

*Instant EtherFast® Series*

# **EtherFast® Layer 3 Management 24-Port 10/100 + 2-Port Gigabit Ethernet Switch**



Use this guide to install:

EF1324

**User Guide**



## EC Declaration of Conformity (Europe)

In compliance with the EMC Directive 89/336/EEC, Low Voltage Directive 73/23/EEC, and Amendment Directive 93/68/EEC, this product meets the requirements of the following standards:

- EN55022 Emission
- EN55024 Immunity

## Industry Canada (Canada)

This Class B digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe (B) est conforme à la norme NMB-003 du Canada.

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## LIMITED WARRANTY

Linksys guarantees that every EtherFast® Layer 3 Management 24-Port 10/100 + 2-Port Gigabit Ethernet Switch is free from physical defects in material and workmanship under normal use for FIVE years from the date of purchase, when used within the limits set forth in the Specifications chapter of this User Guide. If the product proves defective during this warranty period, call Linksys Technical Support in order to obtain a Return Authorization Number. **BE SURE TO HAVE YOUR PROOF OF PURCHASE ON HAND WHEN CALLING. RETURN REQUESTS CANNOT BE PROCESSED WITHOUT PROOF OF PURCHASE.** When returning a product, mark the Return Authorization Number clearly on the outside of the package and include a copy of your original proof of purchase. All customers outside of the United States of America and Canada shall be held responsible for shipping and handling charges.

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## FCC STATEMENT

The EtherFast® Layer 3 Management 24-Port + 2-Port Gigabit Ethernet Switch has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which is found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment or devices
- Connect the equipment to an outlet other than the receiver's
- Consult a dealer or an experienced radio/TV technician for assistance

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# Introduction

## The EtherFast® Layer 3 Management 24-Port 10/100 + 2-Port Gigabit Ethernet Switch

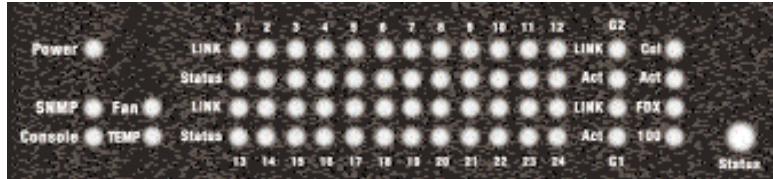
Migrate your network to Gigabit speed with the EtherFast® Layer 3 Management 24-Port 10/100 + 2-Port Gigabit Ethernet Switch. Perfect for today's network computing demands, this Switch from Linksys delivers Layer 3 switching and fast transfer speeds for your network applications with integrated Gigabit connectivity.

The Switch's Layer 3 switching and "intelligent" design provide maximum network control, regulating traffic and eliminating server bottlenecks. Integrate the Switch into your current Ethernet network, and your data traffic efficiency will improve several times over. Connect your workstations to the managed 10/100 ports, and speed up access time for all your users in just one move. Connect your servers through the Gigabit ports for dedicated bandwidth of up to 1000Mbps—and you've maximized your network potential. Plus, configuration's a snap using the Web management interface.

Save money and time with this all-in-one managed solution for Gigabit connectivity to your servers or Gigabit backbone.

# Getting to Know the Switch

## LEDs



**Power** (Green) The LED will illuminate when the switch is powered on.

**SNMP** (Green) The LED will illuminate when the switch is being managed via SNMP.

**Console** (Green) The LED will illuminate when the switch is being managed via the local console.

**Fan** (Green) The LED will illuminate when a fan has failed.

**TEMP** (Green) The LED will illuminate when the switch is overheating.

### PER PORT

**Link** (Green) The LED will illuminate when the port is connected.

**Status** (Red) The LED will illuminate when the port is displaying each of the four status options. You can use the Status Button to cycle through each of the four options.

### PER GIGABIT PORT (G1/G2)

**Link** (Green) The LED will illuminate when the port is successfully connected to a network.

**Act** (Red) The LED will illuminate when the port is actively operating.

## Status

**Col** (Red) The LED will illuminate when collisions are detected.

**Act** (Red) The LED will illuminate when there are active ports.

**FDX** (Red) The LED will illuminate when there are ports operating in full-duplex mode.

**100** (Red) The LED will illuminate when there are ports transmitting data at 100Mbps.

### The Status Button

When you press the Status Button, the Switch will cycle through each mode. Look at the LEDs for each port to check the port's status.

## The RJ-45 Ports

The Switch is equipped with twenty-four 10/100 RJ-45 ports. These RJ-45 ports support network speeds of either 10-100Mbps in half-duplex mode, or 20-200Mbps in full-duplex mode. Auto-sensing technology enables each port to automatically detect the speed of the device connected to it (10Mbps or 100Mbps), and adjust its speed and duplex accordingly.

To connect a device to a port, you will need to use a network cable. If you are using 100BaseTX devices you will need to use UTP Category 5 (or better) cable. The two Gigabit ports require UTP Category 5e cable (or better).



## The Gigabit Ports

The Switch is equipped with two Gigabit ports. These ports provide links to high-speed network segments or individual workstations at speeds of up to 1000Mbps (Gigabit Ethernet). The two Gigabit ports require UTP Category 5e cable (or better).

## The Console Port

The Switch is equipped with a RS-232 serial port (located on the rear of the Switch) that allows you to connect to a computer (for configuration purposes) using the provided serial cable.



# Installing the Switch

## Pre-Installation Considerations

### Fast Ethernet and Gigabit Considerations

If you will be using the Switch for Fast Ethernet (100Mbps) or Gigabit (1000Mbps) applications, you must observe this guideline:

The maximum UTP cabling length using Category 5 cable is 328 feet (100m).

### Full-Duplex Considerations

As previously mentioned, the Switch provides full-duplex support for its RJ-45 ports. Full-duplex operation allows data to be sent and received simultaneously, doubling a port's potential data throughput.

If you will be using the Switch in full-duplex mode, the maximum UTP cable length using Category 5e (or better) cable is 328 feet (100 m).

### Positioning the Switch

Before you choose a location for the Switch, observe the following guidelines:

- Keep cabling away from sources of electrical noise, power lines, and fluorescent lighting fixtures.
- Position the Switch away from water and moisture sources.
- To ensure adequate air flow around the Switch, be sure to provide a minimum of one inch (25 mm) clearance.
- Do not stack free-standing Switches more than four units high.

## Rack-Mounting the Switch

The Switch can be used as a free-standing unit, or installed in any standard 19-inch rack.

Use the following instructions to rack-mount the Switch:

Before you begin, disconnect all cables from the Switch.

1. Place the Switch right side up, with the front panel facing you.
2. Position a mounting bracket over the screw holes on one side of the Switch.
3. Secure the mounting bracket by inserting three screws into the screw holes. Use a screwdriver to tighten the screws, ensuring that they are fastened firmly in place.
4. Repeat steps 2 and 3 to install the other mounting bracket on the opposite side of the Switch.
5. Insert the Switch into the 19-inch rack and secure it with suitable screws (not provided). Ensure that the ventilation holes are not obstructed.

**The rack-mount installation is complete.  
You can now re-connect the cables to the Switch.**

## Powering on the Switch

To power on the Switch, simply connect the AC power cord to the back of the Switch, and then plug the power cord into an electrical outlet. The Switch will boot up within approximately 30 seconds.

## Uplinking the Switch

Any of the 26 ports on the Switch can act as an uplink port, allowing you to uplink to other switches or hubs using a standard Ethernet connection. UTP Category 5e (or better) cable is recommended when using the Gigabit ports.

To uplink the switch, connect one end of a network cable into the Switch, and then connect the other end of the cable into the desired network device's uplink port.

# Switch Management

The Switch offers an easy-to-use, menu-driven configuration program. This program can be accessed by a console interface, a Web browser, a telnet connection, or SNMP/RMON. Using this configuration program, you can perform various switch configuration and management activities, including:

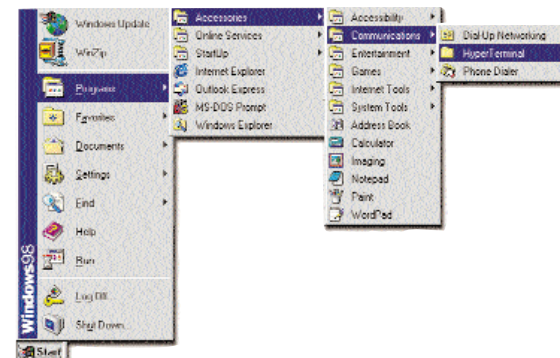
- Enable/disable any port
- Set the communication mode for any port
- Configure SNMP parameters
- Add ports to network VLANs
- Create and manage VLAN Configurations

## Local Console Management

You can manage the Switch locally using HyperTerminal; simply connect the Switch to a PC or workstation through the serial port.

The serial port settings need to be configured before connecting to the Switch. In order to change the settings of your port, run the **HyperTerminal** program. This program comes packaged with Windows, but it may not be installed on your computer. It should be located as is shown below (varies according to operating system). If it is not, consult your Windows documentation for instructions on installing HyperTerminal.

1. Click the **Start** button. Select **Accessories** and then **Communications**. Hyperterminal should be one of the options listed in this menu. Select **HyperTerminal**.



2. The following screen will appear. Enter a **Name** for this connection. In the example below, the name of the connection is EF1324. Click the **OK** button.

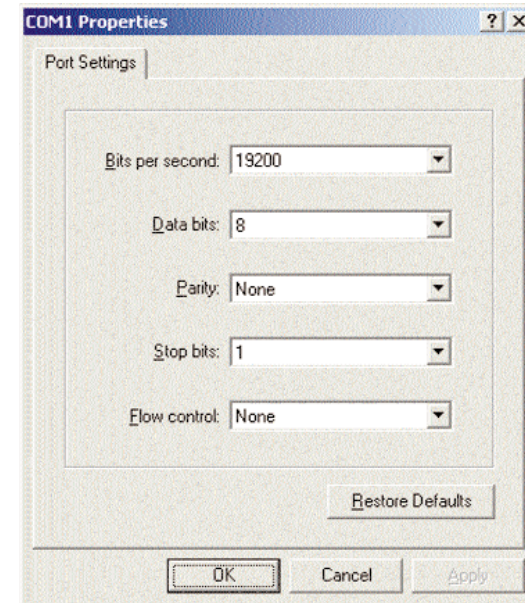


3. The following screen will appear. In the bottom drop down box labeled **Connect using:**, click the arrow and choose the COM port that the Switch will be connected to. In the example below, COM1 is the port selected. Click the **OK** button.



4. When the following screen appears, make sure that the port settings are as follows:

**BAUD RATE:** 19200  
**DATA BITS:** 8  
**PARITY:** None  
**STOP BITS:** 1  
**FLOW CONTROL:** None



Click the **OK** button.

## Web Management

The IP address is already configured on the Switch by default. Use a standard Web browser (Internet Explorer 4.0 or above, or Netscape Navigator 4.0 or above is suggested) from any computer attached to the network. The Switch has a default IP address of **192.168.1.254** and a default subnet address of **255.255.255.0**.



## Telnet Management

Use telnet from any computer attached to the network. You can telnet into the Switch at any time.

## SNMP/RMON Management

SNMP/RMON management is available; you can manage the Switch from any network computer using network management software. You must have a TCP/IP connection to the Switch in order to use it.



*Note: The Switch's configuration program only provides access to basic configuration functions. To access the full range of SNMP management functions, you must use SNMP-based network management software.*

# Connecting the Serial Cable to the Switch and Computer

To enable communications with the Switch, the serial cable must be connected between the Switch and the computer.

1. Make sure both the Switch and the computer are powered down.
2. Plug one end of the serial cable into the console port of the Switch.
3. Plug the other end of the serial cable into the COM1 port on the back panel of your computer.
4. Turn on the Switch and computer.

**The serial cable connection is complete.  
You can now configure the Switch.**

# Configuring the Switch Using the Console Interface

## Overview

The Switch's menu-driven configuration program may be configured using the console port, a Web browser, telnet, or SNMP/RMON. The remote management methods can be used once the IP parameters have been set via the local console.

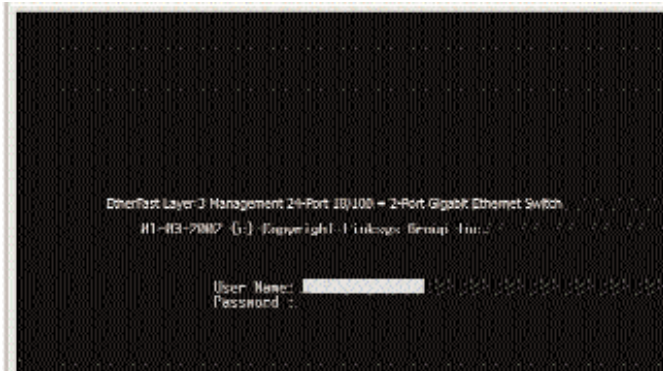
## Logging On to the Switch

When logging on to the Switch, you will receive the following screen prompt:

User Name:

Password:

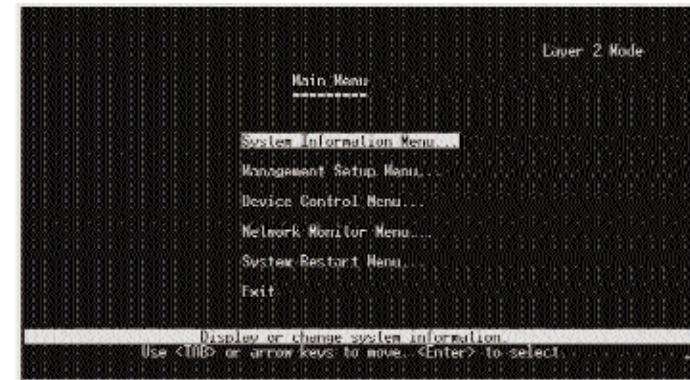
Enter the default user name, **admin**, in the *User Name* field, and press **Enter**. Do not enter anything for the *Password*, and press **Enter**.



