hold Time (in seconds)      : 1                           │
│      Designated Root             : 0.0000E800E800              │
│      Root Cost                   : 19                          │
│      Root Port                   : 1                           │
│      Configuration Changes       : 2                           │
│      Topology Up Time            : 48069 (0 day, 1 hr, 2min, 34 sec) │
│                                                                │
│                              <OK>                              │
│            Use <Tab> or arrow keys to move, <Enter> to select. │
│                                                                │
└──────────────────────────────────────────────────────────────┘
```

**Figure 2-26.  Bridge STA Information**

| Parameter | Description |
|---|---|
| Priority | Device priority is used in selecting the root device, root port, and designated port. The device with the highest priority becomes the STA root device. However, if all devices have the same priority, the device with the lowest MAC address will then become the root device. |
| Hello Time | The time interval (in seconds) at which the root device transmits a configuration message. |
| Max Age | The maximum time (in seconds) a device can wait without receiving a configuration message before attempting to reconfigure. |
| Forward Delay | The maximum time (in seconds) the root device will wait before changing states (i.e., listening to learning to forwarding). |
| Hold Time | The minimum interval between the transmission of consecutive Configuration BPDUs. |
| Designated Root | The priority and MAC address of the device in the spanning tree that this switch has accepted as the root device. |
| Root Cost | The path cost from the root port on this switch to the root device. |
| Root Port | The number of the port on this switch that is closest to the root. This switch communicates with the root device through this port. If there is no root port, then this switch has been accepted as the root device of the spanning tree network. |
| Configuration Changes | The number of times the spanning tree has been reconfigured. |
| Topology Up Time | The time since the spanning tree was last reconfigured. |

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**Displaying the Current STA for Ports or Modules**

The parameters shown in the following figure and table are for port or module STA Information (Port 1-12, Port 13-24, Port 25-32).

```
           Vertical Horizon Local Management -- VH-2402S

           Spanning Tree Port Information : Unit 1 Port 1-12

   Port    Type        Status     Designated   Designated     Designated
                                   Cost         Bridge         Port
   ------------------------------------------------------------------------------------------------
    1.   10/100TX   FORWARDING   0     0.0000E800E800    128.3
    2.   10/100TX   FORWARDING   19    32768.00029522800  128.1
    3.   10/100TX   FORWARDING   19    32768.00029522800  128.1
    4.   10/100TX   FORWARDING   19    32768.00029522800  128.5
    5.   10/100TX   LISTENING    19    32768.00029522800  128.6
    6.   10/100TX   LEARNING     19    32768.00029522800  128.3
    7.   10/100TX   FORWARDING   19    32768.00029522800  128.3
    8.   10/100TX   FORWARDING   19    32768.00029522800  128.3
    9.   10/100TX   FORWARDING   19    32768.00029522800  128.4
   10.   10/100TX   FORWARDING   19    32768.00029522800  128.5
   11.   10/100TX   FORWARDING   19    32768.00029522800  128.5
   12.   10/100TX   FORWARDING   19    32768.00029522800  128.5

    <OK>  <PREV UNIT>  <NEXT UNIT>  <PREV PAGE>  <NEXT PAGE>
         Use <TAB> or arrows keys to move. <Enter> to select.
```

**Figure 2-27.  Spanning Tree Port Information**

| Parameter | Description |
|---|---|
| Type | Shows port type as: |
| | 10/100TX  : 10Base-T / 100Base-TX |
| | 100FX      : 100Base-FX |
| | 1000SX    : 1000Base-SX |
| | 1000LX    : 100Base-LX |
| Status | Displays the current state of this port within the spanning tree: |
| | No Link — There is no valid link on the port. |
| | Disabled — Port has been disabled by the user or has failed diagnostics. |
| | Blocking — Port receives STA configuration messages, but does not forward packets. |
| | Listening — Port will leave blocking state due to topology change, starts transmitting configuration messages, but does not yet forward packets. |
| | Learning — Has transmitted configuration messages for an interval set by the Forward Delay parameter without receiving contradictory information. Port address table is cleared, and the port begins learning addresses. |
| | Forwarding — The port forwards packets, and continues learning addresses. |

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| Parameter | Description |
|---|---|
| | The rules defining port status are: |
| | • A port on a network segment with no other STA-compliant bridging device is always forwarding. |
| | • If two ports of a switch are connected to the same segment and there is no other STA device attached to this segment, the port with the smaller ID forwards packets and the other is blocked. |
| | • All ports are blocked when the switch is booted, then some of them change state to listening, to learning, and then to forwarding. |
| Designated Cost | The cost for a packet to travel from this port to the root in the current spanning tree configuration. The slower the media, the higher the cost. |
| Designated Bridge (ID) | The priority and MAC address of the device through which this port must communicate to reach the root of the spanning tree. |
| Designated Port (ID) | The priority and number of the port on the designated bridging device through which this switch must communicate with the root of the spanning tree. |

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## Using a Mirror Port for Analysis

You can mirror traffic from any source port to a target port for real-time analysis. You can then attach a logic analyzer or RMON probe to the target port and study the traffic crossing the source port in a completely unobtrusive manner. When mirroring port traffic, note that the target port must be configured in the same VLAN and be operating at the same speed as the source port (see Configuring Virtual LANs on page 49). If the target port is operating at a lower speed, the source port will be forced to drop its operating speed to match that of the target port.

You can use the Mirror Port Configuration screen to designate a single port pair for mirroring as shown below:

```
┌──────────────────────────────────────────────────────────────┐
│          Vertical Horizon Local Management -- VH-2402S         │
│                                                                │
│                                                                │
│                  Mirror Port Configuration                     │
│                                                                │
│                                                                │
│            Mirror Source Port :  Unit 1                         │
│                                  Port 1                         │
│                                                                │
│            Mirror Target Port  :  Unit 1                        │
│                                   Port 2                        │
│                                                                │
│            Status              :  DISABLED                      │
│                                                                │
│        <APPLY>          <OK>          <CANCEL>                  │
│      Use <TAB> or arrow keys to move, other keys to make changes.│
│                                                                │
└──────────────────────────────────────────────────────────────┘
```

**Figure 2-28.  Mirror Port Configuration**

| Parameter | Description |
|-----------|-------------|
| Mirror Source Port | The port whose traffic will be monitored. |
| Mirror Target Port | The port that will duplicate or "mirror" all the traffic happening on the monitored port. |
| Status | Enables or disables the mirror function. |

## Configuring Port Trunks

Port trunks can be used to increase the bandwidth of a network connection or to ensure fault recovery. You can configure up five trunk connections (combining 2~4 ports into a fat pipe) between any two standalone VH-2402S switches, or up to 12 for an entire stack. However, before making any physical connections between devices, use the Trunk Configuration menu to specify the trunk on the devices at both ends. When using a port trunk, note that:

- The ports used in a trunk must all be of the same media type (RJ-45, 100Mbps fiber, or 1000Mbps fiber). The ports that can be assigned to the same trunk also have certain other restrictions (see the next page).

- Ports can only be assigned to one trunk.

- The ports at both ends of a connection must be configured as trunk ports.

- The ports at both ends of a trunk must be configured in an identical manner, including speed, duplex mode, and VLAN assignments.

- None of the ports in a trunk can be configured as a mirror source port or mirror target port.

- All the ports in a trunk have to be treated as a whole when moved from/to, added or deleted from a VLAN.

- The Spanning Tree Algorithm will treat all the ports in a trunk as a whole.

- Enable the trunk prior to connecting any cable between the switches to avoid creating a loop.

- Disconnect all trunk port cables or disable the trunk ports before removing a port trunk to avoid creating a loop.

You can use the Port Trunking Configuration screen set up port trunks as shown below:

```
                  Vertical Horizon Local Management -- VH-2402S
                          Port Trunking Configuration

        Trunk ID    Status              Member List
                                   1            2            3            4
      ------------- ------------ --------------- --------------- --------------- ---------------
          --        ------------ Unit : -        Unit : -        Unit : -        Unit : -
                                 Port : --       Port : --       Port : --       Port : --

          --        ------------ Unit : -        Unit : -        Unit : -        Unit : -
                                 Port : --       Port : --       Port : --       Port : --

          --        ------------ Unit : -        Unit : -        Unit : -        Unit : -
                                 Port : --       Port : --       Port : --       Port : --

      Trunk ID : 1                          Trunk ID : 1    Member Unit : 1
                                                            Member Port : 1

      [Show]    [More]
      [Enable]  [Disable]                     [Add]    [Delete]

                                  <OK>
        Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-29.  Port  Trunking Configuration**

| Parameter | Description |
|---|---|
| Trunk ID | Configure up to three trunks per switch. |
| Unit | Specifies a switch unit in the stack (1~7). |
| Port | Select from 2~4 ports per trunk. |
| [Show] | Displays trunk settings, where the first trunk listed is specified by "Sorted by Trunk ID." |
| [More] | Scrolls through the list of configured trunks. |
| [Enable] [Disable] | Enables/disables the selected trunk. |

The RJ-45 ports used for each trunk must all be on the same internal switch chip. The port groups permitted include:

| Group 1 | Group 2 | Group 3 |
|---|---|---|
| 1,2,3,4,<br>13,14,15,16 | 5,6,7,8,<br>17,18,19,20 | 9,10,11,12,<br>21,22,23,24 |

Only two 100Mbps fiber ports can be configured as a trunk and these must be on the same module. However, 1000Mbps fiber ports may be on any module in the stack.

### IGMP Multicast Filtering

Multicasting is used to support real-time applications such as video conferencing or streaming audio. A multicast server does not have to establish a separate connection with each client. It merely broadcasts its service to the network, and any hosts which want to receive the multicast register with their local multicast switch/router. Although this approach reduces the network overhead required by a multicast server, the broadcast traffic must be carefully pruned at every multicast switch/router it passes through to ensure that traffic is only passed on the hosts which subscribed to this service.

This switch uses IGMP (Internet Group Management Protocol) to query for any attached hosts who want to receive a specific multicast service. The switch looks up the IP Multicast Group used for this service and adds any port which received a similar request to that group. It then propagates the service request on to any neighboring multicast switch/router to ensure that it will continue to receive the multicast service. (For more information, see "IGMP Snooping and IP Multicast Filtering" on page 97.)