When you select **User Configuration** from the Management Setup Menu, you will be allowed to define a new administrator password.

## Main Menu

After you log on to the Switch, the Main Menu screen will appear.



The Main Menu screen consists of a series of options. Each option leads you to the screen for that management setting. Highlighting any option selects it; pressing the **Enter** key takes you to that screen.

To navigate through the Console Interface, use the **Tab** or **arrow** keys to move, the **Enter** key to select, and the **Esc** key to return to the previous selection. Scroll through choices using the **spacebar**. Options for the currently selected item are displayed in the highlighted area at the bottom of the interface screen.

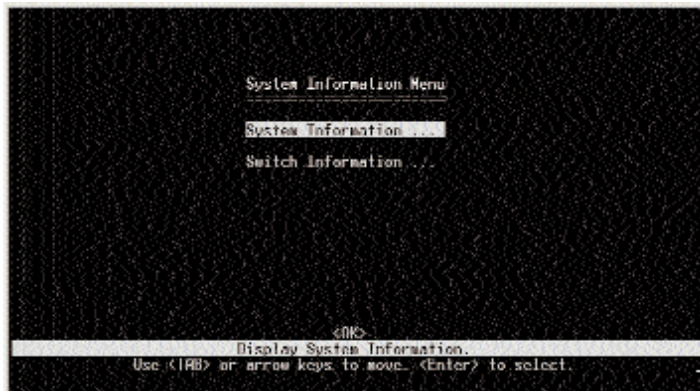
The text string in the top right corner of the screen shows if the Switch is operating as a Layer 2 switch or as a multilayer routing switch. The default is multilayer.

- **System Information Menu** - Displays a basic description of the switch, including contact information, hardware and firmware versions, uptime, and location.
- **Management Setup Menu** - Configures the IP address for the Switch, serial port settings for console management, SNMP parameters, and user privileges.
- **Device Control Menu** - Controls a broad range of functions, including port mode, port mirroring, port trunking, spanning tree, VLANs, IP subnets, multicast filtering, and routing protocols.

- **Network Monitor Menu** - Provides access to port statistics, RMON statistics, address tables, VLAN registration and forwarding information, multicast groups, and subnet addresses.
- **System Restart Menu** - Resets the management agent and allows you to restore the Switch to its default configuration.
- **Exit** - Exits the program and terminates communications with the Switch for the current session to restart your management session.

## System Information Menu

The System Information Menu displays a basic description of the Switch, including contact information and hardware and firmware versions.

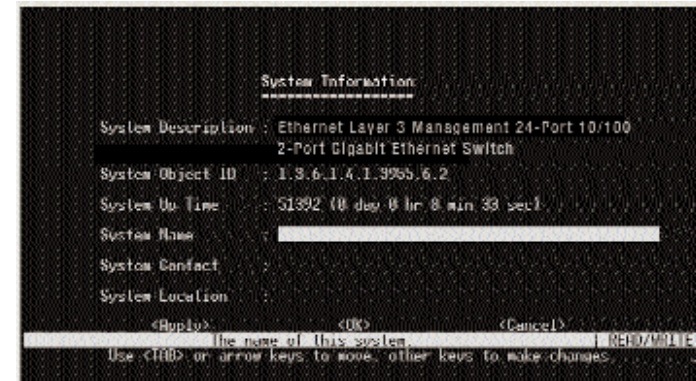


- **System Information** - Provides basic system descriptions, including contact information, uptime, system name, location, and system object ID.
- **Switch Information** - Shows hardware and firmware version numbers, power status, Gigabit port usage of the Switch, number of ports, fan power status, and serial number (this information cannot be changed).

Select **OK** to return to the previous panel.

## System Information

The System Information screen displays descriptive information about the Switch or system.



- **System Description** - System hardware description: Layer 3 Management 24-Port 10/100 + 2-Port Gigabit Ethernet Switch.
- **System Object ID** - MIB II object identifier for the Switch's network management subsystem.
- **System Up Time** - Length of time the Switch has been running. Note that the first value is in centiseconds.
- **System Name\*** - Name assigned to the switch system.
- **System Contact\*** - Contact person for the system. (This is usually the system administrator.)
- **System Location\*** - Specifies the area or location where the system resides.

\* The maximum string length is 99, but the screen only displays 45 characters. You can use the arrow keys to browse the entire string.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

## Switch Information

The Switch Information screen displays hardware and firmware version numbers for the main board, as well as the power status.

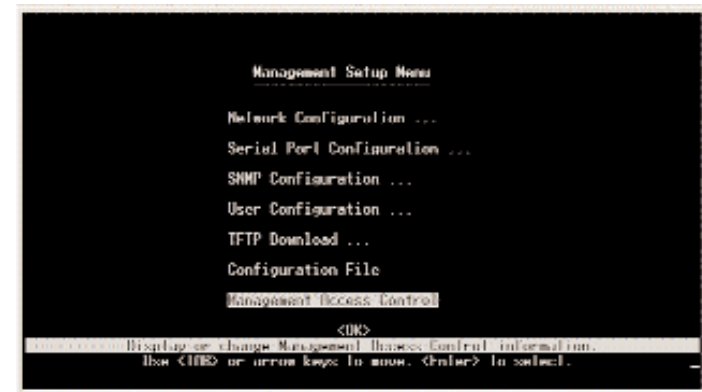


- **Hardware Version** - Hardware version of the main board.
- **Firmware Version** - System firmware version in ROM.
- **Serial Number** - Serial number of the main board (MAC address of the Switch).
- **Port Number** - Number of ports available on this Switch.
- **Power Status** - Shows if power is active or inactive.
- **Redundant Power Status** - Status of redundant power supply.
- **Fan Power Status** - Shows if power to fan is active or inactive.
- **G1 Information** - Speed of the first Gigabit port.
- **G2 Information** - Speed of the second Gigabit port.

Select **OK** to return to the previous panel.

## Management Setup Menu

The Management Setup Menu screen allows you to configure the IP address for the Switch, serial port settings for console management, SNMP parameters, and user privileges.

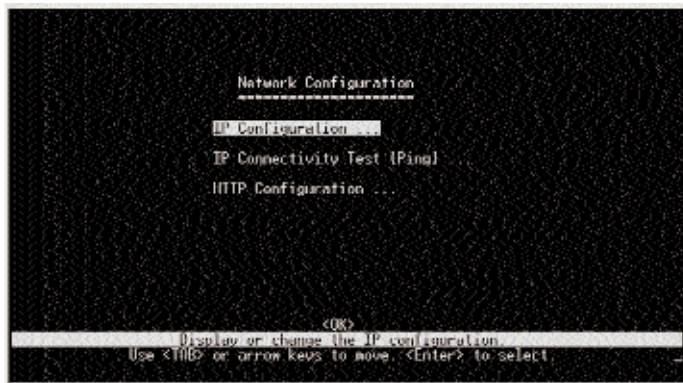


- **Network Configuration** - Includes IP setup, ping facility, and HTTP setup for the on-board Web agent.
- **Serial Port Configuration** - Sets communication parameters for the serial port, including baud rate, console time-out, and screen data refresh interval.
- **SNMP Configuration** - Activates authentication failure traps and configures communities and trap managers.
- **User Configuration** - Sets the user names and passwords for system access.
- **TFTP Download** - Downloads new version of firmware to update your system.
- **Configuration File** - Allows downloading of a configuration file.
- **Management Access Control** - Allows management of user access to the Switch.

Select **OK** to return to the previous panel.

## Network Configuration

The Network Configuration menu allows you to set the Switch's IP address, configure the IP parameters, or enable the on-board Web management.



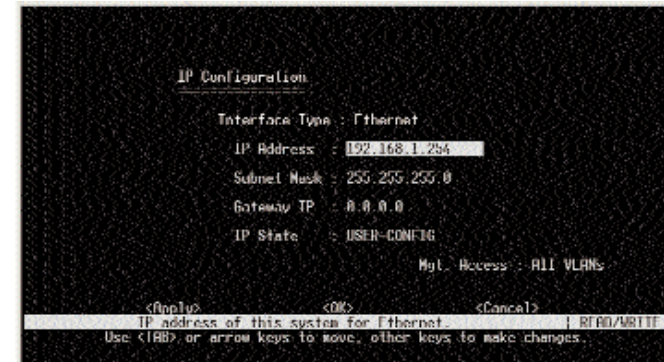
- **IP Configuration\*** - Sets the bootup option or configure the Switch's IP parameters. It changes the default IP address on the Switch.
- **IP Connectivity Test (Ping)** - Tests IP connectivity to a specified device. You can plug in a workstation on the network to check for connectivity.
- **HTTP Configuration** - Allows the admin to enable or disable the Web administration feature of the Switch.

\* This menu does not appear if the Switch is set to multilayer mode. In this case, you need to configure an IP interface for each VLAN that needs to connect to any device outside of its own VLAN group.

Select **OK** to return to the previous panel.

## IP Configuration

The IP Configuration menu allows you to configure the IP parameters. (Only displayed in **Layer 2** mode)



- **Interface Type** - Indicates IP over Ethernet.
- **IP Address** - IP address of the Switch you are managing. The system supports SNMP over TCP/IP transport protocol. In this environment, all systems on the Internet, such as network interconnection devices, must have an IP address.
- **Subnet Mask** - Subnet mask of the Switch. This mask identifies the host address bits used for routing to specific subnets.
- **Gateway IP** - Gateway used to pass trap messages from the system to the management station. **Note:** The gateway must be defined (when operating at Layer 2) if the management station is located in a different IP segment.
- **IP State** - Specifies whether IP functionality is enabled via manual configuration (default setting), or set by Boot Protocol (BOOTP).

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### IP Connectivity Test (Ping)

The IP Connectivity Test is used to see if another site or node on the network can be reached.



- **IP Address** - IP address of the device you want to ping.
- **Test Times** - The number of ICMP echo requests to send to the specified site. Range varies from 1 to 1000.
- **Success/Failure** - The number of times the specified site has responded—or not—to a ping request.

**Note:** There is a 10-second interval between pings.

Select **Start** to begin the test. Select **Cancel** to cancel the test.

### HTTP Configuration

The HTTP Configuration screen allows you to enable or disable Web management.

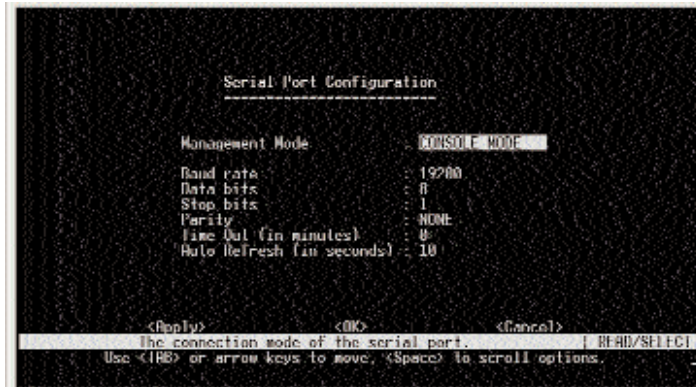


**Note:** Port 80 is used for HTTP service.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

## Serial Port Configuration

The Serial Port Configuration screen allows you to access the communication parameters for the Switch's serial port. (Linksys recommends that you do not change the default settings.)

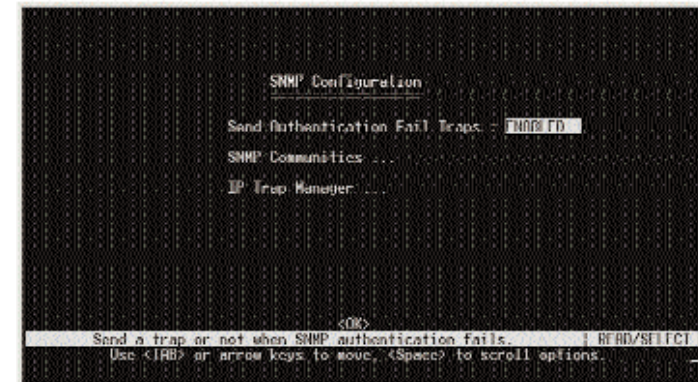


- **Baud Rate** - The rate at which data is sent between devices. Default is 19200. Options are 9600, 19200, and 38400 baud.
- **Data Bits** - Sets the data bits of the RS-232 port. Options are 7 and 8.
- **Stop Bits** - Sets the stop bits of the RS-232 port. Options are 1 and 2.
- **Parity** - Sets the parity of the RS-232 port. Default is None. Options are none, odd, and even.
- **Time-Out** - If no input is received from the attached device after this interval, the current session is automatically closed. Default is 10 minutes. The range is 0 to 100 minutes, where 0 indicates disabled.
- **Auto Refresh** - 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. Default is 1 second. The range is 0, or 5 to 255 seconds, where 0 indicates disabled.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

## SNMP Configuration

The SNMP Configuration screen displays parameters for the Simple Network Management Protocol (SNMP).



- **Send Authentication Fail Traps** - Issue a trap message to specified IP trap managers whenever authentication of an SNMP request fails. 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.

Select **OK** to return to the previous panel.

### SNMP Communities

The SNMP Communities screen allows you to configure the community strings authorized for management access. Up to five community names may be entered.

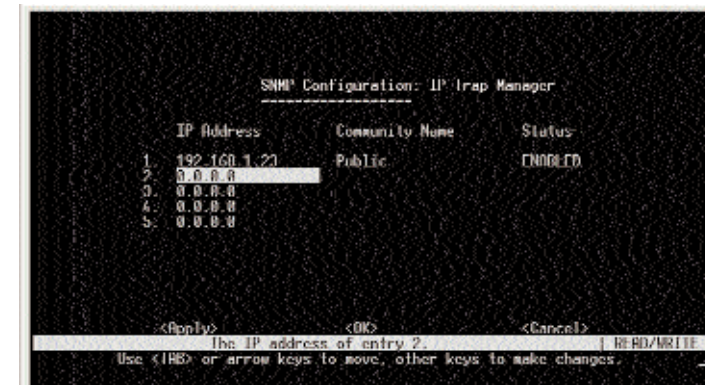


- **Community Name** - A community entry authorized for management access. Maximum string length is 19 characters.
- **Access** - Management access is restricted to Read Only or Read/Write.
- **Status** - Sets administrative status of entry to enabled or disabled.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### IP Trap Managers

The IP Trap Managers screen specifies management stations that will receive authentication failure messages or other trap messages from the Switch. Up to five trap managers may be entered.



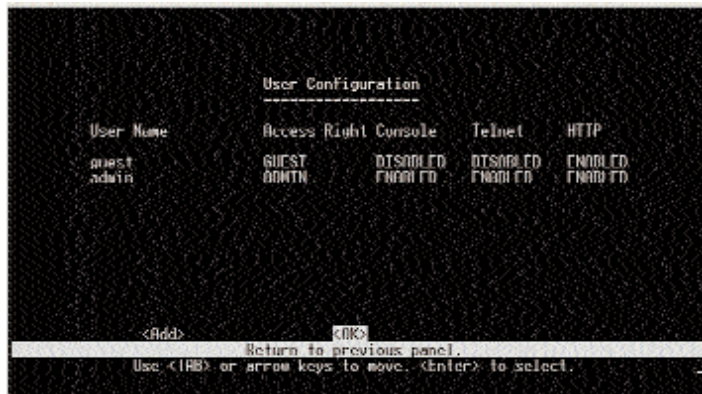
- **IP Address** - IP address of the trap manager.
- **Community Name** - A community specified for trap management access.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.



## User Configuration

The User Configuration screen to restrict management access based on specified user names and passwords. There are two user types, Administrator and Guest. Only the Administrator has write access for parameters governing the SNMP agent.

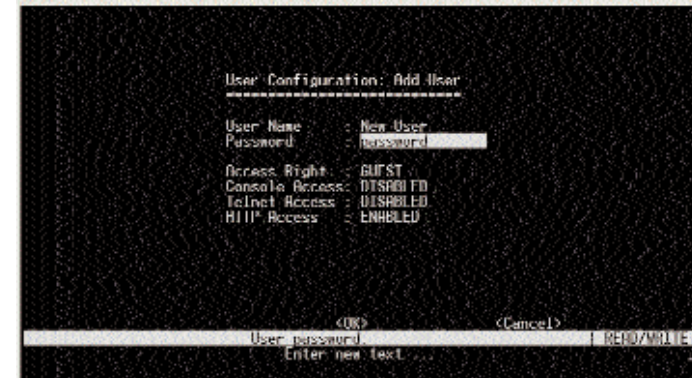


- **User Name** - Specifies user authorized management access to the Switch via the console, telnet, or the Web.
- **Access Right** - ADMIN: Read/Write for all screens.  
GUEST: Read Only for all screens.
- **Console** - Authorizes management via the console.
- **Telnet** - Authorizes management via a telnet connection.
- **HTTP** - Authorizes management via HTTP, e.g., a Web browser.

Select **Add** to add a user. Select **OK** to return to the previous panel.

## Add User

The Add User screen allows you to add a user.



- **User Name** - Specifies user authorized management access to the Switch via the console, telnet, or the Web.
- **Password** - Sets up the password for the new user.
- **Access Right** - ADMIN: Read/Write for all screens.  
GUEST: Read Only for all screens.
- **Console Access** - Authorizes management via the console.
- **Telnet Access** - Authorizes management via a telnet connection.
- **HTTP Access** - Authorizes management via HTTP, e.g., a Web browser.

Select **OK** to confirm the changes. Select **Cancel** to cancel any changes.

## TFTP Download

The TFTP Download screen lets you load software updates to permanent flash ROM in the Switch. After downloading the new software, the agent will automatically restart itself. You must be running a TFTP server on your network to use the TFTP Download feature.

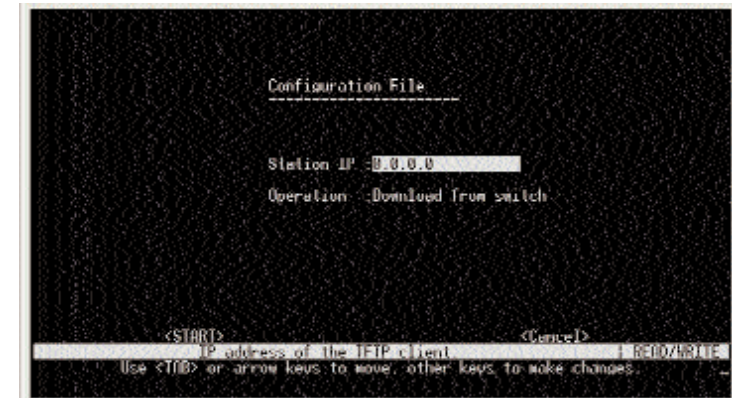


- **Download Server IP** - IP address of the TFTP server on your network.
- **Download Filename** - The binary file to download.
- **Download Option** - You may choose either **Runtime Code** or **Post Code**.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

## Configuration File

The Configuration File screen allows you to load a configuration file on any Switch on the network.



- **Station IP** - IP address of the Switch you want the configuration file to be sent to.
- **Operation** - Gives you the choice of downloading the configuration file from your Switch.

Download from switch - Downloads the current switch configuration to a file on the client PC.

Upload to switch - Uploads a configuration file to the Switch from the client PC.

Select **Start** to begin the download. Select **Cancel** to cancel the download.

## Management Access Control

The Management Access Control screen allows you to control the access that users have to the Switch.

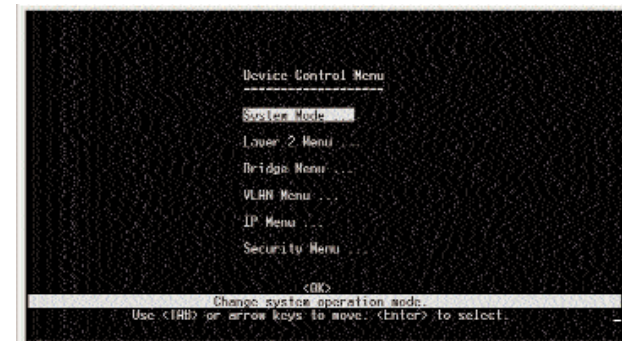


- **IP Address** - The IP Address of the PC you want to have access to the Switch. It is recommended that the PC be given a static IP address.
- **Subnet Mask** - The Subnet Mask of the PC that has access to the Switch.
- **(DELETE)** - Select DELETE if you want to deny access to a PC with a specific IP Address and Subnet Mask.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

## Device Control Menu

The Device Control Menu is used to control a broad range of functions, including port mode, port mirroring, port trunking, Spanning Tree, VLANs, IP subnets, multicast filtering, and routing protocols.



**Note:** This screen shot shows the Device Control Menu displayed by a multi-layer switch.

- **System Mode** - Sets the Switch to operate as a Layer 2 switch or as a multi-layer routing switch.
- **Layer 2 Menu** - Configures port communication mode, mirror ports, and port trunking.
- **Bridge Menu** - Configures the Spanning Tree Protocol for the bridge or for specific ports, GMRP and GVRP for automatic registration of multicast and VLAN groups, traffic class priority threshold, and address aging time.
- **VLAN Menu** - Configures VLAN settings for specific ports and defines the port membership for VLAN groups.
- **IP Menu** - Configures the subnets for each VLAN group, global configuration for unicast and multicast routing protocols, and IGMP snooping. (Only displayed for **multilayer** mode)
- **Security Menu** - Configures security settings.



**Note:** This screen shot shows the Device Control Menu displayed by a Layer 2 switch.

- **IGMP Snooping Configuration** - Configures IGMP multicast filtering. (Only displayed for **Layer 2** mode. When the Switch is in multilayer mode, IGMP Snooping Configuration is available through the IP Menu.)

Select **OK** to return to the previous panel.

## System Mode

The System Mode screen lets you set the Switch to operate as a Layer 2 switch or as a multilayer routing switch. As a Layer 2 switch, the Switch makes all filtering and forwarding decisions based strictly on MAC addresses. As a multilayer routing switch, it switches packets for all non-IP protocols based on MAC addresses, and routes all IP packets based on the specified routing protocol.



- **Layer 2** - Filtering and forwarding decisions will be based on MAC addresses for all protocol traffic.
- **Multilayer** - Switching based on MAC addresses will be used for all non-IP protocol traffic, and routing will be used for all IP protocol traffic.

Select **OK** to return to the previous panel.

## Layer 2 Menu

The Layer 2 Menu contains options for port configuration, port mirroring, and port trunking.



- **Port Configuration** - Enables any port, enables/disables flow control, and sets communication mode to auto-negotiation, full duplex, or half duplex.
- **Mirror Port Configuration** - Sets the source and target ports for mirroring.
- **Port Trunking Configuration** - Specifies ports to group into aggregate trunks.
- **Static Unicast Address Configuration** - Used to manually configure host MAC addresses in the unicast table.
- **Static Multicast Address Configuration** - Used to manually configure host MAC addresses in the multicast table.

Select **OK** to return to the previous panel.

## Port Configuration

The Port Configuration screen lets you display or set communication parameters for any port on the Switch, including administrative status, auto-negotiation, default communication speed and duplex mode, as well as flow control in use.

Port	Link Status	Admin Status	Auto Negotiate	Default Type	Current Type	Flow Control	Jack Type
1	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45
2	On	ENABLED	ENABLED	10HDX	100TH-FDX	OFF	RJ-45
3	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45
4	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45
5	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45
6	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45
7	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45
8	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45
9	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45
10	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45
11	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45
12	OFF	ENABLED	ENABLED	10HDX	10HDX	OFF	RJ-45

Administrative status for port 1: READ/SELECT

- **Port (#)** - Number of the port.
  - **Link Status** - Indicates if the port has a valid connection to an external device.
  - **Admin Status** - 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.
  - **Auto Negotiate** - Enables or disables auto-negotiation for port speed, duplex mode, and flow control.
  - **Default Type** - If auto-negotiation is disabled, the port will be set to the indicated speed and duplex mode.
  - **Current Type** - Indicates the current speed and duplex mode of each port.
- Port Configuration**
- **Flow Control** - 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. When enabled, back pressure is used for half duplex and IEEE 802.3x for full duplex.

**Note:** Flow control should not be used if a port is connected to a hub.

- **Jack Type** - Shows the jack type for each port. Ports 1-26 are RJ-45.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page.

### Mirror Port Configuration

The Mirror Port Configuration screen allows you to 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, the target port must be included in the same VLAN as the source port.



- **Enable Port Mirror** - Enables or disables the mirror function.
- **Mirrored Ports (Tx/Rx)** - The port whose transmitted or received traffic will be mirrored. Press Add to specify mirrored ports.

- **Monitor Port** - The port that will duplicate the transmitted or received traffic appearing on the mirrored port.

**Note:** You can mirror multiple ports to a single port to view traffic such as that crossing a port trunk. However, note that some packets may be dropped for moderate to heavy loading.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Add** to add a port.

### Port Trunking Configuration

Ports can be combined into an aggregate link to increase the bandwidth of a network connection or ensure fault recovery. You can configure trunks between any two switches. The RJ-45 ports on this Switch can be grouped into a trunk consisting of two, four, or eight ports, creating an aggregate bandwidth up to 400, 800, or 1600Mbps when operating at full duplex.

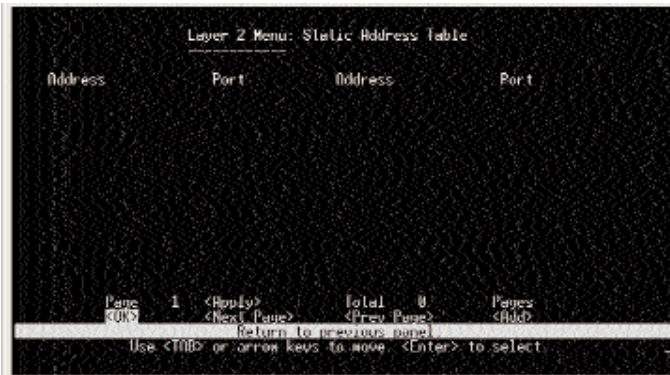


- **Index** - The trunk identifier.
- **Port Count** - Trunks can contain 2, 4, or 8 ports.
- **Port Number** - The ports assigned to each trunk.

Select **OK** to return to the previous panel. Select **Add** to add a trunk.

### Static Unicast Address Configuration

The Static Unicast Address Table can be used to assign the MAC address for a host device to a specific port on this Switch. Static unicast addresses are never aged out, and cannot be learned on another port.



- **Address** - The MAC address of a host device attached to this Switch.
- **Port** - The switch port the host device is attached to.

To assign a destination MAC address to one or more ports, use **Add**. To delete or modify an address, highlight it with the cursor and press **Enter**. Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

### Add Static Address Entry

The Add Static Address Entry screen allows you to add static addresses for unicasting.

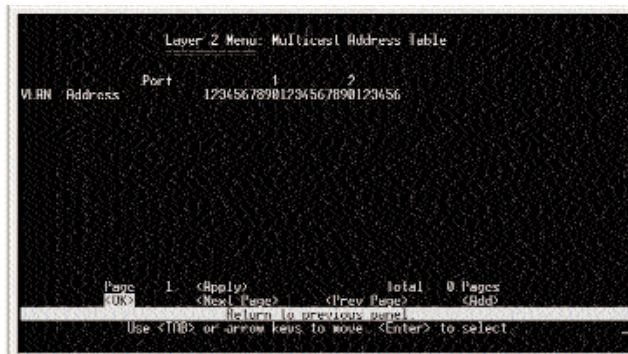


- **Address** - The MAC address of a host device attached to this Switch.
- **Port** - The switch port the host device is attached to.