More user manuals on ManualsBase.com

### Configuring IGMP

This protocol allows a host to inform its local switch/router that it wants to receive transmissions addressed to a specific multicast group. You can use the IGMP Configuration screen to configure multicast filtering shown below:

```
┌─────────────────────────────────────────────────────────────────┐
│          Vertical Horizon Local Management -- VH-2402S            │
│                                                                   │
│                                                                   │
│                        IGMP Configuration                         │
│                                                                   │
│                                                                   │
│         IGMP Status               : DISABLED                      │
│                                                                   │
│         Act as IGMP Querier       : DISABLED                      │
│                                                                   │
│         IGMP Query Count          : 2                             │
│                                                                   │
│         IGMP Report Delay (Seconds) : 10                          │
│                                                                   │
│          <APPLY>         <OK>          <CANCEL>                    │
│       Use <TAB> or arrow keys to move, <Space> to scroll options. │
└─────────────────────────────────────────────────────────────────┘
```

**Figure 2-30.  IGMP Configuration**

| Parameter | Description |
|---|---|
| IGMP Status | If enabled, the switch will monitor network traffic to determine which hosts want to receive multicast traffic. |
| Act as IGMP Querier | If enabled, the switch can serve as the "querier," which is responsible for asking hosts if they want to receive multicast traffic. |
| IGMP Query Count | The maximum number of queries issued for which there has been no response before the switch takes action to solicit reports. (Range: 2 - 10.) |
| IGMP Report Delay | The time (in seconds) between receiving an IGMP Report for an IP multicast address on a port before the switch sends an IGMP Query out of that port and removes the entry from its list. (Range: 5 - 30.) |

**Note: The default values are indicated in the sample screen.**

## Configuring Broadcast Storm Control

Use the Broadcast Storm Control Configuration screen to enable broadcast storm control for any port on the switch, as shown below:

```
          Vertical Horizon Local Management -- VH-2402S

      Broadcast Storm Control Configuration :   Unit  1 Port  1-12

      Broadcast control on all ports :      [Enable]  [Disable]
         Port        Threshold         Broadcast Control
      -------------------------------------------------------
          1            500                ENABLED
          2            500                ENABLED
          3            500                ENABLED
          4            500                ENABLED
          5            500                ENABLED
          6            500                ENABLED
          7            500                ENABLED
          8            500                ENABLED
          9            500                ENABLED
         10            500                ENABLED
         11            500                ENABLED
         12            500                ENABLED

 <APPLY> <OK> <CANCEL> <PREV UNIT> <NEXT UNIT> <PREV PAGE> <NEXT PAGE>
            Use <TAB> or arrow keys to move. <Enter> to select
```

**Figure 2-31.  Broadcast Storm Control Configuration**

| Parameter | Description |
| --- | --- |
| Broadcast Control on All Ports | Allows you to enable/disable broadcast storm control for all ports on the switch. |
| Threshold | The packet-per-second threshold for broadcast packets on the port. (Default is 500 pps.) |
| Broadcast Control | Enables/disables broadcast control for the port. When enabled, the switch drops all broadcast packets if the packet-per-second threshold is exceeded. (Default is Enabled.) |

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## Configuring Bridge MIB Extensions

The Bridge MIB includes extensions for managed devices that support Traffic Classes, Multicast Filtering and Virtual LANs. To configure these extensions, use the Extended Bridge Configuration screen as shown below:

```
           Vertical Horizon Local Management -- VH-2402S


                      Extended Bridge Configuration

              Bridge Capability : (Read Only)
                 Extended Multicast Filtering Services   : NO
                 Traffic Classes                         : YES
                 Static Entry Individual Port            : YES
                 Configurable PVID Tagging               : YES
                 Local VLAN Capable                      : NO

              Bridge Settings :
                 Traffic Class                 : TRUE
                 VLAN Learning                 : SVL
                 GMRP                          : DISABLED
                 GVRP                          : DISABLED

                 <APPLY>         <OK>         <CANCEL>
              Use <TAB> or arrow keys to move. <Space> to scroll options.
```

**Figure 2-32.  Extended Bridge Configuration**

| Parameter | Description |
|---|---|
| *Bridge Capability* | |
| Extended Multicast Filtering Services | Indicates that this switch does not support the filtering of individual multicast addresses based on GMRP (GARP Multicast Registration Protocol). Note that this function is not available for the current firmware release. |
| Traffic Classes | This switch provides mapping of user priorities to multiple traffic classes. (Refer to 802.1P Configuration.) |
| Static Entry Individual Port | This switch enables static filtering for unicast and multicast addresses. (Refer to Network Monitor Menu / Static Unicast Address Table Configuration and Static Multicast Address Table Configuration.) |
| Configurable PVID Tagging | This switch allows you to override the default PVID setting (Port VLAN ID used in frame tags) and its egress status (VLAN-Tagged or Untagged) on each port. (Refer to Port Assignment VLAN Configuration.) |
| Local VLAN Capable | This switch does not support multiple local bridges (that is, multiple Spanning Trees). |

| Parameter | Description |
|---|---|
| *Bridge Settings* | |
| Traffic Class* | Multiple traffic classes are supported by this switch as indicated under Bridge Capabilities. However, you can disable this function by setting this parameter to False. |
| VLAN Learning | As default this switch uses Shared VLAN Learning (SVL), whereby all ports share one VLAN filtering database. However, you can set the switch to use Independent VLAN Learning (IVL), where each port maintains its own filtering database. |
| | Note that when you change from one method to the other, the switch will automatically reset and the current VLAN configuration will be lost.. |
| GMRP* | GARP Multicast Registration Protocol (GMRP) allows network devices to register endstations with multicast groups. (Note that GMRP is not implemented in the current firmware release.) |
| | The Internet Group Management Protocol (IGMP) is currently used by this switch to provide automatic multicast filtering. |
| GVRP* | GARP VLAN Registration Protocol (GVRP) defines a way for switches to exchange VLAN information in order to register necessary VLAN members on ports across the network. This function should be enabled to permit VLANs groups which extend beyond the local switch. |

**\* Not implemented in the current firmware release.**

## Configuring Traffic Classes

IEEE 802.1p defines up to 8 separate traffic classes. This switch supports Quality of Service (QoS) by using two priority queues, with weighted fair queuing for each port. You can use the 802.1P Configuration menu to configure the default priority for each port, or to display the mapping for the traffic classes as described in the following sections. Also, refer to Appendix C, "Class of Service" on page 95. .

```
          Vertical Horizon Local Management -- VH-2402S


              802.1P Configuration : Selection Menu


              802.1P Port Priority Configuration ...

              802.1P Port Traffic Class Information ...



                              <OK>
              Use <TAB> or arrows keys to move. <Enter> to select.
```
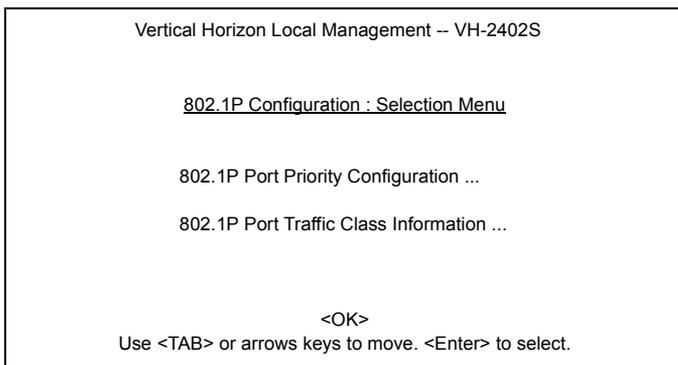
**Figure 2-33.  802.1P Configuration**

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## Port Priority Configuration

The default priority for all ingress ports is zero. Therefore, any inbound frames that do not have priority tags will be placed in the low priority output queue. Default priority is only used to determine the output queue for the current port; no priority tag is actually added to the frame. You can use the 802.1P Port Priority Configuration menu to adjust default priority for any port as shown below:

```
                 Vertical Horizon Local Management -- VH-2402S

         802.1P Port Priority Configuration : Unit 1 Port  1 - 12


              Port      Default Ingress    Number of Egress
                         User Priority      Traffic Class
              ------------------------------------------------------
               1              0                   2
               2              0                   2
               3              0                   2
               4              0                   2
               5              0                   2
               6              0                   2
               7              0                   2
               8              0                   2
               9              0                   2
              10              0                   2
              11              0                   2
              12              0                   2

  <APPLY> <OK> <CANCEL> <PREV UNIT> <NEXT UNIT> <PREV PAGE> <NEXT PAGE>
              Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-34.  802.1P Port Priority Configuration**

| Parameter | Description |
|---|---|
| Port | Numeric identifier for switch port. |
| Default Ingress User Priority | Default priority can be set to any value from 0~7, where 0~3 specifies the low priority queue and 4~7 specifies the high priority queue. |
| Number of Egress Traffic Classes | Indicates that this switch supports two priority output queues. |

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### 802.1P Port Traffic Class Information

This switch provides two priority levels with weighted fair queuing for port egress. This means that any frames with a default or user priority from 0~3 are sent to the low priority queue "0" while those from 4~7 are sent to the high priority queue "1" as shown in the following screen:

```
                Vertical Horizon Local Management -- VH-2402S

        802.1P Port Traffic Class Information :   Unit 1 Port  1 - 12

            Port                   User Priority
                    0    1    2    3    4    5    6    7
            ----------------------------------------------------------
                1   0    0    0    0    1    1    1    1
                2   0    0    0    0    1    1    1    1
                3   0    0    0    0    1    1    1    1
                4   0    0    0    0    1    1    1    1
                5   0    0    0    0    1    1    1    1
                6   0    0    0    0    1    1    1    1
                7   0    0    0    0    1    1    1    1
                8   0    0    0    0    1    1    1    1
                9   0    0    0    0    1    1    1    1
               10   0    0    0    0    1    1    1    1
               11   0    0    0    0    1    1    1    1
               11   0    0    0    0    1    1    1    1

        <OK> <PREV UNIT> <NEXT UNIT> <PREV PAGE> <NEXT PAGE>
          Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-35.  802.1P Port Traffic Class Information**

| Parameter | Description |
|-----------|-------------|
| Port | Numeric identifier for switch port. |
| User Priority | Shows that user priorities 0~3 specify the low priority queue and 4~7 specify the high priority queue. |

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## Configuring Virtual LANs

You can use the VLAN configuration menu to assign any port on the switch to any of up to 256 LAN groups. In conventional networks with routers, broadcast traffic is split up into separate domains. Switches do not inherently support broadcast domains. This can lead to broadcast storms in large networks that handle a lot of IPX and NetBeui traffic. By using IEEE 802.1Q compliant VLANs and GARP VLAN Registration Protocol, you can organize any group of network nodes into separate broadcast domains, confining broadcast traffic to the originating group. This also provides a more secure and cleaner network environment. For more information on how to use VLANs, see Appendix B, "Virtual LANs (VLANs)" on page 91. The VLAN configuration screens are described in the following sections.

### 802.1Q VLAN Base Information

The 802.1Q VLAN Base Information screen displays basic information on the VLAN type supported by this switch.

```
Vertical Horizon Local Management -- VH-2402S



            802.1Q VLAN Base Information

    VLAN Version Number                    : 1

    MAX VLAN ID                            : 2048

    MAX Supported VLANs                    : 256

    Current Number of 802.1Q VLANs Configured : 2

                   <OK>
            Return to previous panel.
               <Enter> to select.
```

**Figure 2-36.  802.1Q VLAN Base Information**

| Parameter | Description |
|---|---|
| VLAN Version Number | The VLAN version used by this switch as specified in the IEEE 802.1Q standard. |
| MAX VLAN ID | Maximum VLAN ID recognized by this switch. |
| MAX Supported VLANs | Maximum number of VLANs that can be configured on this switch. |
| Current Number of VLANs Configured | The number of VLANs currently configured on this switch. |

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### 802.1Q VLAN Current Table Information

This screen shows the current port members of each VLAN and whether or not the port supports VLAN tagging. Ports assigned to a large VLAN group that crosses several switches should use VLAN tagging. However, if you just want to create a small port-based VLAN for one or two switches, you can assign ports to the same untagged VLAN (page 53). The current configuration is shown in the following figure.

```
          Vertical Horizon Local Management -- VH-2402S

               802.1Q VLAN Current Table Information

                   Deleted VLAN Entry Counts : 0

          VID            Creation Time                 Status
      ---------------------------------------------------------------------
           1        0 (0 day 0 hr 0 min 0 sec)        Dynamic GVRP

Unit  Current Egress Ports              Current Untagged Ports
  1.  100000000000 100000000000 10   100000000000 000000000000 00
  2.  ------------ ------------ --     ------------ ------------ --
  3.  ------------ ------------ --     ------------ ------------ --
  4.  ------------ ------------ --     ------------ ------------ --

    Sorted by VID : 1        Port 1    Port 13    Port 25

    [Show]    [More]
                             <OK>
           Use <TAB> or arrow keys to move. <Enter> to select.
```

**Figure 2-37.  802.1Q VLAN Current Table Information**

| Parameter | Description |
|---|---|
| Deleted VLAN Entry Counts | The number of times a VLAN entry has been deleted from this table. |
| VID | The ID for the VLAN currently displayed. |
| Creation Time | The value of sysUpTime (System Up Time) when this VLAN was created. |
| Status | Shows how this VLAN was added to the switch:<br>Dynamic GVRP: Automatically learned via GVRP.<br>Permanent:     Added as a static entry. |
| Unit | Stack unit. |
| Current Egress Ports | Shows the ports which have been added to the displayed VLAN group, where "1" indicates that a port is a member and "0" that it is not. |
| Current Untagged Ports | If a port has been added to the displayed VLAN (see Current Egress Ports), its entry in this field will be "1" if the port is untagged or "0" if tagged. |
| [Show] | Displays the members for the VLAN indicated by the "Sorted by VID" field. |
| [More] | Displays any subsequent VLANs if configured. |

### 802.1Q VLAN Static Table Configuration

Use this screen to create a new VLAN or modify the settings for an existing VLAN. You can add/delete port members for a VLAN from any unit in the stack, or prevent a port from being automatically added to a VLAN via the GVRP protocol. (Also, note that all ports can only belong to one untagged VLAN. This is set to VLAN 1 by default, but can be changed via the Port Assignment VLAN Configuration screen on page 53.)

```
              Vertical Horizon Local Management -- VH-2402S

                      1Q VLAN Static Table Configuration

                  VID      VLAN Name  Status
                  ------------------------------------------
                   1                   Active

          Unit  Egress Ports                    Forbidden Egress Ports
          1.    111111111111 111111111111 ----  000000000000 000000000000 ----
          2.    ----------- ----------- ----    ----------- ----------- ----
          3.    ----------- ----------- ----    ----------- ----------- ----
          4.    ----------- ----------- ----    ----------- ----------- ----

          Unit  Untagged Ports
          1.    111111111111 111111111111 ----  VID : 1
          2.    ----------- ----------- ----    [Show]
          3.    ----------- ----------- ----    [More]
          4.    ----------- ----------- ----    [New]

                    <APPLY>         <OK>          <CANCEL>
              Use <TAB> or arrow keys to move, other keys to make changes.
                              <Enter> to select.
```

**Figure 2-38.  802.1Q VLAN Static Table Configuration**

| Parameter | Description |
|---|---|
| VID | The ID for the VLAN currently displayed. Range: 1-2048 |
| VLAN Name | A user-specified symbolic name for this VLAN. |
| | String length: Up to 8 alphanumeric characters |
| Status | Sets the current editing status for this VLAN as: |
| | Not in Service, Destroy, or Active. |
| Unit | Stack unit. |
| Egress Ports | Set the entry for any port in this field to "1" to add it to the displayed VLAN, or "0" to remove it from the VLAN. |
| Forbidden Egress Ports | Prevents a port from being automatically added to this VLAN via GVRP. |
| Untagged Ports | Set the entry for any port in this field to "1" to add it to the displayed VLAN as an untagged port. |
| [Show] | Displays settings for the specified VLAN. |
| [More] | Displays consecutively numbered VLANs. |
| [New] | Sets up the screen for configuring a new VLAN. |

For example, the following screen displays settings for VLAN 2, which includes tagged ports 1-6, and forbidden port 12. (Note that the dashed lines show that there are no switch units in this system other than Unit 1.)

```
                Vertical Horizon Local Management -- VH-2402S

                    1Q VLAN Static Table Configuration

                    VID      VLAN Name  Status
                    ------------------------------------------
                     2                  Active

  Unit  Egress Ports                    Forbidden Egress Ports
  1.    111111000000 000000000000 ----  000000000001 000000000000 ----
  2.    ----------- ----------- ----     ----------- ----------- ----
  3.    ----------- ----------- ----     ----------- ----------- ----
  4.    ----------- ----------- ----     ----------- ----------- ----

  Unit  Untagged Ports
  1.    000000000000 000000000000 ----  VID : 2
  2.    ----------- ----------- ----    [Show]
  3.    ----------- ----------- ----    [More]
  4.    ----------- ----------- ----    [New]

              <APPLY>        <OK>        <CANCEL>
         Use <TAB> or arrow keys to move, other keys to make changes.
                          <Enter> to select.
```

**Figure 2-39.  802.1Q VLAN Static Table Configuration Example**

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### Port Assignment VLAN Configuration

Use this screen to configure port-specific settings for IEEE 802.1Q VLAN features.

```
        Vertical Horizon Local Management -- VH-2402S

              Port Assignment VLAN Configuration

        Unit  Port  PVID   802.1Q Trunk   Ingress Filter
       ----------------------------------------------------------
         1     1     3         NO            TRUE
         1     2     3         NO            TRUE
         1     3     1         NO            FALSE
         1     4     1         NO            FALSE
         1     5     1         NO            FALSE
         1     6     1         NO            FALSE
         1     7     1         NO            FALSE
         1     8     1         NO            FALSE
         1     9     1         NO            FALSE
         1    10     1         NO            FALSE

    Unit ID  : 1          [Show]
    Port ID  : 1          [More]

            <APPLY>        <OK>         <CANCEL>
       Use <TAB> or arrow keys to move, <Space> to scroll options.
```

**Figure 2-40.  Port Assignment VLAN Configuration**

| Parameter | Description |
|-----------|-------------|
| PVID | The VLAN ID assigned to untagged frames received on this port. Use the PVID to assign ports to the same untagged VLAN. |
| 802.1Q Trunk | Used to enable/disable the VLAN trunk status for the port. A VLAN Trunk link between two VLAN-aware switches will carry traffic from all VLANs, allowing VLAN tagged frames to maintain their VLAN ID across multiple switches. When enabled, a port joins all configured VLANs and the untagged port VLAN ID (PVID) is set to 4000, a reserved VLAN ID for trunk ports. |
| Ingress Filter* | If set to "True," incoming frames for VLANs which do not include this port in their member set will be discarded at the inbound port. |
| [Show] | Displays settings for the specified stack unit and port. |
| [More] | Displays consecutively numbered stack units and ports. |

**\* This control does not affect VLAN independent BPDU frames, such as GVRP or STP. However, it does affect VLAN dependent BPDU frames, such as GMRP.**

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## Multicast Router Port Information

You can use the Multicast Router Port Information screen to display the ports on this switch attached to a neighboring multicast router/switch for each VLAN ID.

```
            Vertical Horizon Local Management -- VH-2402S

                    Multicast Router Port Information


Unit Dynamic Router Port List          Unit Static Router Port List
-------------------------------------------------------------------------------------------------

1    000000000000 000000000000 00-- 1    000000000000 000000000000 00--




     Sorted by VID : 1

     [Show]   [More]

               <OK>           <PREV UNIT>        <NEXT UNIT>
             Use <TAB> or arrow keys to move. <Enter> to select
```

**Figure 2-41.  Multicast Router Port Information**

| Parameter | Description |
|-----------|-------------|
| Unit | The stack unit ID. |
| Dynamic Router Port List | The switch ports that have been automatically listed as being attached to a neighboring multicast router/switch. |
| Static Router Port List | The switch ports that have been manually listed as being attached to a neighboring multicast router/switch. |
| Sorted by VID | The VLAN ID number used to sort the list. |
| [Show] | Displays settings for the specified VLAN ID and stack unit. |
| [More] | Displays consecutively numbered stack units. |

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## Static Multicast Router Port Configuration

You can use the Static Multicast Router Port Configuration screen to assign ports that are attached to a neighboring multicast router/switch.

```
                Vertical Horizon Local Management -- VH-2402S

                 Static Multicast Router Port Configuration


            Unit     Static Multicast Router Port List
            ------------------------------------------------------------
             1       000000000000 000000000000 00--




      Sorted by VID : 1          Unit : 1  Port : 1
      [Show]   [More]            [Add]    [Delete]

               <OK>          <PREV UNIT>        <NEXT UNIT>
            Use <TAB> or arrow keys to move. <Enter> to select
```

**Figure 2-42.  Static Multicast Router Port Configuration**

| Parameter | Description |
|---|---|
| Unit | The stack unit ID. |
| Static Multicast Router Port List | A list of the switch ports that have been manually configured as being attached to a neighboring multicast router/switch. |
| Sorted by VID | The VLAN ID number used to sort the list. |
| [Show] | Displays settings for the specified VLAN ID and stack unit. |
| [More] | Displays consecutively numbered stack units. |
| [Add] | Adds a new router port to the current list. |
| [Delete] | Removes a router port from the current list. |

## IGMP Member Port Configuration

You can use the IGMP Member Port Configuration screen to assign ports that are attached to hosts who want to receive a specific multicast service.

```
              Vertical Horizon Local Management -- VH-2402S

                     IGMP Member Port Configuration


Unit  Dynamic IGMP Member Port List      Static IGMP Member Port List
-----------------------------------------------------------------------------------------------------------------
 1



    VID        :
    Multicast IP :          Unit : 1  Port : 1
    [Show]   [More]           [Add]    [Delete]

            <OK>          <PREV UNIT>        <NEXT UNIT>
           Use <TAB> or arrow keys to move. <Enter> to select
```

**Figure 2-43.  IGMP Member Port Configuration**

| Parameter | Description |
|-----------|-------------|
| Unit | The stack unit ID. |
| Dynamic IGMP Member Port List | A list of the switch ports that have been automatically configured as being attached to a IGMP host. |
| Static IGMP Member Port List | A list of the switch ports that have been manually configured as being attached to a IGMP host. |
| VID | The VLAN ID number used to sort the list. |
| Multicast IP | The IP address for a specific multicast service that is used to sort the list. |
| [Show] | Displays settings for the specified VLAN ID and stack unit. |
| [More] | Displays consecutively numbered stack units. |
| [Add] | Adds a new host port to the current list. |
| [Delete] | Removes a host port from the current list. |

## Port Security Configuration

Use the Port Security Configuration screen to enable and configure port security for the switch. Port Security allows you to configure each port with a list of MAC addresses of devices that are authorized to access the network through that port.

```
Vertical Horizon Local Management -- VH-2402S

                    Port Security Configuration

       MAC Address              MAC Address
       ---------------------------------------------------------------




Secure address count : 0

Unit  : 1        Port : 1          MAC  : 00-00-00-00-00-00
[Show]           [More]            [Add] [Delete]
Mode:DISABLE  [Apply]              [Clear]

                          <OK>
         Use <TAB> or arrow keys to move. <Enter> to select
```

**Figure 2-44.  Port Security Configuration**

| Parameter | Description |
|---|---|
| MAC Address | A list of the authorized MAC addresses that can access the network through the specified port. |
| Secure Address Count | The number of authorized MAC addresses for the specified port. |
| Unit | The stack unit ID. |
| Port | The port number on the unit. |
| [Show] | Displays authorized MAC addresses for the specified port. |
| [More] | Displays more MAC addresses for the port. |
| Mode | Port security can set to three states; Static, Disable, or Learning. When set to Static, the switch will drop packets from the port if the source MAC address does not match one of the addresses in the MAC Address list. If set to Learning, the switch will add the source MAC address of all packets received on the port to the authorized MAC Address list. |
| [Apply] | Applies a change of Mode to the port. |
| MAC | A specific MAC address to be added or deleted from the list. |
| [Add] | Adds a new MAC address to the current list. |
| [Delete] | Removes a MAC address from the current list. |
| [Clear] | Clears all the MAC addresses for the current port. |