Select **OK** to confirm the changes. Select **Cancel** to cancel any changes.

### Static Multicast Address Configuration

The Static Multicast Address Table can be used to assign a destination MAC address (and the corresponding ports) to the VLAN group used for a specific multicast service. Static multicast addresses are never aged out, and traffic with these addresses can only be forwarded to ports specified in this table.



- **VLAN** - The VLAN corresponding to this multicast service.
- **Address** - The destination MAC address for a multicast service.
- **Port** - The ports to which this multicast traffic can be forwarded. Read the numbers vertically; they range from 1-26. For each port number, there are two choices:

If the letter “M” is present, it indicates that the VLAN has access to messages transmitted by that particular port.

If there is no letter “M,” then there is no access to messages transmitted by that particular port.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

### Add Multicast Address Entry

The Add Static Address Entry screen allows you to add static addresses for multicasting.



- **VLAN** - The VLAN corresponding to this multicast service.
- **Address** - The destination MAC address for a multicast service.
- **Port** - The ports to which this multicast traffic can be forwarded.

Read the numbers vertically; they range from 1-26. For each port number, there are two choices: “M” or nothing. Use the spacebar to scroll through the choices.

Select the letter “M” to indicate that the VLAN has access to messages transmitted by that particular port.

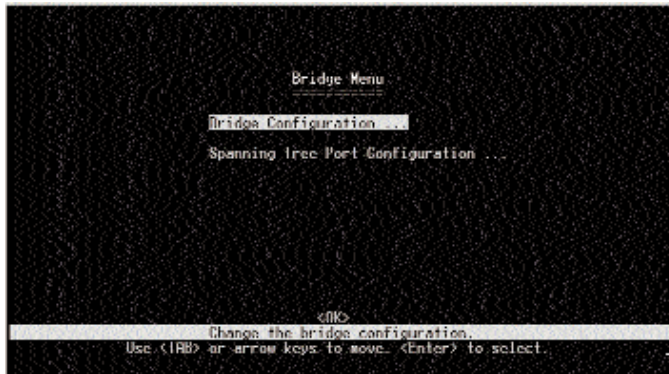
Select a blank space to indicate that there is no access to messages transmitted by that particular port.

Select **OK** to confirm the changes. Select **Cancel** to cancel any changes.



## Bridge Menu

The Bridge Menu is used to configure settings for the Spanning Tree Algorithm, as well as the global bridge settings for GMRP (GARP Multicast Registration Protocol) and GVRP (GARP VLAN Registration Protocol), traffic classes priority threshold, and address aging time.



- **Bridge Configuration** - Contains global bridge settings for STA (including bridge priority, hello time, forward delay, maximum message age), GMRP, GVRP, traffic class priority threshold, and address aging time.
- **Spanning Tree Port Configuration** - Contains STA settings for individual ports, including port priority, path cost, and fast forwarding.

Select **OK** to return to the previous panel.

## Bridge Configuration

The Bridge Configuration screen allows you to configure global bridge settings.



- **Spanning Tree** - Enable this parameter to participate in a STA compliant network.
- **Bridge Priority** - Bridge 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. The lower the numeric value, the higher the priority.
- **Hello Time** - Time interval (in seconds) at which the root device transmits a configuration message.
- **Forward Delay** - The maximum time (in seconds) the root device will wait before changing states.
- **Max Age** - The maximum time (in seconds) a device can wait without receiving a configuration message before attempting to reconfigure.
- **GMRP** - GMRP allows network devices to register endstations with multicast groups.

- **GVRP** - GVRP defines a way for switches to exchange VLAN information in order to register VLAN members on ports across the network. This function should be enabled to permit automatic VLAN registration, and to support VLANs which extend beyond the local switch.
- **Priority Threshold** - This Switch supports Quality of Service (QoS) by using two priority queues, with Weighted Fair Queuing for each port.
- **Aging Time** - Time-out period in seconds for aging out dynamically learned forwarding information. Range varies from 10-415 seconds.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### Spanning Tree Port Configuration

The Spanning Tree Port Configuration allows you to configure spanning tree port settings.



Port	Type	Priority	Cost	FastForwarding
1	100TX	128	19	ENABLED
2	100TX	128	19	ENABLED
3	100TX	128	19	DISABLED
4	100TX	128	19	DISABLED
5	100TX	128	19	DISABLED
6	100TX	128	19	DISABLED
7	100TX	128	19	DISABLED
8	100TX	128	19	DISABLED
9	100TX	128	19	DISABLED
10	100TX	128	19	DISABLED
11	100TX	128	19	DISABLED
12	100TX	128	19	DISABLED

- **Type** - Shows port type as 100TX for 10Base-T/100Base-TX, or 1000T for 1000Base-T.
- **Priority** - 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 (that is, lowest value) will be configured as an active link in

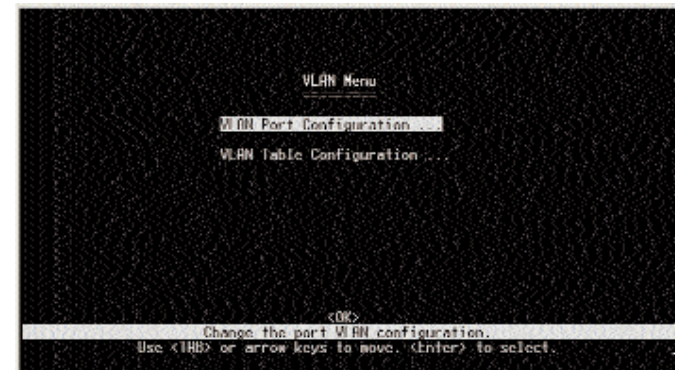
the Spanning Tree. When more than one port is assigned the highest priority, the port with the lowest numeric identifier will be enabled. The range is 0-255.

- **Cost** - 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. (This takes precedence over port priority.)
- **Fast Forwarding** - This parameter is used to enable/disable the Fast Spanning Tree mode for the selected port.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page.

### VLAN Menu

The VLAN Menu is used to assign any port on the Switch to any of up to 256 VLAN groups. By using IEEE 802.1Q compliant VLANs, 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.



- **VLAN Port Configuration** - Configures GARP, the default VLAN identifier, default port priority, VLAN tagging on the attached link, GVRP and

GMRP status, and filtering of incoming frames for VLAN groups a specific port does not belong to.

- **VLAN Table Configuration** - Use this screen to create a new VLAN or modify the settings for an existing VLAN.

Select **OK** to return to the previous panel.

### VLAN Port Configuration

The VLAN Port Configuration screen allows you to configure GARP, the default VLAN identifier, default port priority, VLAN tagging on the attached link, GVRP and GMRP status, and filtering of incoming frames for VLAN groups a specific port does not belong to.



### GARP

Group Address Registration Protocol is used by GVRP and GMRP to register or deregister client attributes for client services within a bridged LAN.

- **Join Time** - The interval (centiseconds) between transmitting requests/queries to participate in a group.
- **Leave Time** - The interval (centiseconds) a port waits before leaving a group. This time should be set to more than twice the Join Time. This ensures that after a Leave or Leave All message has been issued, the applicants can re-join before the port actually leaves the group.

- **Leave All Time** - The interval (centiseconds) between sending out a Leave All query message for group participants and the port leaving the group. This interval should be considerably larger than the Leave Time to minimize the amount of traffic generated by nodes rejoining the group.

### VLAN and Priority

These fields set the default values for VLANs, port priority, GVRP, and GMRP.

- **Port VID** - The VLAN ID assigned to untagged frames received on this port.
- **Port Default Priority** - Sets the default ingress priority to any value beneath the priority threshold to specify the low priority queue, or to any value equal to or above this threshold to specify the high priority queue.
- **VLAN Tagging** - Indicates whether or not VLAN tags will be included on frames passing through this port.
- **GVRP** - Enables or disables GVRP for this port. When disabled, any GVRP packets received on this port will be discarded and no GVRP registrations will be propagated from other ports. **Note:** GMVP must be enabled for the Switch before this setting can take effect.
- **GMRP** - Enables or disables GMRP for this port. When enabled, this port will allow endstations to register with multicast groups. **Note:** GMRP must be enabled for the Switch before this setting can take effect.
- **Ingress Filtering** - If enabled, incoming frames for VLANs that do not include this ingress port in their member set will be discarded at the ingress port.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes. Select **Prev Port** to view the previous port. Select **Next Port** to view the next port. To display a specific port, set the port number in the Page field and then press **Apply**.

## VLAN Table Configuration

The VLAN Table Configuration screen is used to create a new VLAN or modify the settings for an existing VLAN.



- **VLAN** - The ID for the VLAN currently displayed. The range is 1-2048.
- **Port** - Port entries may be marked as:
  - (Normal) Uses GVRP to determine port membership.
  - S (Static) Adds port as a static entry. GVRP protocol is disabled.
  - R (Registration Fixed) Adds port as a static entry. GVRP protocol messages are still forwarded through this port.
  - X (Forbidden) Disables GVRP for this VLAN on the specified port.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**. Select **Add** to add a VLAN.

## IP Menu

The IP Menu is used to configure the IP subnets for each VLAN on your Switch, the unicast and multicast routing protocols, and IGMP. This menu is only available for a Switch in **multilayer** mode.



- **Subnet Configuration** - Specifies the IP interface for VLANs configured on this Switch, including the subnet address and routing protocols.
- **Protocol Configuration** - Enables the unicast and multicast routing protocols globally for this Switch.
- **Static ARP Configuration** - Specifies the static Address Resolution Protocol.
- **Static Route** - Configures a static route.
- **Default Route** - Defines the router to which this Switch will forward all traffic for unknown networks.

Select **OK** to return to the previous panel.

## Subnet Configuration

The Subnet Configuration screen allows you to specify an IP interface for any VLAN configured on this Switch that needs to communicate with a device outside of its own group (that is, another network segment).



- **IP Address** - The IP address associated with the specified VLAN interface. By convention, the last three digits should be set to “254” to readily distinguish this device as a router port. To modify this IP interface, select it and press **Enter**.
- **Subnet Mask** - A template that identifies the address bits in the host address used for routing to specific subnets. Each bit that corresponds to a “1” is part of the network/subnet number, and each bit that corresponds to “0” is part of the host number.
- **VLAN** - The VLAN associated with this IP interface.
- **RIP** - Routing Information Protocol for unicast routing.
- **OSPF** - Open Shortest Path First routing protocol.
- **DVMRP** - Distance-Vector Multicast Routing Protocol.
- **Status** - Status of the VLAN IP.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**. Select **Add** to add an IP interface.

## Modify Subnet

The Modify Subnet screen allows you to modify an IP interface.

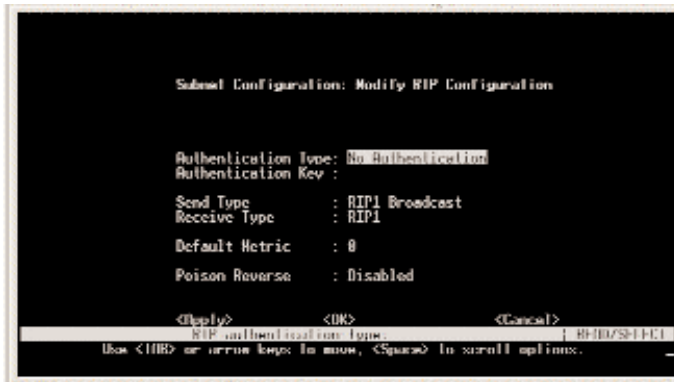


- **VLAN** - The VLAN associated with this IP interface.
- **Select** - Use this option to create or modify a VLAN.
- **IP Address** - The IP address associated with the specified VLAN interface.
- **Subnet Mask** - A template that identifies the address bits in the host address used for routing to specific subnets.
- **Proxy ARP** - Enable or disable the Proxy Address Resolution Protocol.
- **RIP** - Enable or disable the Routing Information Protocol for unicast routing. Select **Advanced** to make more changes.
- **OSPF** - Enable or disable the Open Shortest Path First protocol. Select **Advanced** to make more changes.
- **DVMRP** - Enable or disable the Distance-Vector Multicast Routing Protocol. Select **Advanced** to make more changes.

Select **Delete** to delete a subnet. Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

**Subnet Configuration: Modify RIP Configuration**

The Subnet Configuration: Modify RIP Configuration screen allows you to modify the RIP parameters.



- **Authentication Type** - Authentication can be used to ensure that routing information comes from a valid source.
- **Authentication Key**- A simple password must be provided if authentication is enabled. It is case-sensitive and can have up to 16 characters.
- **Send Type** - Select the type of protocol used for traffic sent from this port.
- **Receive Type** - Select the kind of routing protocol messages accepted on this port.
- **Default Metric** - This is used for the default route in RIP updates originated on this interface. A value of zero indicates that no default route should be originated.
- **Poison Reverse** - This propagates routes back to an interface port from which they have been acquired, but it sets the distance vector metrics to infinity.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

**Subnet Configuration: Modify OSPF Configuration**

The Subnet Configuration: Modify OSPF Configuration screen allows you to modify the OSPF parameters.