# Monitoring the Switch

The Network Monitor Menu provides access to port statistics, RMON statistics, IP multicast addresses, and the static (unicast) address table. Each of the screens provided by these menus is described in the following sections.

```
Vertical Horizon Local Management -- VH-2402S


                        Network Monitor Menu


        Port Statistics ...
        RMON Statistics ...
        Unicast Address Table ...
        Multicast Address Registration Table ...
        IP Multicast Registration Table ...
        Static Unicast Address Table Configuration ...
        Static Multicast Address Table Configuration...

                            <OK>
        Use <TAB> or arrow keys to move. <Enter> to select.
```
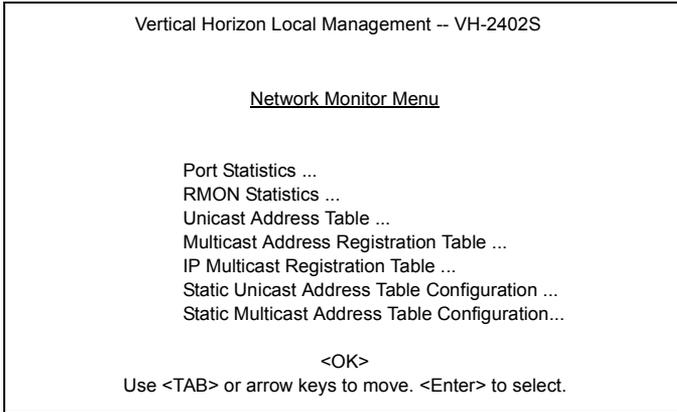
**Figure 2-45.  Network Monitor Menu**

| Parameter | Description |
|---|---|
| Port Statistics | Displays statistics on network traffic passing through the selected port. |
| RMON Statistics | Displays detailed statistical information for the selected port such as packet type and frame size counters. |
| Unicast Address Table | Provides full listing of all unicast addresses stored in the switch, as well as sort, search and clear functions. |
| Multicast Address Registration Table | Displays the ports that belong to each GMRP Muticast group. (Not implemented in this firmware release.) |
| IP Multicast Registration Table | Displays the ports that belong to each IP Muticast group. |
| Static Unicast Address Table Configuration | Allows you to display or configure static unicast addresses. |
| Static Multicast Address Table Configuration | Allows you to display or configure static GMRP multicast addresses. (Not implemented in this firmware release.) |

## Displaying Port Statistics

Port Statistics display key statistics from the Ethernet-like MIB for each port. Error statistics on the traffic passing through each port are displayed. This information can be used to identify potential problems with the switch (such as a faulty port or unusually heavy loading). The values displayed have been accumulated since the last system reboot.

Select the required stack unit, and port or module. The statistics displayed are indicated in the following figure and table.

```
        Vertical Horizon Local Management -- VH-2402S


                    Port Statistics : Unit 1 Port 1


        EtherLike Counter:

        Alignment Errors        :0      Late Collisions             :0
        FCS Errors              :0      Excessive Collisions        :0
        Single Collision Frames :0      Internal MAC Transmit Errors:0
        Multiple Collision Frames:0     Carrier Sense Errors        :0
        SQE Test Errors         :0      Frames Too Long             :0
        Deffered Transmissions  :0      Internal MAC Receive Errors :0

        [Refresh Statistics]                Show port  : 1
        [Reset Counters]                       [Show]

    <OK>  <PREV UNIT>  <NEXT UNIT> <PREV PORT> <NEXT PORT>
           Use <TAB> or arrow keys to move. <Enter> to select.
```

**Figure 2-46.  Port Statistics**

| Parameter | Description |
|---|---|
| Alignment Errors | For 10 Mbps ports, this counter records alignment errors (mis-synchronized data packets). For 100 Mbps ports, this counter records the sum of alignment errors and code errors (frames received with rxerror signal). |
| FCS Errors | The number of frames received that are an integral number of octets in length but do not pass the FCS check. |
| Single Collision Frames* | The number of successfully transmitted frames for which transmission is inhibited by exactly one collision. |
| Multiple Collision Frames* | A count of successfully transmitted frames for which transmission is inhibited by more that one collision. |
| SQE Test Errors* | A count of times that the SQE TEST ERROR message is generated by the PLS sublayer. |
| Deferred Transmissions* | A count of frames for which the first transmission attempt on a particular interface is delayed because the medium was busy. |
| Late Collisions | The number of times that a collision is detected later than 512 bit-times into the transmission of a packet. |
| Excessive Collisions* | The number of frames for which transmission failed due to excessive collisions. |

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| Parameter | Description |
|---|---|
| Internal Mac Transmit Errors* | The number of frames for which transmission failed due to an internal MAC sublayer transmit error. |
| Carrier Sense Errors* | The number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame. |
| Frames Too Long | The number of frames received that exceed the maximum permitted frame size. |
| Internal Mac Receive Errors* | The number of frames for which reception failed due to an internal MAC sublayer receive error. |

**\* The reported values will always be zero because these statistics are not supported by the internal chip set.**

### Displaying RMON Statistics

Use the RMON Statistics screen to display key statistics for each port or media module from RMON group 1. (RMON groups 2, 3 and 9 can only be accessed using SNMP management software.) The following screen displays the overall statistics on traffic passing through each port. RMON statistics provide access to a broad range of statistics, including a total count of different frame types and sizes passing through each port. Values displayed have been accumulated since the last system reboot.

```
            Vertical Horizon Local Management -- VH-2402S


                    RMON Statistics : Unit 1 Port 1


     Drop Events          :0      Jabbers                  :0
     Received Bytes       :199299 Collisions               :0
     Received Frames      :15746  64 Byte Frames           :37837
     Broadcast Frames     :3249   65-127 Byte Frames       :674356
     Multicast Frames     :0      128_255 Byte Frames      :45430
     CRC/Alignment Errors:0       256-511 Byte Frames      :20447
     Undersize Frames     :0      512-1023 Byte Frames     :3740
     Oversize Frames      :0      1024_1518 Byte Frames  :35696
     Fragments            :0


     [Refresh Statistics]              Show port  : 1
     [Reset Counters]                     [Show]

  <OK>   <PREV UNIT>   <NEXT UNIT>   <PREV PORT>   <NEXT PORT>
         Use <TAB> or arrow keys to move. <Enter> to select.
```

**Figure 2-47.  RMON Statistics**

| Parameter | Description |
|---|---|
| Drop Events | The total number of events in which packets were dropped due to lack of resources. |
| Received Bytes | Total number of bytes of data received on the network. This statistic can be used as a reasonable indication of Ethernet utilization. |
| Received Frames | The total number of frames (bad, broadcast and multicast) received. |
| Broadcast Frames | The total number of good frames received that were directed to the broadcast address. Note that this does not include multicast packets. |
| Multicast Frames | The total number of good frames received that were directed to this multicast address. |
| CRC/Alignment Errors | For 10Mbs ports, the counter records CRC/alignment errors (FCS or alignment errors). For 100Mbs ports, the counter records the sum of CRC/alignment errors and code errors (frame received with rxerror signal). |
| Undersize Frames | The total number of frames received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed. |
| Oversize Frames | The total number of frames received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed. |
| Fragments | The total number of frames received that were less than 64 octets in length (excluding framing bits, but including FCS octets) and had either an FCS or alignment error. |
| Jabbers | The total number of frames received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS or alignment error. |
| Collisions | The best estimate of the total number of collisions on this Ethernet segment. |
| 64 Byte Frames | The total number of frames (including bad packets) received and transmitted that were 64 octets in length (excluding framing bits but including FCS octets). |
| 65-127 Byte Frames | The total number of frames (including bad packets) received and transmitted that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets). |
| 128-255 Byte Frames | The total number of packets (including bad packets) received and transmitted that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets). |
| 1024-1518 Byte Frames | The total number of packets (including bad packets) received and transmitted that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets). |

## Displaying the Unicast Address Table

The Address Table contains the MAC addresses and VLAN identifier associated with each port (that is, the source port associated with the address and VLAN), sorted by MAC address or VLAN ID. You can search for a specific address, clear the entire address table, or information associated with a specific address, or set the aging time for deleting inactive entries.

```
            Vertical Horizon Local Management -- VH-2402S

                        Unicast Address Table
      Aging Time: 300      Dynamic Counts: 139      Static Counts: 0
         MAC          VID Unit Port Status      MAC        VID Unit Port Status
    ---------------------------------------------------------------------------
    00-00-00-AA-AA-06  1   1   1   D   00-00-E8-00-00-96  1   1   1   D
    00-00-65-0D-00-D5  1   1   1   D   00-00-E8-00-01-01  1   1   1   D
    00-00-C0-A4-63-F9  1   1   1   D   00-00-E8-00-01-02  1   1   1   D
    00-00-E2-12-F9-F8  1   1   1   D   00-00-E8-00-E8-03  1   1   1   D
    00-00-E2-20-C3-D5  1   1   1   D   00-00-E8-10-00-01  1   1   1   D
    00-00-E8-00-00-00  1   1   1   D   00-00-E8-10-00-AB  1   1   1   D
    00-00-E8-00-00-02  1   1   1   D   00-00-E8-10-DE-F1  1   1   1   D

      Sorted by  : MAC + VID          Cleared by : MAC + VID
      VLAN ID    : 1                  VLAN ID    : 1
      MAC        : 00-00-00-00-00-00  MAC        : 00-00-00-00-00-00
      [Show]     [More]               [Clear]     [Clear Dynamic]

                    <APPLY>     <OK>     <CANCEL>
            Use <TAB> or arrow keys to move, other keys to make changes.
```

**Figure 2-48.  Unicast Address Table**

| Parameter | Description |
|---|---|
| Aging Time | Time-out period in seconds for aging out dynamically learned forwarding information.<br>Range: 10 - 65534 seconds; Default: 300 seconds |
| Dynamic Counts | The number of dynamically learned addresses in the table. |
| Static Counts | The number of static addresses in the table. |
| MAC | The MAC address of a node. |
| VID | The VLAN(s) associated with this address or port. |
| Unit | Switch unit in the stack (1~7). |
| Port | The port whose address table includes this MAC address. |
| Status | Indicates address status as:<br>D: Dynamically learned, or<br>P: Fixed permanently by SNMP network management software. |
| [Show] | Displays the address table based on specified VLAN ID, and sorted by primary key MAC or VID. |
| [More] | Scrolls through the entries in the address table. |
| [Clear] | Clears the specified MAC address. |
| [Clear Dynamic] | Clears all dynamically learned MAC addresses in the table. |

## Displaying the IP Multicast Registration Table

Use the IP Multicast Registration Table to display all the multicast groups active on this switch, including multicast IP addresses and the corresponding VLAN ID.

```
            Vertical Horizon Local Management -- VH-2402S

                      IP Multicast Registration Table

  VID    Multicast IP    Unit    Multicast Group Port Lists      Learned by
  ------------------------------------------------------------------------------------
   1      225.1.1.1        1.    000000001100 110000000000 00     IGMP
                           2.    000000001100 110000000000 00     IGMP
                           3.    000000001100 110000000000 00     IGMP
                           4.    000000001100 110000000000 00     IGMP

   5      225.1.1.2        1.    000000001100 110000000000 00     IGMP
                           2.    000000001100 110000000000 00     IGMP
                           3.    000000001100 110000000000 00     IGMP
                           4.    000000001100 110000000000 00     IGMP

   Sorted by    : VID + Multicast IP
   VID          : 1
   Multicast IP : 225.1.1.1
   [Show]       [More]

                                 <OK>
              Use <TAB> or arrow keys to move. <Enter> to select
```

**Figure 2-49. IP Multicast Registration Table**

| Parameter | Description |
|---|---|
| VID | VLAN ID assigned to this multicast group. |
| Multicast IP | IP address for specific multicast services. |
| Unit | Stack unit. |
| Multicast Group Port Lists | The switch ports registered for the indicated multicast service. |
| Learned by | Indicates if the ports were learned dynamically or via IGMP. |
| [Show] | Displays the address table sorted on VID and then Multicast IP. |
| [More] | Scrolls through the entries in the address table. |

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## Configuring Static Unicast Addresses

Use the Static Unicast Address Table Configuration screen to manually configure host MAC addresses in the unicast table. You can use this screen to associate a MAC address with a specific VLAN ID and switch port as shown below.

```
           Vertical Horizon Local Management -- VH-2402S

              Static Unicast Address Table Configuration

      VID     MAC Address     Unit   Port     Status
      --------------------------------------------------------------------
       1    00-00-00-E8-43-12    1      1      Permanent




    Sorted by : VID + MAC       VID  : 1     MAC: 00-00-00-00-00-00
       VID  : 1                 Unit  : 1     Port : 1
       MAC : 00-00-00-00-00-00  Status : Permanent

     [Show]    [More]                   [Set]

                            <OK>
            Use <TAB> or arrow keys to move. <Enter> to select
```

**Figure 2-50.  Static Unicast Addreeess Table Configuration**

| Parameter | Description |
|---|---|
| VID | The VLAN group this port is assigned to. |
| MAC Address | The MAC address of a host device attached to this switch. |
| Unit | The switch unit the host device is attached to. |
| Port | The port the host device is attached to. |
| Status | The status for an entry can be set to: |
| | Permanent: This entry is currently in use and will remain so after the next reset of the switch. |
| | DeleteOnReset: This entry is currently in use and will remain so until the next reset. |
| | Invalid: Removes the corresponding entry. |
| | DeleteOnTimeOut: This entry is currently in use and will remain so until it is aged out. (Refer to Address Table Aging Time on page 62.) |
| | Other: This entry is currently in use but the conditions under which it will remain so differ from the preceding values. |
| [Show] | Displays the static address table sorted on VID as the primary key and MAC address as secondary key. |
| [More] | Scrolls through entries in the static address table. |
| [Set] | Adds the specified entry to the static address table, such as shown in the following example:<br>VID    : 1        MAC  : 00-00-00-e8-34-22<br>Unit    : 1        Port : 1<br>Status : Permanent |

## Resetting the System

Select the System Restart Menu under the Main Menu to reset the management agent. The reset screen includes options as shown in the following figure and table.

```
        Vertical Horizon Local Management -- VH-2402S


                     System Restart Menu


  Restart Option :
      POST                    : YES
      Reload Factory Defaults : NO
      Keep IP Setting         : NO
      Keep User Authentication : NO

      [Restart]

       <APPLY>              <OK>              <CANCEL>
      Use <TAB> or arrow keys to move, <Space> to scroll options.
```
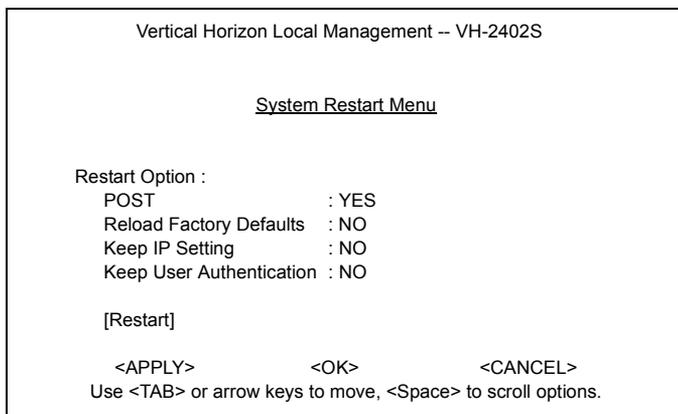
**Figure 2-51.  System Restart Menu**

| Parameter | Description |
| --- | --- |
| POST | Runs the Power-On Self-Test |
| Reload Factory Defaults | Reloads the factory defaults |
| Keep IP Setting | Retains the settings defined in the IP Configuration menu. |
| Keep User Authentication | Retains the user names and passwords defined in the Console Login Configuration menu. |

## Logging Off the System

Use the Exit command under the Main Menu to exit the configuration program and terminate communications with the switch for the current session.

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# 3. CONFIGURING & MONITORING THE SWITCH

## Common Tasks

The switch console menus allow you to modify default switch settings and configure the switch for network management. They also allow you to monitor switch performance and status. See Section 2, "VH-2402S User Interface," for an overview of the menu hierarchy and a description of all menus. The following sections describe common tasks in setting up and operating the VH-2402S switch using the console menus.

To begin, set operating parameters and make sure the network connections are correct by performing these tasks:

- Setting password protection for the switch to prevent unauthorized access to console menus

- Assigning an IP address for the switch if you plan to manage the switch using SNMP, or if you use Telnet to access the switch

- Checking network configuration status and verifying that network connections are correct

After the switch is installed and operating, you may want to perform any of the following tasks:

- Connecting via Telnet for in-band access to the console menus

- Setting SNMP parameters for management access

- Viewing switch statistics to monitor and evaluate switch performance and traffic patterns on the network

- Configuring port mirroring

- Downloading a software upgrade

- Configuring Spanning Tree parameters

- Configuring VLANs

- Configuring Class of Service

- Configuring IGMP multicast filtering

- Configuring port operation (enable/disable, port speed, full/half duplex and flow control)

- Configuring port trunks

- Configuring broadcast storm control

- Configiring the Unicast Address table

- Setting a default gateway

- Configuring BootP

## Setting Password Protection

The VH-2402S switch is factory-configured with administrator access rights to the console menus set to READ/WRITE. This setting allows anyone to use the console menus to modify any operational parameter. To protect the configuration of the switch from unauthorized modification, you should enable password protection to the console menus.

To enter a password, do the following:

1. Select Management Setup Menu from the Main Menu and press [Enter].

2. Select Console Login Configuration and press [Enter].

3. For the "ADMIN" user type, enter a password containing up to 11 alphanumeric characters. Note that the password is not case sensitive.

By factory default, there is no password configured. This means that at the login: prompt, all you have to do is type "admin" for the username and press [Enter] to gain READ/ WRITE access to the console menus. When you configure the password parameter, the factory default setting is deactivated and the new password governs access to the console menus.

If you forget your password, contact your Enterasys Networks Support Representative.

**You are automatically logged out from the console menus based on the Lock-out Time setting in the Console Login Configuration Menu. A setting of "0" permits the console menus to remain available indefinitely.**

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## Assigning an IP Address

To assign an IP address to the switch, do the following:

**1.** Select Management Setup Menu from the Main menu.

**2.** Select Network Configuration and then IP Configuration.

**3.** Highlight the IP address field and enter the IP address. Press [Enter].

The IP address is now set. The subnet mask is automatically set to correspond to the class of the address entered. If a different mask is used on the network, higlight Subnet Mask and enter the appropriate mask.

## Checking Network Configuration Status

To check connection status for the network, do the following:

**1.** Select Device Control Menu from the Main Menu.

**2.** Select Port Information and press [Enter].

If a network cable is properly connected to a port, the Link for the port reads UP. If no cable is connected to the port, or if the cable or port is faulty, the Link for the port reads DOWN.

**3.** If you see a DOWN status for a connected port, plug the cable into another port on the switch or try another cable.

## Connecting via Telnet

You can connect to the VH-2402S switch from a remote location using the Telnet application. This application allows you to establish in-band access to the console menus.

To connect to the VH-2402S switch via Telnet, do the following:

**1.** Assign an IP address using the Network Configuration Menu.

**2.** Set a password using the Console Login Configuration Menu.

**3.** Login to the VH-2402S switch via Telnet using the configured IP address and the password.

## Setting SNMP Management Access

Access to the VH-2402S switch through SNMP is controlled by community names. The community names set for the switch must match those used by the SNMP management station for successful communication to occur. Access for community names can be set to READ/WRITE or READ ONLY access. The default "Public" community name allows READ ONLY access to the device via SNMP, whereas the default "Private" community name allows READ/WRITE access.

The VH-2402S switch can send SNMP messages called traps to SNMP management stations when an important event occurs with the switch. The switch allows up to five destinations to be configured for these trap messages to be sent.

To configure SNMP access for the switch, do the following:

1.  Select Management Setup Menu from the Main Menu.

2.  Select SNMP Configuration Menu.

3.  Select SNMP Communities from the menu. Enter the desired community names (you are permitted to enter from one to 20 characters) and set access to READ/WRITE or READ ONLY.

4.  Select IP Trap Managers from the SNMP Configuration Menu.

5.  Enter appropriate IP addresses for the Trap destinations.

6.  For each Trap destination entered, a corresponding access community name should be entered.

## Viewing Switch Statistics

To view switch statistics, do the following:

1.  Select Network Monitor Menu from the Main Menu.

2.  Select Port Statistics. Then select the stack unit, and port to display the main statistical counts for the port.

3.  Select RMON Statistics. Then select the stack unit, and port to display detailed statistical counts for the port.

4.  On any of the statistics screens, select Reset Counters to clear (zero) the displayed statistical counts and Refresh Counters to refresh (update) the displayed statistical counts.

# Configuring Port Mirroring

You can mirror the traffic being switched on any port for the purposes of network traffic analysis and connection assurance. When Port Mirroring is enabled, one port becomes a monitor port for any other port within the stack. Note that the source and target ports must be configured within the same VLAN and be operating at the same speed. If the target port is operating at a lower speed, the source port will be forced to drop its operating speed to match that of the target port.

To configure port mirroring, do the following:

1. Select Device Control Menu from the Main Menu.

2. Select Mirror Port Configuration.

3. For the Mirror Source Port, select the stack unit and port number.

4. For the Mirror Target Port, select the stack unit and port number.

5. Set the Status field to ENABLED.

6. Connect a traffic analyzer or RMON probe to the mirroring port.

# Downloading a Software Upgrade

You can upgrade the operational software in the VH-2402S switch without physically opening the switch or being in the same location. The software storage sector in the flash memory of the switch is reprogrammable, allowing you to easily download software feature enhancements and problem fixes to the switch from a local or remote location.

Software can be downloaded to the switch in two ways:

- Via the serial port. This procedure is an out-of-band operation that copies the software through the serial port to the switch. This operation takes approximately 10 minutes and requires minimal configuration.

- Via TFTP download. This procedure uses a TFTP server connected to the network and downloads the software using the TFTP protocol. A TFTP download is much faster than a serial download, requiring only a few seconds, and can be used to upgrade an switch that is not VH-2402S physically proximate. The disadvantage is that this method requires a TFTP server and additional setup.

## Downloading Via the Serial Port

A serial download is the easiest method to upgrade the VH-2402S switch software, requiring the least amount of equipment and configuration.

To download switch software via the serial port, do the following:

1. With the console port connected, reset the switch by powering the switch off and then on.

2. After the power-on hardware and software tests are complete, the system initialization screen displays the following message:.

   ```
   (D)ownload System Image or (S)tart Application: [S]
   ```

3. Press "D" to download system firmware. The following message appears:

   ```
   Select the Firmware Type to Download (1)Runtime
   (2)POST (3)Mainboard [1]:
   ```

4. Select "1" to download the agent software. The following messages appear:

   ```
   Your Selection: Runtime Code

   Download code to FlashROM address 0x02880000

   Change Baud Rate to 115200 and Press <ENTER> to
   Download.
   ```

5. Change your baud rate to 115200 bps and press [Enter]. Send the file using the XMODEM protocol from your computer application (the procedure varies depending upon the application used).