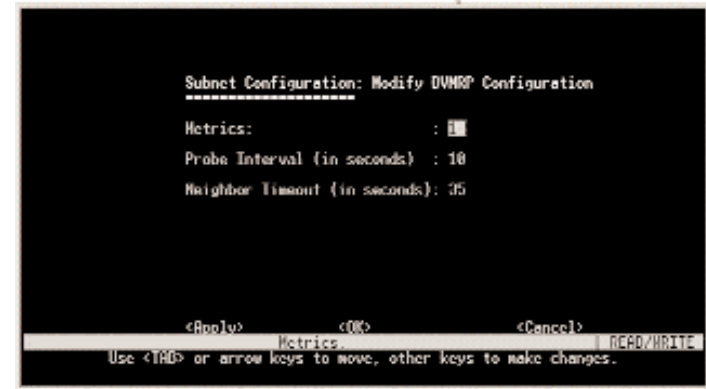
- **Area ID** - A 32-bit number assigned to each interface or subnet running the OSPF protocol.
- **Router Priority** - When two routers are attached to a network, both attempt to become the designated router, and the one with the highest priority takes precedence.
- **Interface Cost** - The cost of sending a packet on the interface.
- **Transit Delay** - The estimated number of seconds it takes to transmit a Link State Update Packet over this interface.
- **Retransmit Interval** - The number of seconds between LSA retransmissions, for adjacencies belonging to this interface.
- **Hello Interval** - The length of time, in seconds, between the Hello Packets that the router sends on the interface.
- **Dead Interval** -After ceasing to hear a router's Hello Packets, the number of seconds before its neighbors declare the router to be down.

- **Poll Interval** - After beginning to hear a router's Hello Packets, the period of time after its neighbors declare the router to be up.
- **Authentication Type** - Identifies the authentication procedure to be used on the attached network.
- **Authentication Key**- The configured data allows the authentication procedure to verify OSPF protocol packets received over the interface.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### Subnet Configuration: Modify DVMRP Configuration

The Subnet Configuration: Modify DVMRP Configuration screen allows you to modify the DVMRP parameters.



- **Metrics** - This value is used to select the best reverse path to networks that are connected directly to an interface on the Switch.
- **Probe Interval** - The interval between sending neighbor probe messages to the multicast group address for all DVMRP users.
- **Neighbor Timeout** - The interval to wait without hearing from a DVMRP neighbor before declaring it dead.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### Add Subnet

The Add Subnet screen allows you to add an IP interface.

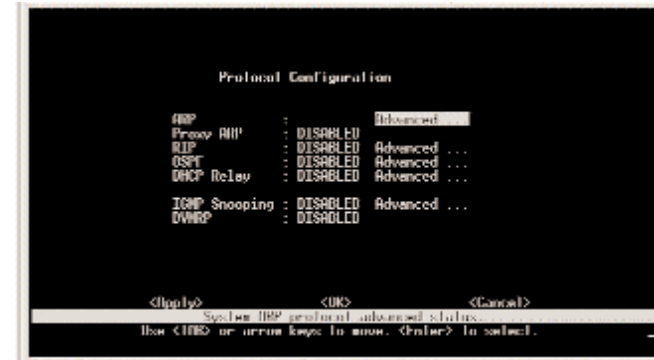


- **VLAN** - The VLAN associated with this IP interface.
- **Select** - Use this option to create or modify a VLAN.
- **IP Address** - The IP address associated with the specified VLAN interface.
- **Subnet Mask** - A template that identifies the address bits in the host address used for routing to specific subnets.
- **Proxy ARP** - Enable or disable the Proxy Address Resolution Protocol.
- **RIP** - Enable or disable the Routing Information Protocol for unicast routing.
- **OSPF** - Enable or disable the Open Shortest Path First protocol.
- **DVMRP** - Enable or disable the Distance-Vector Multicast Routing Protocol.

Select **OK** to confirm the changes. Select **Cancel** to cancel any changes.

### Protocol Configuration

The Protocol Configuration screen is used to globally enable or disable unicast or multicast routing protocols for the Switch.



- **ARP** - Address Resolution Protocol. Select **Advanced** for additional configuration (see page 23).
- **Proxy ARP** - Enable or disable the Proxy Address Resolution Protocol.
- **RIP** - Enable or disable the Routing Information Protocol for unicast routing. Select **Advanced** for additional configuration.
- **OSPF** - Enable or disable the Open Shortest Path First protocol. Select **Advanced** for additional configuration.
- **DHCP Relay** - Enable or disable the Dynamic Host Configuration Protocol relay. Select **Advanced** for additional configuration.
- **IGMP Snooping** - Enable or disable IGMP multicast filtering. Select **Advanced** for additional configuration.
- **DVMRP** - Enable or disable the Distance-Vector Multicast Routing Protocol.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.



### ARP Configuration

The ARP Configuration screen allows you to specify the timeout duration.



- **ARP Timeout** - Duration of timeout (in minutes).

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### RIP Configuration

The RIP Configuration screen allows you to specify how routers exchange routing table information.



- **RIP Update Time** - Duration of timeout (in seconds).
- **Default Route Advertisement** - Enable or disable the use of default route messages.
- **Static Route Advertisement** - Enable or disable the use of static route messages.
- **Ignore Host Route** - Enable or disable the use of host routes. If you enable the Ignore Host Route feature, then host routes will not be used.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

## OSPF Configuration Menu

The OSPF Configuration Menu screen allows you to configure the OSPF parameters.



- **Router ID Selection** - Allows you to assign an algorithm.
- **Router ID** - The OSPF identifier for the router at the other end of the link.
- **AS Border Status** - Enable or disable the router that exchanges routing information with routers that belong to other Autonomous Systems.
- **RFC 1583 Compatibility** - Controls the preference rules when choosing among multiple AS-external-LSAs advertising the same destination.
- **Area ID Configuration** - Defines an area within which all OSPF routers actively exchange routing information to ensure that they all have an identical link state database.
- **OSPF Area Range Configuration** - Defines a range of subnetwork addresses. An area range is used to summarize route information exchanges between Area Border Routers.

- **OSPF Virtual Link Configuration** - Defines a virtual link that can be used to connect an OSPF area not physically adjacent to the OSPF backbone, or to create a backup link to any area.
- **OSPF Host Router Configuration** - Defines a main route of OSPF to connect to other areas.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

**IP Menu: OSPF Area Configuration**

The IP Menu: OSPF Area Configuration screen allows you to configure the Area ID parameters.



- **Area ID** - Allows you to assign an algorithm.
- **Type** - Select the Area Type. “Standard” means that AS-External-LSAs are included in the area. “Stub” means that AS-External-LSAs are excluded from the area.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**. Select **Add** to add an area.

**OSPF Area Configuration: Add OSPF Area**

The OSPF Area Configuration: Add OSPF Area screen allows you to add an area.



- **Area ID** - The ID of the OSPF area.
- **Stub** - The type of the OSPF area.

Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### OSPF Area Range Configuration

The OSPF Area Range Configuration Menu screen allows you to configure the area range parameters.



- **Area Identity** - The OSPF Area to which the attached network belongs.
- **IP Address** - The IP protocol address for this interface.
- **Address Mask** - This indicates the portion of the IP interface address with the IP interface.
- **Advertisement** - Unit of data describing the local state of a router or network.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**. Select **Add** to add an area range.

### Add OSPF Range

The Add OSPF Range screen allows you to add an OSPF range.

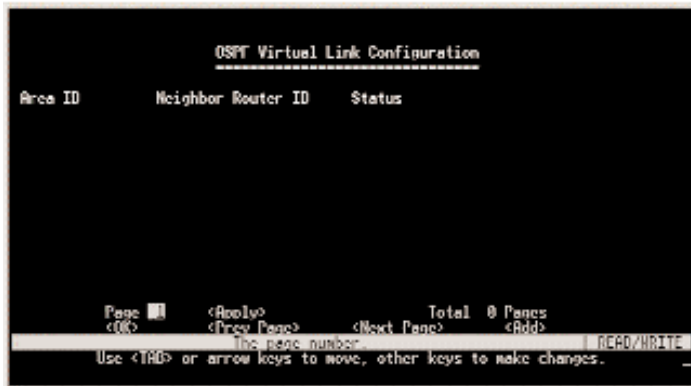


- **Area Identity** - The OSPF Area to which the attached network belongs.
- **IP Address** - The IP protocol address for this interface.
- **Address Mask** - This indicates the portion of the IP interface address with the IP interface.
- **Advertise** - Select whether or not this OSPF range should be advertised or not.

Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### OSPF Virtual Link Configuration

The OSPF Virtual Link Configuration screen allows you to configure the OSPF parameters.



- **Area ID** - This is a 32-bit number that identifies the area.
- **Neighbor Router ID** - The ID of the routers that have interfaces to a common network.
- **Status** - Shows the interface is linked or down.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**. Select **Add** to add a virtual link.

### Add OSPF Virtual Link

The Add OSPF Virtual Link screen allows you to add an OSPF virtual link.

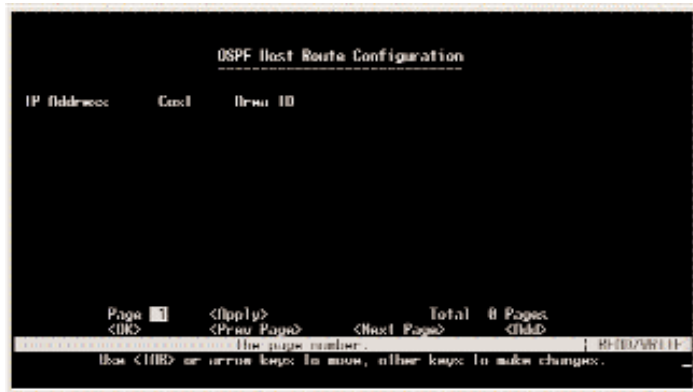


- **Area ID** - This is a 32-bit number that identifies the area.
- **Neighbor Router ID** - The ID of the routers that have interfaces to a common network.

Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### OSPF Host Route Configuration

The OSPF Host Route Configuration screen allows you to configure the OSPF host route parameters.



- **IP Address** - The IP address applied for this interface.
- **Cost** - The cost of sending a packet on the interface, expressed in the link state metric.
- **Area ID** - The OSPF area to which the attached network belongs to.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**. Select **Add** to add a host route.

### Add OSPF Host Route

The Add OSPF Host Route screen allows you to add an OSPF host route.

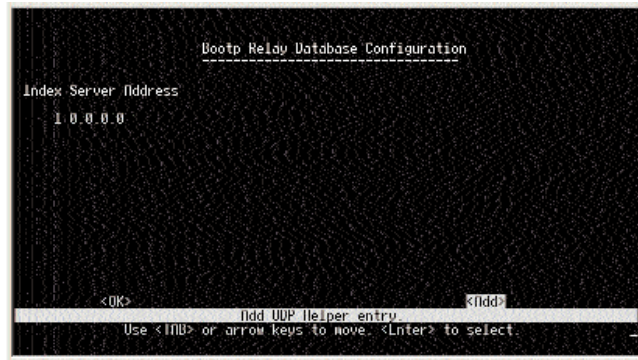


- **IP Address** - The IP address applied for this interface.
- **Cost** - The cost of sending a packet on the interface, expressed in the link state metric.
- **Area ID** - The OSPF area to which the attached network belongs to.

Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### BOOTP Relay Database Configuration

The BOOTP Relay Database Configuration screen allows you to specify the IP address for a BOOTP relay server.



- **Index Server Address** - Used to define any preferred DHCP servers or the outbound subnetwork for relaying a DHCP request broadcast. (Up to five entries are permitted.)

Select **OK** to return to the previous panel. Select **Add** to add another entry.

### Add BOOTP Relay Server

The Add BOOTP Relay Server screen allows you to add an entry.



- **IP Address** - IP address of server.

Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### IGMP Snooping Configuration

The IGMP Snooping Configuration allows you to set up IGMP snooping. IGMP snooping is used to monitor for any attached hosts who want to receive a specific multicast service. It looks up the IP Multicast Group used for this service and adds any port that received a similar request to that group. (This is the screen and options displayed for a Switch in multilayer mode.)

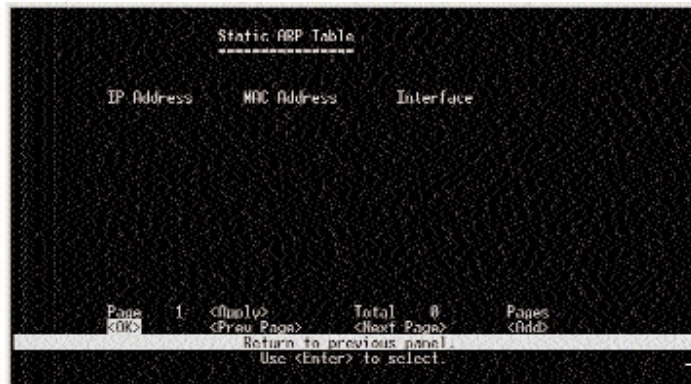


- **IGMP Router Timeout** - A switch port that stops receiving multicast protocol packets for this interval will be removed from the IGMP forwarding list. The range is 3-5 minutes.
- **IGMP Group Timeout** - The time between last spotting an IGMP Report message for an IP multicast address on a specific port and the Switch removing that entry from its list. The range is 3-5 minutes.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

### Static ARP Table

The Static ARP Table screen is used to specify the static Address Resolution Protocol.

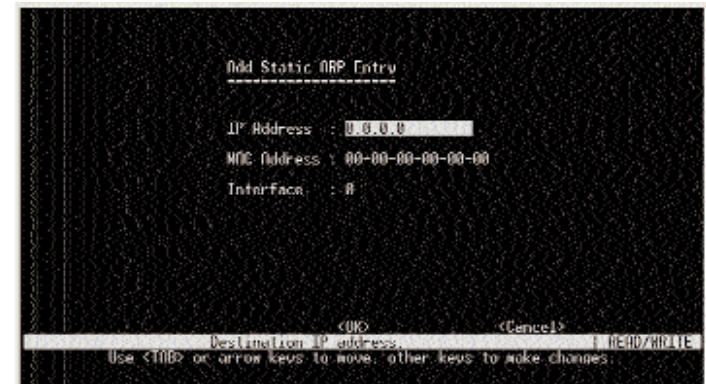


- **IP Address** - IP address statically mapped to a physical MAC address.
- **MAC Address** - MAC address statically mapped to the corresponding IP address.
- **Interface** - The index number of the IP interface that will use this static ARP entry. (Port "0" refers to the CPU.)