   When the XMODEM procedure finishes, the following messages are displayed:

   ```
   XModem Download to DRAM buffer area 0x00200000: ...
   SUCCESS !

   Verifying image in DRAM download buffer
   0x00200000... SUCCESS !

   Update FlashROM Image at 0x02880000 ... SUCCESS !

   (D)ownload another Image or (S)tart Application:
   [S] s

   Change Baud Rate to 19200 and Press <ENTER>.
   ```

6. Press "S" to start the user interface, change your baud rate to back to 19200 bps and press [Enter]. The user interface logon screen will then appear.

## Downloading Via TFTP

To perform a TFTP download, you must first configure the VH-2402S switch. This consists of programming the switch with an IP address, if this has not already been done, and entering the IP address of the TFTP

server and the name of the upgrade file. To program the switch IP address, select the Management Setup Menu from the Main Menu screen, then select Network Configuration.

To download switch software via TFTP, do the following:

**1.** Select Download Server IP Address from the TFTP Download Menu.

**2.** Enter the TFTP server IP address and press [Enter].

**3.** Select Download Filename and enter the file name to be downloaded from the TFTP server.

> **For a TFTP download, the path to the file must be included in its name. For example, if the upgrade file name is filename.bin and it resides in the directory /usr/tftp on the TFTP server, then you must enter the TFTP file name as: "/usr/tftp/filename.bin".**

**4.** If necessary, configure the address of an IP gateway to reach the server from the switch using the Gateway IP field in the Network Configuration: IP Configuration menu.

**5.** Configure the TFTP server by copying the download file from the upgrade disk to an appropriate directory and starting the server.

**6.** Select Process TFTP Download and press [Enter].

To verify that the TFTP download has been successfully completed, note the software version level displayed on the Switch Information screen accessible from the System Information Menu. This number should match the version number that appears on the upgrade disk.

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# Configuring Spanning Tree Parameters

The VH-2402S switch supports the IEEE 802.1D Spanning Tree Protocol. This protocol allows redundant connections to be created between LAN segments for purposes of fault tolerance. Two or more physical paths between different segments can be created through the switch, with the Spanning Tree Protocol choosing a single path at any given time and disabling all others.

If the chosen path fails for any reason, a disabled alternative is activated, thereby maintaining the connection. See Appendix A, "Spanning Tree Concepts" on page 85 for further information on using the Spanning Tree Protocol in a network.

> **Configuring Spanning Tree parameters from their default can cause serious deterioration of network performance.**

To configure Spanning Tree Parameters, do the following:

1. Select the Device Control Menu from the Main Menu.

2. Select the Spanning Tree Configuration Menu and then STA Bridge Configuration.

3. Turn the switch Spanning Tree operation on or off by setting the Spanning Tree Protocol field to ENABLED/DISABLED.

4. Form the Spanning Tree Configuration Menu, select STA Port Configuration.

   The Spanning Tree Port Configuration Menu displays. Change the parameters that display in this menu as required.

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# Configuring VLANs

A virtual LAN (VLAN) is a group of devices on one or more LANs that are configured such that they can communicate as if they were attached to the same wire. Because VLANs are based on logical instead of physical connections, they are extremely flexible.

The most fundamental benefit of VLAN technology is the ability to create workgroups based on function rather than on physical location or media. For further information, see Appendix B, "Virtual LANs (VLANs)" on page 91.

To configure VLANs, do the following:

1. Select the Device Control Menu from the Main Menu.

2. Select 802.1Q VLAN Static Table Configuration Menu.

3. In the VID and VLAN Name fields, enter an ID number (1-2048) and a symbolic alphanumeric name (up to 8 characters) to indentify the VLAN.

4. Set the Status field to Active.

5. Under Egress Ports for each stack unit, select ports by entering "1," or enter "0" to remove it from the VLAN.

6. Under Forbidden Egress Ports for each stack unit, enter a "1" to prevent a port from being automatically added to this VLAN via GVRP.

   Note that you can enable or disable GVRP for the stack from the Extended Bridge Configuration screen on the Device Control Menu.

7. To configure other VLANs, select New and press [Enter].

# Configuring Class of Service

You can configure Class of Service parameters using the 802.1P Port Priority Configuration screen. This screen permits you to configure two priority levels for traffic being forwarded through the switch. During periods of congestion, Class of Service settings ensure that traffic which has been assigned high priority is forwarded through the switch ahead of normal priority traffic. For further information, see Appendix C, "Class of Service" on page 95."

To configure Class of Service, do the following:

1. Select Device Control Menu from the Main Menu.

2. Select 802.1P Configuration, then 802.1P Port Priority Configuration.

3. For each stack unit, set individual port priorities by entering 0-3 for the low priority queue or 4-7 for the high priority queue.

   Note that the default for all ingress ports is zero.

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# Configuring Port Operation

You can configure switch ports for operational parameters such as auto-negotiation, duplex mode, port speed and flow control. The 100Base-FX fiber ports always operate in full duplex mode and 100Mbps speed. Therefore, these two parameters, along with auto-negotiation, are not configurable on these fiber ports.

To configure port operation, do the following:

1. Select Device Control Menu from the Main Menu.

2. Select Port Configuration and press [Enter].

3. Select the stack unit and port number to configure.

4. In the Admin column, select ENABLED. You can also disable the port due to abnormal behavior or for security reasons.

5. In the Flow Control column, select ENABLED to enable flow control or DISABLED to disable it. When enabled, the switch uses back pressure for half duplex and IEEE 802.3x for full duplex. These flow control methods can also be set directly by selecting BACK_PRESSURE or 802.3X. Note that flow control should not be used of the port is connected to a hub.

6. In the Speed and Duplex column, select AUTO to enable Auto-negotiation for the port, or select 1000_FULL, 1000_HALF, 100_FULL, 100_HALF, 10_FULL, or 10_HALF.

**If Auto-negotiation is not enabled, the duplex mode and port speed needs to be configured.**

# Configuring the Unicast Address Table

The Unicast Address Table allows you to designate forwarding treatment through the switch for specific MAC addresses, allowing you to maintain the efficiency and security of your network. You can search for a specific MAC address, clear the entire table, or information associated with a specific address, or set the Aging Time for deleteing inactive entries. The switch learns addresses dynamically from incoming packets and builds a table of these addresses along with their associated ports. There are two types of MAC addresses in the forwarding table:

- Dynamic MAC addresses, which are dynamically learned and removed by the switch based on a time period defined using the Aging Time option.

- Static MAC addresses, which are entered manually, stored in nonvolatile memory and automatically placed in the address table.

There are five types of status that can be configured for each address in the table:

- Permenant, which means that the MAC address is in use and will remain so after the next switch reset.

- Delete On Reset, which means that the MAC address is in use and will remain so until the next switch reset.

- Invalid, which will remove the entry.

- Delete On Time Out, which means that the MAC address is in use and will remain so until it is aged out.

- Other, which means that the MAC address is in use but the conditions under which it will remain so differ from the preceding values.

To configure the Unicast Address Table, do the following:

1. Select Network Monitor Menu from the Main Menu.

2. Select Unicast Address Table.

3. As desired, set the Aging Time for the table, or view, search or clear entries by MAC address or VLAN ID.

To configure a specific MAC address in the table, do the following:

1. From the Network Monitor Menu, select Static Unicast Address Table Configuration.

2. For the MAC address, specify the VLAN ID, switch port and the Status (Permanent, Delete On Reset, Invalid, Delete On Time Out, or Other).

3. Highlight the Set field and press [Enter].

## Setting a Default Gateway

The default Gateway parameter defines the IP address of a router or other network device to which IP packets are to be sent if destined for a subnet outside of that which the switch is operating.

To set a default gateway, do the following:

1. Select Management Setup Menu from the Main Menu.

2. Select Network Configuration and then IP Configuration.

3. In the field Gateway IP,enter the IP address and press [Enter].

## Configuring BootP

The BootP protocol allows you to automatically configure the switch's IP address information. Enabling this feature greatly speeds up device configuration, especially when a large number of devices are installed.

A BootP server must be operating on the network and be properly configured for this option to work. When this option is enabled, the switch tries to obtain an IP address from the BootP server.

To configure BootP, do the following:

1. Select Management Setup Menu from the Main Menu.

2. Select Network Configuration and then IP Configuration.

3. In the IP State field, select BOOTP-GET-IP.

   This selection toggles between BOOTP-GET-IP and USER-CONFIG (the default setting).

# Configuring Port Trunks

You can configure up to five port trunks on a standalone VH-2402S switch, or up to 12 for an entire stack. Each trunk can combine two, three, or four ports, creating an aggregate bandwidth of up to 4Gbps when grouping gigabit ports. Besides balancing the load across each port in the trunk, the additional ports provide redundancy by taking over the load if another port in the trunk should fail.

To configure the port trunks, do the following:

1. Select the Device Control Menu from the Main Menu.

2. Select Port Trunking Configuration.

3. Enter a Trunk ID number from 1 to 12 to identify the trunk.

4. Select up to four ports to configure as one trunk. You can configure up to five trunks per switch unit. The ports used in a trunk must all be of the same media type (RJ-45, 100 Mbps fiber, or 1000 Mbps fiber). The ports that can be assigned to the same trunk also have certain other restrictions.

   The RJ-45 ports used for each trunk must all be on the same internal switch chip. The port groups permitted include:

   | Group 1 | Group 2 | Group 3 |
   |---------|---------|---------|
   | 1,2,3,4, | 5,6,7,8, | 9,10,11,12, |
   | 13,14,15,16 | 17,18,19,20 | 21,22,23,24 |

   Only two 100Mbps fiber ports can be configured as a trunk and these must be on the same module. However, 1000Mbps fiber ports can be on any module in the stack.

   Note that ports at both ends of a trunk must be configured in an identical manner, including speed, duplex mode, and VLAN assignments.

5. For each Trunk ID, select Enable to enable the trunk.

   Note that it is advisable to enable the trunk prior to connecting any cable between the switches to avoid creating a loop.

When using port trunks, remember that:

- Before removing a port trunk via the configuration menu, you must disable all the ports in the trunk or remove all the network cables. Otherwise, a loop may be created.

- To disable a single link within a port trunk, you should first remove the network cable, and then disable both ends of the link via the configuration menu. This allows the traffic passing across that link to be automatically distributed to the other links in the trunk, without losing any significant amount of traffic.

# 4. SNMP MANAGEMENT

## The SNMP Protocol

SNMP (Simple Network Management Protocol) is a communication protocol designed specifically for the purpose of managing devices or other elements on a network. Network equipment commonly managed with SNMP includes hubs, switches, routers, and host computers. SNMP is typically used to configure these types of devices for proper operation in their network environment, as well as to monitor them to evaluate their performance and detect potential problems.

Managed entities supporting SNMP typically contain software, which runs locally on the device and is referred to as an agent. In Figure 4-1, software in an VH-2402S switch functions as an agent, monitoring and controlling the functionality of the switch.
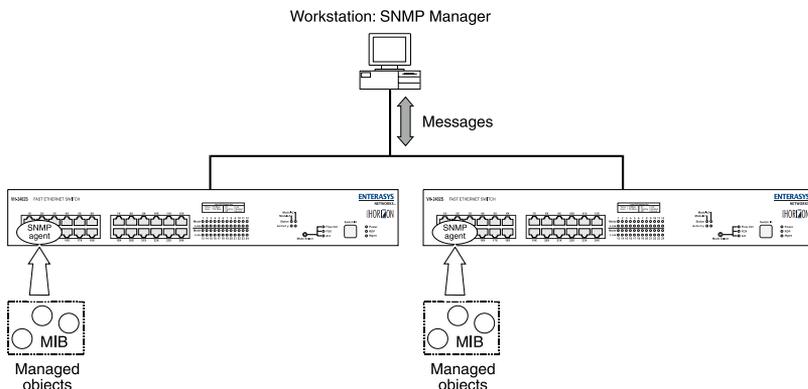


**Figure 4-1. VH-2402S Switches Managed by an
SNMP Management Workstation**

A defined set of variables, referred to as managed objects, is maintained by the agent and used to manage the device. These objects are defined in a Management Information Base (MIB) which allows for a standard presentation of the information controlled by the agent over the network.

The software used to access the information maintained by the SNMP agents across a network is referred to as the SNMP Manager, and typically runs on a workstation.

The SNMP manager software uses a MIB specification, equivalent to that which the agent maintains, to read and write objects controlled by the agent for purposes of configuring and monitoring the device. SNMP defines the format of the MIB specifications and the protocol used to access this information.

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There are three main operations defined in SNMP:

- GET operations read information from the managed device, such as those used to obtain status or statistical data.

- SET operations change a functional parameter on the device, such as those used to configure Port Speed or to initiate a software download. GET and SET operations are initiated only by the manager software, and result in a response by the agent.

- TRAP operations allow the agent to send an unsolicited message to the manager. This operation is typically used as an alert of a potential problem or a change of status with the device. The Trap Destination parameter in the SNMP Configuration Menu is used to configure the IP addresses of the SNMP Manager to which VH-2402S trap messages are sent.

## MIB Objects

A number of standard MIB specifications have been defined for managing network equipment. SNMP compliant devices typically support one or more standard MIBs defined by the Internet Engineering Task Force (IETF), in the form of Request for Comments (RFC) documents.

These MIBs provide a common method of managing devices, such as hubs and switches, and network interfaces, such as Ethernet and token ring. The primary standard MIB, referred to as MIB-II, provides an overall view of the managed agent and must be supported, at least in part, by all SNMP agents. In addition, proprietary MIB extensions are defined by commercial vendors for managing device-specific functions of their products.

The VH-2402S switch supports six standard MIBs:

- RFC 1213 - Management Information Base for Network Management of TCP/IP based Internets (MIB-II)

- RFC 1573 - Evolution of the Interfaces Group of MIB-II

- RFC 1643 - Definitions of Managed Objects for the Ethernet-like Interface Types (Ethernet-Like MIB)

- RFC 1493 - Definitions of Managed Objects for Bridges

- RFC 1757 - Remote Network Monitoring Management Information Base

- IEEE 802.1Q - VLAN Bridge Management (Q-MIB)

The VH-2402S switch also supports Enterasys proprietary MIB extensions.

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### RFC 1213 (MIB-II)

RFC 1213 provides management of system-level parameters, including TCP/IP protocol-related statistics, IP addressing, and interface statistics for each switch port. MIB-II is the standard MIB defined by RFC 1213. All agent devices operating SNMP are required to support at least part of MIB-II.

This MIB reports information about the protocols and network interfaces supported on the agent itself, as well as other general information. The MIB is divided into a number of groups, each of which corresponds to a specific protocol or set of information. Some groups are defined in other RFC documents.

The groups specifically defined in RFC 1213 and supported by the VH-2402S switch system software are as follows:

- System – General information about the agent system

- Interfaces – Information about the network interfaces of the system

- Address Translation – Interface address information, both MAC level and network (IP) level

- IP – Statistics and information related to the IP protocol

- ICMP – Statistics and information related to the ICMP protocol

- TCP – Statistics and information related to the TCP protocol

- UDP – Statistics and information related to the UDP protocol

- Transmission – Statistics and information related to the physical network medium to which the system interfaces (e.g. Ethernet, token ring, etc.).

- SNMP – Statistics and information related to the SNMP protocol

### RFC 1573 (Interfaces Evolution MIB)

RFC 1573 clarifies and extends the managed objects of the "Interfaces" group of MIB-II. This MIB takes account of the evolution in interface types and speeds employed in today's networks.

### RFC 1643 (Ethernet-Like MIB)

RFC 1643 provides management and monitoring for the Ethernet-specific aspects of each port on the switch. This is the Ethernet-specific statistics subgroup of the MIB-II Transmission group. This group provides a set of statistics related to Ethernet's physical level operation. Specifically, error and collision-related statistics are presented.

### RFC 1493 (Bridge MIB)

RFC 1493 is a group defined under MIB-II. This MIB deals with the operation of the system as an 802.1D-compliant bridge. Areas of functionality supported by this group include Spanning Tree and forwarding table information and configuration.

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### RFC 1757 (RMON MIB)

RFC 1757 is a group defined under MIB-II. This MIB provides management for the RMON aspects of the switch. The VH-2402S switch supports four of the nine groups of RMON defined for Ethernet networks on a per port basis.

### IEEE 802.1Q (Q-MIB)

This MIB includes the set of managed objects as defined in the IEEE 802.1Q VLAN standard. This MIB provides management for the VLAN aspects of the switch.

### Enterasys Proprietary MIB Extensions

Areas of VH-2402S switch functionality not covered by the standard RFC MIBs are specified in the Enterasys private MIB. This MIB definition is specified separately from MIB-II. Areas covered in this MIB include various system, switch, and port level information.

## Compiling MIB Extensions: Enterasys Website

The MIBs supported by the VH-2402S switch must be compiled into the SNMP network management platform before the switch can be managed. The supported MIBs are available using Enterasys's website at:

*http://www.enterasys.com*

The four standard MIB specifications listed above with which the VH-2402S switch is compliant are generally available with the SNMP management platform.

# APPENDIX A.  SPANNING TREE CONCEPTS

## General

The IEEE 802.1D Spanning Tree Protocol resolves the problems of physical loops in a network by establishing one primary path between any two switches in a network. Any duplicate paths are barred from use and become standby or blocked paths until the original path fails, at which point they can be brought into service.

## Spanning Tree Features

The VH-2402S switch meets the requirements of the Spanning Tree Protocol (STP) by performing the following functions:

- Creates a single spanning tree from any arrangement of switching or bridging elements.

**The term "switch" is used as an equivalent to "bridge" in this document.**

- Compensates automatically for the failure, removal, or addition of any device in an active data path.

- Achieves port changes in short time intervals, which establishes a stable active topology quickly with a minimum of network disturbance.

- Uses a minimum amount of communications bandwidth to accomplish the operation of the Spanning Tree Protocol.

- Reconfigures the active topology in a manner that is transparent to stations transmitting and receiving data packets.

- Manages the topology in a consistent and reproducible manner through the use of Spanning Tree Protocol parameters.

# Spanning Tree Protocol in a Network

Figure A-1 illustrates the use of three VH-2402S switches to establish an effective Spanning Tree configuration. Switches A, B and C are connected together in a redundant topology (more than one path between two points). If the connection between A and B goes down, the link between A and C becomes active, thereby establishing a path between A and B through switch C. Additionally, if the connection between B and C goes down, the link between A and C becomes active, establishing a path between B and C through switch A.
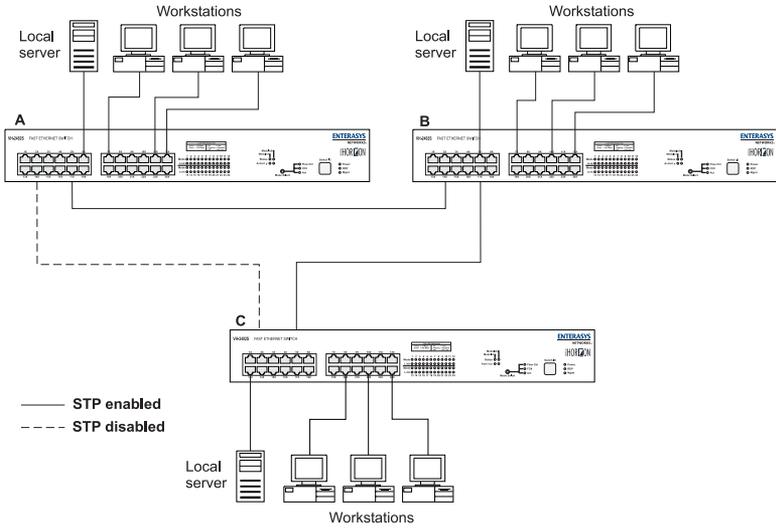


**Figure A-1. Spanning Tree Using VH-2402S Switches**

# Spanning Tree Protocol Parameters

Several configuration parameters control the operation of the Spanning Tree Protocol. Table A-1 describes the parameters and lists the VH-2402S switch default settings for each parameter.

**You can cause serious network performance degradation if you do not fully understand Spanning Tree concepts. Be sure to consult personnel experienced with this process prior to configuring Spanning Tree parameters.**

**Table A-1. Spanning Tree Protocol Defaults**

| Parameter | Description | Default Value |
|---|---|---|
| Bridge Group Address | Unique MAC group address, recognized by all bridges in the network. | |
| Bridge Identifier | Identifier for each bridge. This parameter consists of two parts: a 16-bit bridge priority and a 48-bit network adapter address. Ports are numbered in absolute numbers starting from 1 regardless of their bridge attachment. The network adapter address is the same address as the first port of the bridge. | 32768 (bridge priority) |
| Port Identifier | Port Identifier Identifies each port of each bridge, with an incremental default value given for each port. | |
| | Port 1 -32768   Port 9 -32776   Port 17 -32784 | |
| | Port 2 -32769   Port 10 -32777   Port 18 -32785 | |
| | Port 3 -32770   Port 11 -32778   Port 19 -32786 | |
| | Port 4 -32771   Port 12 -32779   Port 20 -32787 | |
| | Port 5 -32772   Port 13 -32780   Port 21 -32788 | |
| | Port 6 -32773   Port 14 -32781   Port 22 -32789 | |
| | Port 7 -32774   Port 15 -32782   Port 23 -32790 | |
| | Port 8 -32775   Port 16 -32783   Port 24 -32791 | |
| Port Priority | Indicates the priority of a specific port in relation to other ports. | 128 |
| Cost Component of Each Port | The Spanning Tree Protocol calculates and ensures that an active topology generates minimal cost paths. A value of 100 is generally used for 10Mbps Ethernet networks, a value of 19 for 100Mbps Fast Ethernet, and a value of 4 for 1000Mbps Gigabit Ethernet. | 19 |

For detailed information on the operation of the Spanning Tree Protocol, consult Section 4 of IEEE Standard 802.1D, ISO/IEC 10038:1993.

# Spanning Tree Protocol Operation

When the Spanning Tree Protocol is enabled for the first time or when there is a change in the network topology, such as a failure or the addition or removal of a component, the Spanning Tree Protocol automatically sets up the active topology of the current network.

## Communicating Between Bridges

Periodically, all devices running the Spanning Tree Protocol on a network transmit packets to each other "in care of" the Bridge Group Address which all bridges share. When a bridge receives a frame sent to the Bridge Group Address, the bridge's Spanning Tree Protocol processes the packet. Application software and other LAN segments ignore the packet. Bridges communicate between each other in order to determine the Root Bridge.

## Selecting a Root Bridge and Designated Bridges

During communication between bridges, one bridge is determined to have the lowest bridge identifier. This bridge becomes the Root Bridge.

After the Root Bridge has been selected, each LAN segment looks for the bridge that has the lowest cost relative to the Root Bridge. These bridges become Designated Bridges.

## Selecting Designated Ports

Each Designated Bridge selects a Designated Port. This port is responsible for forwarding packets to the Root Bridge.

## Handling Duplicate Paths

When the active topology of the network is determined, all packets between any two nodes in the network use only one path. Where a duplicate path exists, the non-designated port is put into a blocking state.