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**. Select **Add** to add a static ARP entry.

### Add Static ARP Entry

The Add Static ARP Entry screen is used to add a static ARP entry.



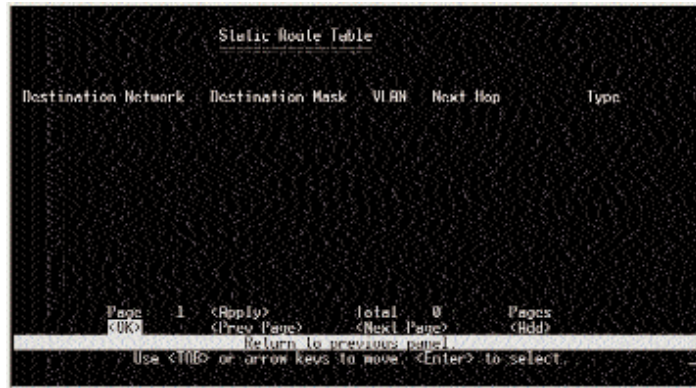
- **IP Address** - IP address statically mapped to a physical MAC address.
- **MAC Address** - MAC address statically mapped to the corresponding IP address.
- **Interface** - The index number of the IP interface that will use this static ARP entry. (Port "0" refers to the CPU.)

Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.



### Static Route Table

The Static Route Table screen is used to configure a static route.



- **Destination Network** - A destination network, subnet, or host.
- **Destination Mask** - The subnet mask that specifies the bits to match. A routing entry will be used for a packet if the bits in the address set by the destination mask match the destination network.
- **VLAN** - The VLAN within which the gateway or destination address resides.
- **Next Hop** - The IP address of the router at the next hop.
- **Type** - The IP route type for the destination network.

Direct - A directly connected subnetwork

Indirect - A remote IP subnetwork or host address

Myself - A switch IP address on a specific IP subnetwork

Bcast - A subnetwork broadcast address

Mcast - An IP multicast address

Invalid - An illegal IP address to be filtered

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**. Select **Add** to add a routing entry.

### Add Routing Entry

The Add Routing Entry screen is used to add a routing entry.



- **IP Address** - IP address of static ARP entry.
- **MAC Address** - MAC address of static ARP entry.
- **Next Hop** - The IP address of the router at the next hop.
- **Routing Metric** - Indicate the number of hops to the destination network.

Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

## Default Route Menu

The Default Route Menu screen is used to define the router to which the Switch will forward all traffic for unknown networks. You can have primary and secondary default routes.

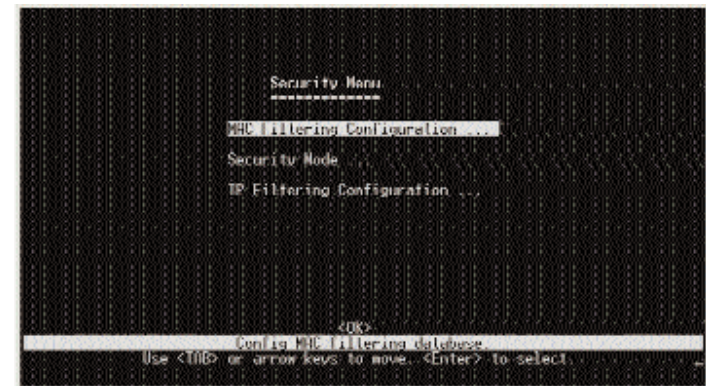


- **Next Hop IP** - IP address of the default router.
- **Test Point IP** - IP used to detect the connection status.
- **Metric** - Number of hops required to reach the default route.
- **Mode** - Select **Enabled** or **Disabled** or enable or disable the default route.
- **Status** - Shows the link status of the route.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

## Security Menu

The Security Menu is used to configure security options.



- **MAC Filtering Configuration** - Security filtering can be used to drop all the traffic from a host device based on a specified MAC address. Traffic with either a source or destination address listed in the MAC Filtering Configuration table will be filtered.
- **Security Mode** - Enable/disable the Learning mode here.
- **IP Filtering Configuration** - Configures IP filtering settings. (Only available when the Switch is in multilayer mode)

Select **OK** to return to the previous panel.

## MAC Filtering Configuration

The MAC Filtering Configuration screen allows you to filter out specified MAC addresses. Any node that presents a security risk or is malfunctioning can be filtered from this Switch. Security filtering can be used to drop all the traffic from a host device based on a specified MAC address.



To add a MAC address, use **Add**. To delete an address, highlight it with the cursor and press **Enter**. Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

## Add MAC Address Filter

The Add MAC Address Filter screen allows you to add MAC addresses.

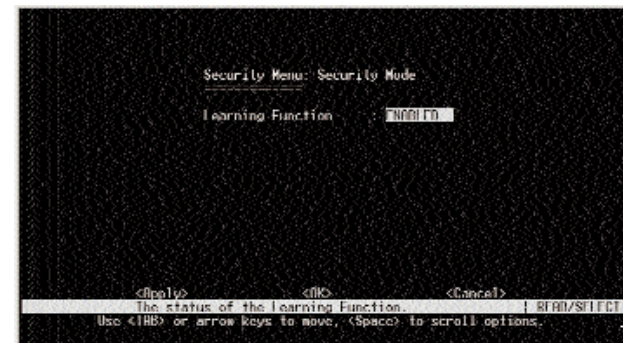


- **MAC Address** - The MAC address of a host device attached to this Switch.

Select **OK** to confirm the changes. Select **Cancel** to cancel any changes.

## Security Mode

The Security Mode menu is used to enable/disable the Learning function.

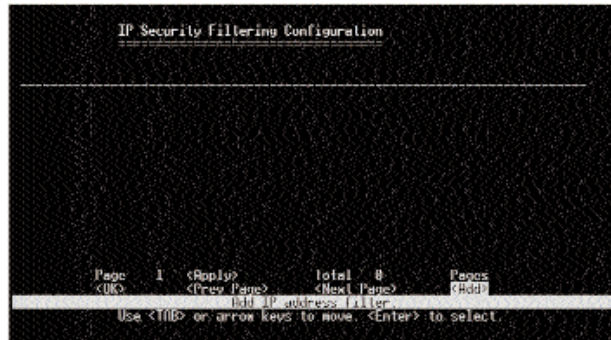


- **Learning Function** - Enables/disables Learning function for security filtering.

Select **Apply** to make a change. Select **OK** to return to the previous panel. Select **Cancel** to cancel any change.

## IP Security Filtering Configuration

Security filtering can be used to drop all the traffic from a specified IP address. (Only available when the Switch is in multilayer mode)



To add an IP address, use **Add**. To delete an address, highlight it with the cursor and press **Enter**. Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

### Add IP Address Filter

The Add IP Address Filter screen allows you to add IP addresses.

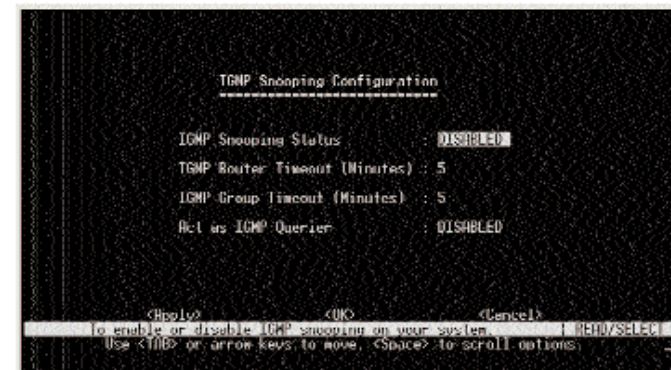


- **IP Address** - The IP address to be filtered.

Select **OK** to confirm the changes. Select **Cancel** to cancel any changes.

## IGMP Snooping Configuration

The IGMP Snooping Configuration allows you to set up IGMP snooping. IGMP snooping is used to monitor for any attached hosts who want to receive a specific multicast service. It looks up the IP Multicast Group used for this service and adds any port that received a similar request to that group. (This is the screen and options displayed for a Switch in Layer 2 mode.)



- **IGMP Snooping Status** - If enabled, the Switch will monitor network traffic to determine which hosts want to receive multicast traffic.
- **IGMP Router Timeout** - A switch port that stops receiving multicast protocol packets for this interval will be removed from the IGMP forwarding list. The range is 3-5 minutes.
- **IGMP Group Timeout** - The time between last spotting an IGMP Report message for an IP multicast address on a specific port and the Switch removing that entry from its list. The range is 3-5 minutes.
- **Act as IGMP Querier** - If enabled, the Switch will query other devices in regards to IGMP.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Cancel** to cancel any changes.

## Network Monitor Menu

The Network Monitor Menu provides access to port statistics, RMON statistics, address tables, VLAN registration and forwarding information, multicast groups, and subnet addresses.



**Note:** This screenshot shows the Network Monitor Menu displayed by a Layer 2 switch.

- **Port Statistics/Statistics Menu** - Displays statistics on network traffic passing through the selected port. You have a choice of viewing port or RMON statistics.
- **Layer 2 Address Table** - Displays detailed statistical information for the selected port, such as packet type and frame size counters.
- **Bridge Menu** - The Bridge menu displays settings for the Spanning Tree Algorithm, as well as the global bridge settings for GMRP (GARP Multicast Registration Protocol) and GVRP (GARP VLAN Registration Protocol), traffic classes priority threshold, and address aging time.
- **VLAN Menu** - Includes learned ports in the VLAN Dynamic Registration Information table, and the ports that are currently forwarding VLAN traffic in the VLAN Forwarding Information table.

- **IP Multicast Registration Table** - Displays all the multicast groups active on this Switch, including the multicast IP address and the corresponding VLANs. (Only displayed for **Layer 2** mode. When the Switch is in multilayer mode, IP Multicast Registration Table is available through the IP Menu.)
- **IP Menu** - Displays information regarding a variety of IP settings, including subnets, ARP table, routing table, and multicast groups. (Not shown in screenshot. Only available in **multilayer** mode.)

Select **OK** to return to the previous panel.

## Port Statistics/Statistics Menu

The Port Statistics/Statistics Menu allows you to view the port or RMON statistics.



- **Port Statistics** - Displays statistics on network traffic passing through the selected port. You have a choice of viewing port or RMON statistics.
- **RMON Statistics** - Displays statistics for each port from RMON group 1 (RMON groups 2, 3, and 9 can only be accessed using SNMP management software).

Select **OK** to return to the previous panel.

## Port Statistics

Port Statistics display key statistics from the Interfaces Group and Ethernet-like MIBs 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 port.

```

Port Statistics
-----
Interfaces
In Octets          : 0          Out Octets          : 0
In Unicast Pkts   : 0          Out Unicast Pkts   : 0
In Non Unicast Pkts : 0        Out Non Unicast Pkts : 0
In Discards       : 0          Out Discards       : 0
In Errors         : 0          Out Errors         : 0
Alignment Errors  : 0          CRC Errors         : 0

Ethernet
Single Collisions : 0          Multiple Collisions : 0
Deferred Transmissions : 0      Late Collisions     : 0
Excessive Collisions : 0        Carrier Sense Errors : 0
Drop Events       : 0          Fragments           : 0
Octets           : 0          Jabbers             : 0

Port Number: 1  <Apply>      <Reset>      <Reset All>
<OK>           <Refresh>    <Next Port>  <Prev Port>
-----
Return to previous panel.
Use <TAB> or arrow keys to move. <Enter> to select.

```

## Interfaces

- **In Octets** - The total number of octets received on the interface, including framing characters.
- **In Unicast Pkts** - The number of unicast packets delivered to a higher-layer protocol.
- **In Non-Unicast Pkts** - The number of non-unicast (that is, subnetwork-broadcast or subnetwork-multicast) packets delivered to a higher-layer protocol.
- **In Discards** - The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.
- **In Errors** - The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.

- **Alignment Errors** - The number of alignment errors (mis-synchronized data packets).
- **Out Octets** - The total number of octets transmitted out of the interface, including framing characters.
- **Out Unicast Pkts** - The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.
- **Out Non-Unicast Pkts** - The total number of packets that higher-level protocols requested be transmitted to a non-unicast (that is, a subnetwork-broadcast or subnetwork-multicast) address, including those that were discarded or not sent.
- **Out Discards** - The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free up buffer space.
- **Out Errors** - The number of outbound packets that could not be transmitted because of errors.
- **CRC Errors** - Number of Ethernet Cyclic Redundancy Check errors detected by this device.

## Ethernet

- **Single Collisions** - The number of successfully transmitted frames for which transmission is inhibited by exactly one collision.
- **Deferred Transmissions** - A count of frames for which the first transmission attempt on a particular interface is delayed because the medium was busy.
- **Excessive Collisions** - The number of frames for which transmission failed due to excessive collisions.
- **Drop Events** - The total number of events in which packets were dropped due to lack of resources.

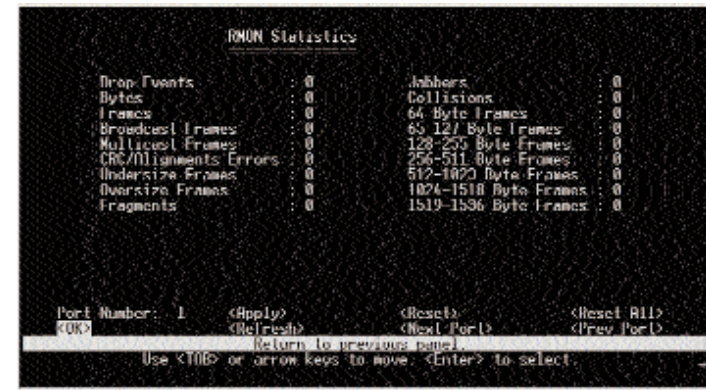
- **Octets** - Number of octets passing through this port.
- **Multiple Collisions** - A count of successfully transmitted frames for which transmission is inhibited by more than one collision.
- **Late Collisions** - The number of times that a collision is detected later than 512 bit-times into the transmission of a packet.
- **Carrier Sense Errors** - The number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame.
- **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.

Select **Apply** to make changes. Select **Refresh** to refresh the statistics. Select **OK** to return to the previous panel. Select **Reset** to reset a specific statistic. Select **Reset All** to reset the all statistics. Select **Prev Port** to view the previous port. Select **Next Port** to view the next port. To display a specific port, set the port number in the Port field and then press **Apply**.

### RMON Statistics

The RMON Statistics screen provides access to a broad range of statistics, including a total count of different frame types and sizes passing through each port. The values displayed have been accumulated since the last system reboot.

Select the required port.



- **Drop Events** - The total number of events in which packets were dropped due to lack of resources.
- **Bytes** - Total number of bytes of data received on the network. This statistic can be used as a reasonable indication of Ethernet utilization.
- **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. This does not include multicast packets.
- **Multicast Frames** - The total number of multicast frames.
- **CRC/Alignment Errors** - The number of CRC/alignment errors (FCS or alignment errors).

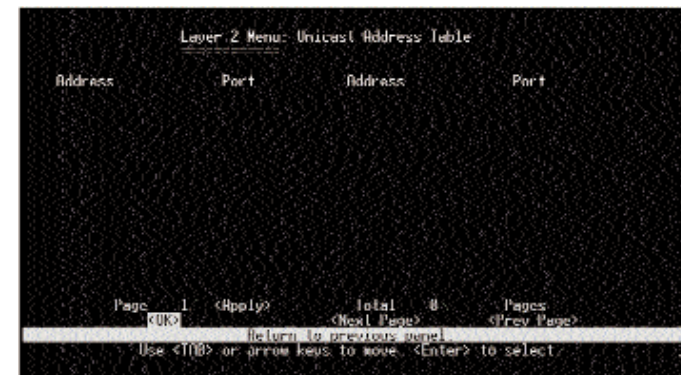
- **Undersize Frames** - The total number of frames received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
- **Oversize Frames** - The total number of frames received that were longer than 1518 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
- **Fragments** - The number of outbound packets that could not be transmitted because of errors.
- **Jabbers** - The total number of frames received that were longer than 1518 octets long (excluding framing bits, but including FCS octets) and had either an RCS 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 where the number of octets fall within the specified range (excluding framing bits, but including FCS octets).
- **128-255 Byte Frames** - The total number of frames (including bad packets) received and transmitted where the number of octets fall within the specified range (excluding framing bits, but including FCS octets).
- **256-511 Byte Frames** - The total number of frames (including bad packets) received and transmitted where the number of octets fall within the specified range (excluding framing bits, but including FCS octets).
- **512-1023 Byte Frames** - The total number of frames (including bad packets) received and transmitted where the number of octets fall within the specified range (excluding framing bits, but including FCS octets).
- **1024-1518 Byte Frames** - The total number of frames (including bad packets) received and transmitted where the number of octets fall within the specified range (excluding framing bits, but including FCS octets).

- **1519-1536 Byte Frames** - The total number of frames (including bad packets) received and transmitted where the number of octets fall within the specified range (excluding framing bits, but including FCS octets).

Select **Apply** to make changes. Select **Refresh** to refresh the statistics. Select **OK** to return to the previous panel. Select **Reset** to reset a specific statistic. Select **Reset All** to reset the all statistics. Select **Prev Port** to view the previous port. Select **Next Port** to view the next port. To display a specific port, set the port number in the Port field and then press **Apply**.

### Layer 2 Address Table

When you select Layer 2 Address Table from the Network Monitor Menu, you will see a screen that allows you to select the **Unicast Address Table**. This contains the MAC addresses associated with each port (that is, the source port associated with the address).



- **Address** - The MAC address of a node seen on this Switch.
- **Port** - The port whose address table includes this MAC address.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.



## Bridge Menu

The Bridge Menu is used to display settings for the Spanning Tree Algorithm, as well as the global bridge settings for GMRP (GARP Multicast Registration Protocol) and GVRP (GARP VLAN Registration Protocol), traffic classes priority threshold, and address aging time.



- **Spanning Tree Bridge Information** - Displays a full list of STA values used for the bridge.
- **Spanning Tree Port Information** - Displays a list of STA values used for each port, including status, designated cost, designated bridge, and designated port.

Select **OK** to return to the previous panel.

## Spanning Tree Bridge Information

The STA Bridge Information screen displays a summary of STA information for the overall bridge.



- **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.

Select **OK** to return to the previous panel.

### Spanning Tree Port Information

The STA Port Information screen displays a summary of STA information for the various ports.

Port	Type	Status	Designated Cost	Designated Bridge	Designated Port
1	100TX	DISABLED	0	32768.001005489400	128.1
2	100TX	FORWARDING	0	32768.001005489400	128.2
3	100TX	DISABLED	0	32768.001005489400	128.3
4	100TX	DISABLED	0	32768.001005489400	128.4
5	100TX	DISABLED	0	32768.001005489400	128.5
6	100TX	DISABLED	0	32768.001005489400	128.6
7	100TX	DISABLED	0	32768.001005489400	128.7
8	100TX	DISABLED	0	32768.001005489400	128.8
9	100TX	DISABLED	0	32768.001005489400	128.9
10	100TX	DISABLED	0	32768.001005489400	128.10
11	100TX	DISABLED	0	32768.001005489400	128.11
12	100TX	DISABLED	0	32768.001005489400	128.12

Navigation options: **OK**, **<Prev Page>**, **<Next Page>**, **Return to previous panel**, **Use <TAB> or arrow keys to move. <Enter> to select.**

- **Port (#)** - Number of the port.
- **Type** - Shows port type as:

100TX 10BaseT/100Base-TX  
1000T 1000Base-T

- **Status** - Displays current state of this port within the Spanning Tree:

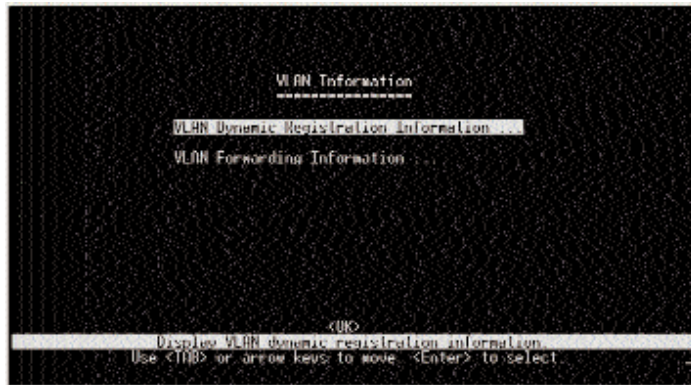
Disabled	No link has been established on this port. Otherwise, the port has been disabled by the user or has failed diagnostics.
Blocking	Port received STA configuration messages, but does not forward packets.
Listening	Port will leave blocking state due to a topology change. It starts transmitting configuration messages, but does not yet forward packets.
Learning	Port has transmitted configuration messages for an interval set by the Forward Delay parameter with out receiving contradictory information. Port address is cleared, and the port begins learning addresses.
Forwarding	The port forwards packets, and continues learning addresses.

- **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.
- **Root Cost** - The path cost from the root port on this Switch to the root device.

Select **OK** to return to the previous panel.

## VLAN Information

The VLAN Information screen offers access to information on the ports that have been automatically learned via GVRP and all the ports that have been configured by dynamic or static means to forward VLAN traffic.



- **VLAN Dynamic Registration Information** - Shows the ports that have been automatically learned via GVRP.
- **VLAN Forwarding Information** - Shows all the ports that have been configured by either dynamic or static means to forward VLAN traffic.

Select **OK** to return to the previous panel.

## VLAN Dynamic Registration Information

The VLAN Dynamic Registration Information screen shows the ports that have been automatically learned via GVRP.



- **VLAN** - The ID for the VLAN.
- **Port** - The ports on the Switch. Read the numbers vertically; they range from 1-26. For each port number, there are two choices:

If the letter “D” is present, it indicates that the port has been automatically learned via GVRP.

If there is no letter “D,” it indicates that the port has not been automatically learned via GVRP.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

## VLAN Forwarding Information

The VLAN Forwarding Information screen shows all the ports that have been configured by either dynamic or static means to forward VLAN traffic.



- **VLAN** - The ID for the VLAN.
- **Port** - The ports on the Switch. Read the numbers vertically; they range from 1-26. For each port number, there are two choices:

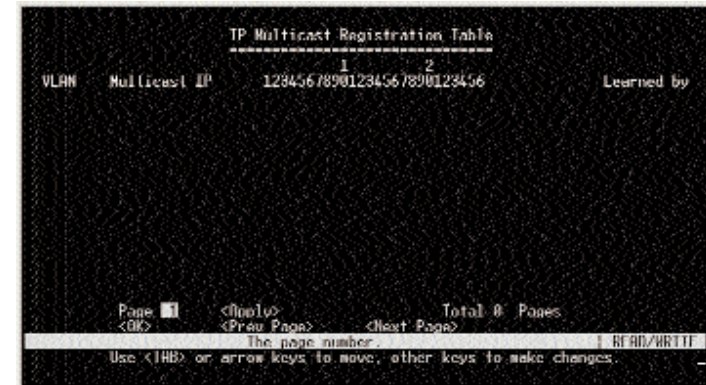
If the letter “D” is present, it indicates that the port has been configured by dynamic means.

If the letter “S” is present, it indicates that the port has been configured by static means.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

## IP Multicast Registration Table

The IP Multicast Registration Table displays all the multicast groups active on the Switch, including the multicast IP address and the corresponding VLANs.



- **VLAN** - A VLAN with host members that have asked to receive the indicated multicast service.
- **Multicast IP** - A source IP address that represents a specific multicast service.
- **(Multicast Group Port Lists)** - The ports that belong to the indicated VLAN group. Read the numbers vertically; they range from 1-26. For each port number, there are two choices:

If the letter “M” is present, it indicates that the VLAN has access to messages transmitted by that particular port.

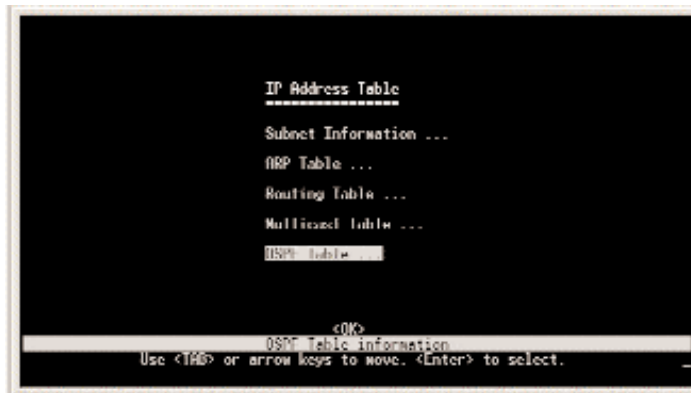
If there is no letter “M,” then there is no access to messages transmitted by that particular port.

- **Learned by** - Shows if this entry was learned dynamically or via IGMP Snooping. An entry is learned dynamically if a multicast packet was seen crossing the port, or via IGMP Snooping if an IGMP registration packet was seen crossing the port.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

## IP Menu

The IP Menu displays information regarding a variety of IP settings, including subnets, ARP table, routing table, and multicast groups. (Only available in multilayer mode).

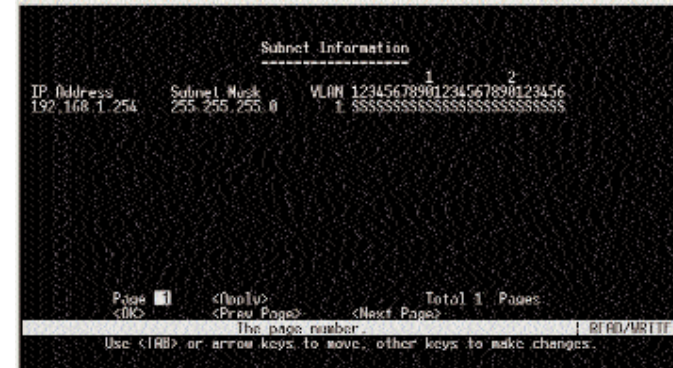


- **Subnet Information** - Displays settings for the IP interface of VLANs.
- **ARP Table** - Shows the IP-to-MAC addresses discovered by ARP.
- **Routing Table** - Shows the routes through which all recognized Ethernet networks (and the corresponding VLAN) can be reached.
- **Multicast Table** - Displays all the multicast groups active on this Switch, including the multicast IP address and the corresponding VLANs.
- **OSPF Table** - Displays the OSPF routing information.

Select **OK** to return to the previous panel.

## Subnet Information

The Subnet Information screen displays information about the IP interface for VLANs configured on this Switch.



- **IP Address** - The IP address associated with the specified VLAN interface.
- **Subnet Mask** - A template that identifies the address bits in the host address used for routing to specific subnets.
- **VLAN** - The VLAN associated with this IP interface.
- **(Ports)** - The ports on the Switch.

Read the numbers vertically; they range from 1-26. For each port number, there are two choices: “S” or “P.” Use the spacebar to scroll through the choices.

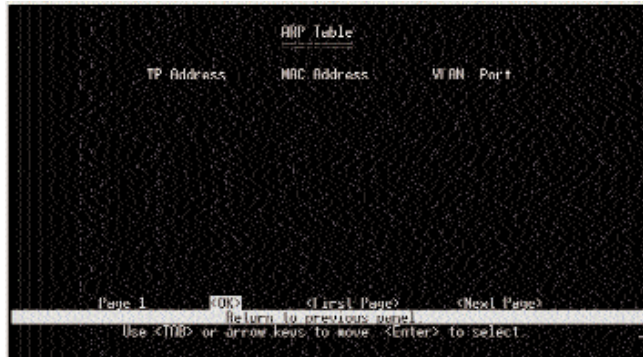
The letter “S” indicates a static entry.