## Remapping Network Topology

If there is a change in the network topology due to a failure or the removal or addition of any active components, the active topology also changes. This may trigger a change in the state of some blocked ports.

There are five (5) states that the ports can be in for spanning tree:

- Blocking: A port in this state does not participate in the transmission of frames, thus preventing duplication arising through multiple paths existing in the active topology of the bridged LAN.

- Listening: A port in this state is preparing to participate in the transmission of frames. The transmission of frames is temporarily disabled in order to prevent temporary loops, which may occur in a bridged LAN during the lifetime of this state as the active topology of the bridged LAN changes.

- Learning: A port in this state is preparing to participate in the transmission of frames.

- Forwarding: A port in this state is participating in the transmission of frames.

- Disabled: A port in this state does not participate in the transmission of frames or the operation of the spanning tree process.

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# APPENDIX B.  VIRTUAL LANS (VLANS)

## VLANs and Frame Tagging

The VH-2402S switch supports IEEE 802.1Q-compliant virtual LANs (VLANs). This capability provides a highly efficient architecture for establishing VLANs within a network and for controlling broadcast/ multicast traffic between workgroups. Central to this capability is an explicit frame tagging approach for carrying VLAN information between interconnected network devices.

With frame tagging, a four byte data tag field is appended to frames that cross the network. The tag identifies which VLAN the frame belongs to. The tag may be added to the frame by the end station itself or by a network device, such as a switch. In addition to VLAN information, the relative priority of the frame in the network can specified by the tag (see Appendix C, "Class of Service").

VLANs provide greater network efficiency by reducing broadcast traffic, but also allow you to make network changes without having to update IP addresses or IP subnets. VLANs inherently provide a high level of network security, since traffic must pass through a Layer 3 switch or a router to reach a different VLAN.

This switch supports the following VLAN features:

- Up to 256 VLANs based on the IEEE 802.1Q standard

- Distributed VLAN learning across multiple switches using explicit or implicit tagging and GARP/GVRP protocol

- Port overlapping, allowing a port to participate in multiple VLANs

- End stations can belong to multiple VLANs

- Passing traffic between VLAN-aware and VLAN-unaware devices

- Two-level priority tagging

- Port trunking with VLANs

# VH-2402S VLAN Configuration

VLAN operation on the VH-2402S is enabled by default. Therefore, all frames are transferred internally through the switch with a VLAN tag. This tag may already be on the frame entering the switch, or added to the frame by the switch. VLAN information already existing on frames entering the switch is automatically handled by the switch. The VH-2402S learns VLAN information from tagged frames and appropriately switches frames out the proper ports based on this information. The configuration of VLANs for frames entering the switch without tags must be made by the user of the switch. This configuration can be made either through the console interface or via SNMP.

## Assigning Ports to VLANs

Before enabling VLANs for the switch, you must first assign each port to the VLAN groups it will participate in. By default all ports are assigned to VLAN 1 as untagged ports. You should add a port as a tagged port (that is, a port attached to a VLAN-aware device) if you want it to carry traffic for one or more VLANs and the device at the other end of the link also supports VLANs. Then assign the port at the other end of the link to the same VLANs. However, if you want a port on this switch to participate in one or more VLANs, but the device at the other end of the link does not support VLANs, then you must add this port as an untagged port (that is, a port attached to a VLAN-unaware device).

Port-based VLANs are tied to specific ports. The switch's forwarding decision is based on the destination MAC address and its associated port. Therefore, to make valid forwarding and flooding decisions, the switch learns the relationship of the MAC address to its related port—and thus to the VLAN—at run-time.

### VLAN Classification

When the switch receives a frame, it classifies the frame in one of two ways:

- If the frame is untagged, the switch assigns the frame to an associated VLAN based on the PVID of the receiving port.

- If the frame is tagged, the switch uses the tagged VLAN ID to identify the port broadcast domain of the frame.

### Port Overlapping

Port overlapping can be used to allow access to commonly shared network resources among different VLAN groups, such as file servers or printers. Note that if you implement VLANs which do not overlap, but still need to communicate, you must connect them using a router or Layer 3 switch.

## Forwarding Tagged/Untagged Frames

Ports can be assigned to multiple tagged or untagged VLANs. Each port on the switch is therefore capable of passing tagged or untagged frames. To forward a frame from a VLAN-aware device to a VLAN-unaware device, the switch first decides where to forward the frame, and then strips off the VLAN tag. However, to forward a frame from a VLAN-unaware device to a VLAN-aware device, the switch first decides where to forward the frame, and then inserts a VLAN tag reflecting this port's default VID. The default PVID is VLAN 1, but this can be changed (see "Port Assignment VLAN Configuration" on page 53). .
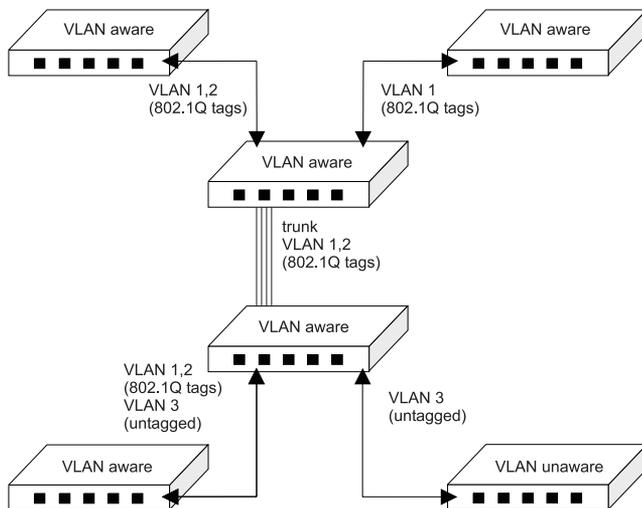


**Figure B-1. Multi-Switch VLAN Configuration**

## Automatic VLAN Registration

GVRP defines a system whereby the switch can automatically learn the VLANs each endstation should be assigned to. If an endstation (or its network adapter) supports the IEEE 802.1Q VLAN standard, it can be configured to broadcast a message to your network indicating the VLAN groups it wants to join. When this switch receives these messages, it will automatically place the receiving port in the specified VLANs, and then forward the message to all other ports. When the message arrives at another switch that supports GVRP, it will also place the receiving port in the specified VLANs, and pass the message on to all other ports. VLAN requirements are propagated in this way throughout the network. This allows GVRP-compliant devices to be automatically configured for VLAN groups based solely on endstation requests.

### Forwarding Traffic with Unknown VLAN Tags

This switch only supports 256 VLANs with VLAN IDs ranging from 1 to 2048, but the IEEE 802.1Q VLAN standard allows for VLAN IDs from 1 to 4094. Therefore, if this switch is attached to endstations that issue VLAN registration requests, it will have to forward unknown VLAN tags. This traffic can only be propagated to the rest of the network if automatic VLAN registration is enabled on the switch.

# APPENDIX C.  CLASS OF SERVICE

Class of Service support on the VH-2402S allows you to assign mission-critical data a higher priority through the switch by delaying less critical traffic during periods of congestion. Higher priority traffic through the switch is serviced first before lower priority traffic. The Class of Service capability of the VH-2402S switch is implemented by a priority queuing mechanism. Class of Service is based on the IEEE 802.1p standard specification and allows you to define two priorities of traffic on each switch port:

• high

• normal

As traffic enters the switch, it is assigned to one of the two priority levels according to information located in the 802.1Q header tag of the frame (see Appendix B, "Virtual LANs") or according to the incoming port number. Frames are then placed into one of two transmit queues on the outbound switch port based on their priority level. Frames on the high priority queue are transmitted first; when that queue empties, traffic on the normal priority queue is transmitted. When priority queuing is being used, each frame that passes through the switch contains a priority level in its header tag. The priority information may already exist in incoming frames, or be assigned by the switch. The determination of individual frame priority is based on the following rules:

1. Incoming tagged frames contain a priority level (range: 0-7)

2. Incoming non-tagged frames are assigned a preconfigured default priority level based on their incoming port (range: 0-7). The assignment of priority per port is done via management using the console interface or via SNMP. See "Configuring Traffic Classes" on page 46.

3. Priority levels of frames are compared against a preconfigured global priority threshold setting. Those frames with levels equal to or above the threshold are designated high priority traffic; those frames with levels below the threshold are designated normal priority traffic. The default setting for the threshold parameter is: 4 and above = High Priority, 3 and below = Normal Priority.

Properly configured, the Class of Service mechanism assures that during congestion, the highest priority data does not get delayed by normal priority traffic. The tagged header in the frame governs individual frame priority.

Figure C-1 shows priority queuing operating within a switch. Frames entering the switch through ports 1 and 4 are tagged as normal traffic and placed in a normal priority queue on the outbound port. Frames entering through ports 2 and 5 are tagged as high priority traffic and placed in a high priority queue on the outbound port. Priority queuing can be configured using the console interface or via SNMP.
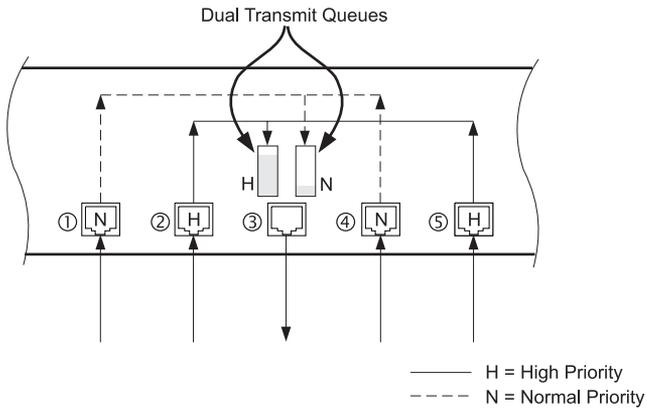


**Figure C-1. Class of Service Example**

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# APPENDIX D. IP MULTICAST FILTERING

## IGMP Snooping and IP Multicast Filtering

The Internet Group Management Protocol (IGMP) runs between hosts and their immediately neighboring multicast router/switch. The protocol's mechanisms allow a host to inform its local router that it wants to receive transmissions addressed to a specific multicast group.

A router, or multicast-enabled switch, can periodically ask their hosts is they want to receive multicast traffic. If there is more than one router/switch on the LAN performing IP multicasting, one of these devices is elected "querier" and assumes the responsibility of querying the LAN for group members.

Based on the group membership information learned from IGMP, a router/switch can determine which (if any) multicast traffic needs to be forwarded to each of its ports. At Layer-3, multicast routers use this information, along with a multicast routing protocol, to support IP multicasting across the Internet.

IGMP provides the final step in an IP multicast packet delivery service since it is only concerned with forwarding multicast traffic from the local router/switch to group members on directly attached subnetwork or LAN segment.

This switch supports IP Multicast Filtering by:

- Passively snooping on the IGMP Query and IGMP Report packets transferred between IP Multicast Routers and IP Multicast host groups to learn IP Multicast group members, and

- Actively sending IGMP Query messages to solicit IP Multicast group members.

The purpose of IP multicast filtering is to optimize a switched network's performance, so multicast packets will only be forwarded to those ports containing multicast group hosts or multicast routers/switches instead of flooding to all ports in the subnet (VLAN).

The VH-2402S, with IP multicast filtering capability, not only passively monitors IGMP Query and Report messages; it can also actively send IGMP Query messages to learn locations of multicast routers/switches and member hosts in multicast groups within each VLAN.

However, note that IGMP neither alters nor routes any IP multicast packets. Since IGMP is not concerned with the delivery of IP multicast packets across subnetworks, an external IP multicast router is needed if IP multicast packets have to be routed across different subnetworks.

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