The letter “P” indicates the port is a static entry, and the port’s PVID is set to this VLAN ID.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

## ARP Table

The ARP Table shows the IP-to-MAC addresses discovered by ARP.

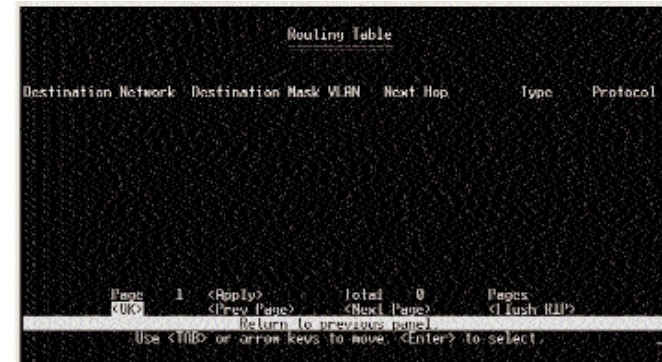


- **IP Address** - IP addresses for which ARP has resolved the physical address through a broadcast message.
- **MAC Address** - MAC address that maps to the corresponding IP address.
- **VLAN** - The VLAN group this host has been assigned to.
- **Port** - The port this host device is attached to.

Select **OK** to return to the previous panel. Select **First Page** to view the first page. Select **Next Page** to view the next page.

## Routing Table

The Routing Table lists the routes through which all recognized Ethernet networks (and corresponding VLAN) can be reached.



- **Destination Network** - A destination network, subnet, or host.
- **Destination Mask** - The subnet mask that specifies the bits to match.
- **VLAN** - The VLAN within which the gateway or destination address resides.
- **Next Hop** - The IP address of the router at the next hop.
- **Type** - The IP route type for the destination network.

Direct: A directly connected subnetwork  
 Indirect: A remote IP subnetwork or host address  
 Myself: A switch IP address on a specific IP subnetwork  
 Bcast: A subnetwork broadcast address  
 Mcast: An IP multicast address  
 Invalid: An illegal IP address to be filtered

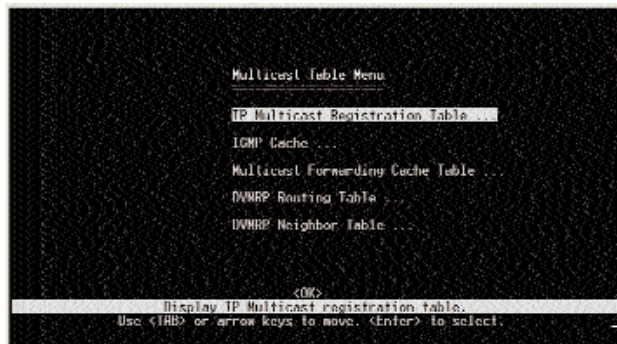
- **Protocol** - How the route was learned.

Local: Manually configured  
 Mgmt: Set via SNMP  
 ICMP: Obtained via ICMP redirect  
 RIP: Learned via RIP protocol  
 Other: Learned by some other method

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**. Select **Flush RIP** to flush the RIP protocol.

### Multicast Table Menu

The Multicast Table Menu offers a variety of multicasting settings.



- **IP Multicast Registration Table** - Displays all the multicast groups active on the Switch, including the multicast IP address and the corresponding VLANs. (See page 80.)
- **IGMP Cache** - Cache for IGMP.

- **Multicast Forwarding Cache Table** - Cache for multicast forwarding.
- **DVMRP Routing Table** - Routing table for Distance-Vector Multicast Routing Protocol.
- **DVMRP Neighbor Table** - Table of neighbors for Distance-Vector Multicast Routing Protocol.

Select **OK** to return to the previous panel.

### IGMP Cache

The IGMP Cache screen shows the settings for the IGMP cache.



- **Group Address** - An IP multicast group address with subscribers directly attached or downstream from this Switch.
- **Intf** - The IP interface on this Switch that has received traffic directed to the IP multicast group address.
- **Reporter** - IP address of the source of the last membership report received for this multicast group on this interface. If no membership report has been received, this object has the value 0.0.0.0.
- **Up Time** - The time elapsed since this entry was created.

- **Expire** - The time remaining before this entry will be aged out. (The default is 260 seconds.)
- **V1 Timer** - The time remaining until the Switch assumes that there are no longer any IGMP Version 1 members on the IP subnet attached to this interface. (The default is 400 seconds.) If the Switch receives an IGMP Version 1 Membership Report, it sets a timer to note that there are Version 1 hosts present which are members of the group for which it heard the report. If there are Version 1 hosts present for a particular group, the Switch will ignore any Leave Group messages that it receives for that group.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

### Multicast Forwarding Cache

The Multicast Forwarding Cache displays the settings for the cache.



- **Group Address** - An IP multicast group address with subscribers directly attached or downstream from this Switch.
- **Source Address** - The IP subnetwork at the root of the multicast delivery tree. This subnetwork contains a known multicast source.
- **Mask** - Subnet mask that is used for the source address. This mask identifies the host address bits used for routing to specific subnets.
- **Upstream Nbr** - The IP address of the network device immediately upstream for this group.
- **Protocol** - The multicast routing protocol associated with this entry.
- **Up Time** - The time elapsed since this entry was created.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.



**DVMRP Routing Table**

The DVMRP Routing Table shows the routes for the Distance-Vector Multicast Routing Protocol.




- **Source Address** - The IP subnetwork at the root of the multicast delivery tree. This subnetwork contains a known multicast source.
- **Mask** - Subnet mask that is used for the source address. This mask identifies the host address bits used for routing to specific subnets.
- **Upstream Nbr** - The IP address of the network device immediately upstream for this multicast delivery tree.
- **Interface** - The IP interface on this Switch that connects to the upstream neighbor.
- **Metric** - The metric for this interface used to calculate distance vectors.
- **Up Time** - The time elapsed since this entry was created.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

**DVMRP Neighbor Table**

The DVMRP Neighbor Table shows information about the neighbors used for the Distance-Vector Multicast Routing Protocol.

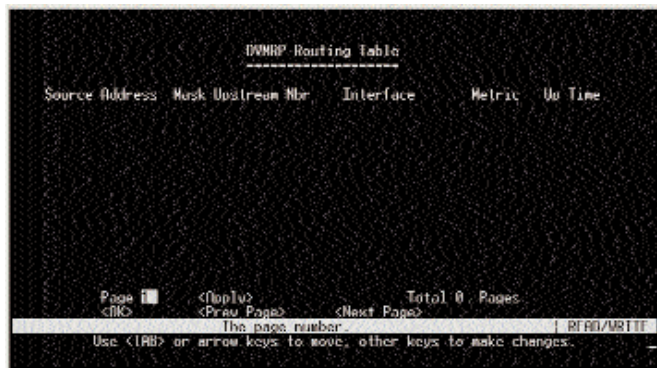


- **Interface** - The IP interface on this Switch that connects to the upstream neighbor.
- **Neighbor Address** - The IP address of the network device immediately upstream for this multicast delivery tree.
- **UpTime** - The time since this device last became a DVMRP neighbor to this Switch.
- **ExpireTime** - The time remaining before this entry will be aged out.
- **Ver** - The neighboring router's DVMRP version number.
- **RcvRoute** - The total number of routes received in valid DVMRP packets from this neighbor. This can be used to diagnose problems such as unicast route injection, as well as giving an indication of the level of DVMRP route exchange activity.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

## OSPF Table Menu

The OSPF Table Menu shows a variety of tables you can have displayed regarding the OSPF information..



- **Interface Table** - Displays information about the OSPF interfaces.
- **Link State Table** - Displays information about the OSPF link states.
- **Neighbor Table** - Displays information about the OSPF neighbors.
- **Virtual Neighbor Table** - Displays information about the OSPF virtual neighbors.

Select **OK** to return to the previous panel.

## OSPF Interface Table

The OSPF Interface Table screen shows information about the interfaces for the OSPF protocol.

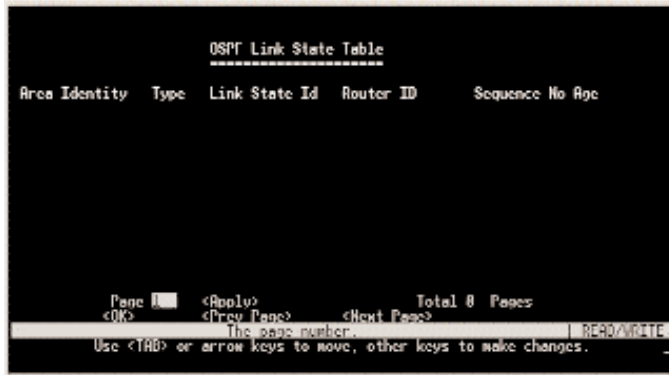


- **IP Address** - The IP address of an interface.
- **Rtr ID** - The ID of the router.
- **Designated Rtr** - The IP address of the designated router.
- **Backup DR** - The IP address of the back-up designated router.
- **Status** - This shows whether the interface is down or not.
- **Events** - The number of events that have occurred.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

### OSPF Link State Table

The OSPF Link State Table screen shows information about the OSPF link states.



- **Area Identity** - A 32-bit number assigned to each interface or subnet.
- **Type** - Description of the link.
- **Link State ID** - The ID of the device that is connected via the link.
- **Router ID** - A 32-bit number assigned to the router.
- **Sequence No** - A 32-bit number that indicates the usage of a link state advertisement.
- **Age** - Age of a link state advertisement.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

### OSPF Neighbor Table

The OSPF Neighbor Table screen displays information about the OSPF neighbors.



- **IP Address** - The IP address of the OSPF neighbor.
- **ID** - The ID of the OSPF neighbor.
- **Router ID** - A 32-bit number assigned to the router.
- **Option** - The optional capabilities that are available.
- **Priority State** - The state of the neighbor's priority.
- **Events** - The number of events that have occurred.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

### OSPF Virtual Neighbor Table

The OSPF Virtual Neighbor Table screen shows information about the OSPF virtual neighbors.

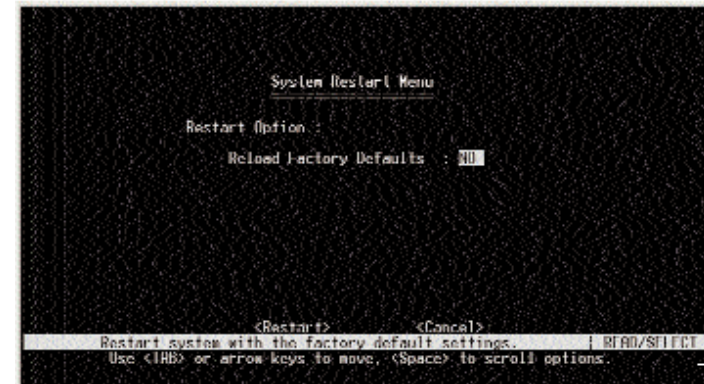


- **Area ID** - A 32-bit number assigned to each interface or subnet.
- **Router ID** - A 32-bit number assigned to the router.
- **IP Address** - The IP address of the OSPF virtual neighbor.
- **Option** - The option selected for the OSPF virtual neighbor.
- **State** - The state of the conversation with the virtual neighbor.
- **Events** - The number of events that have occurred.

Select **Apply** to make changes. Select **OK** to return to the previous panel. Select **Prev Page** to view the previous page. Select **Next Page** to view the next page. To display a specific page, set the page number in the Page field and then press **Apply**.

### System Restart Menu

The System Restart Menu resets the management agent.



- **Reload Factory Defaults**- Choose whether or not you want to reload the factory defaults.
- **[Restart]** - Restarts the Switch.

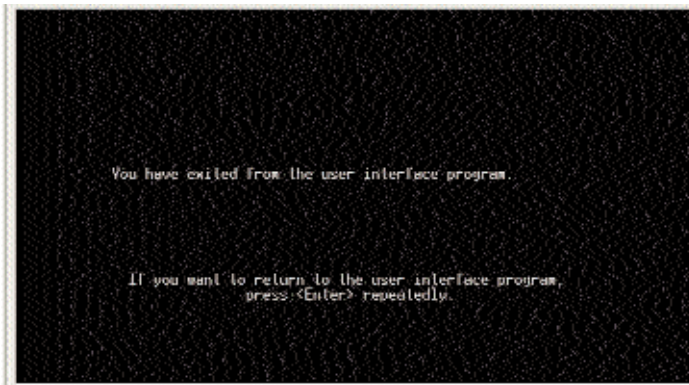
**Note:** When restarting the system, it will always run the Power-On Self-Test. It will also retain all system information, unless you select to reload the factory defaults.

Select **Restart** to restart the Switch. Select **Cancel** to cancel the system restart.

## Exit

The Exit command under the Main Menu is used to exit the configuration program and terminate communications with the Switch for the current session.

If you need to return to the program, press **Enter** repeatedly.



# Troubleshooting

## Common Problems and Solutions

This section provides possible solutions to problems regarding the installation and operation of the Managed 24-Port with Dual Gigabit Switch. If your situation is described here, the problem should be solved by applying the corresponding solution. If you can't find an answer here, check the Linksys website at [www.linksys.com](http://www.linksys.com).

1. I can't connect to the Managed 24-Port with Dual Gigabit Switch using the telnet, Web browser, or SNMP software.
  - Be sure you have configured the agent with a valid IP address, subnet mask, and default gateway (Layer 2).
  - Check that you have a valid network connection to the Switch and that the port you are using has not been disabled.
  - Check the network cabling between the management station and the Switch.
  - If you cannot connect using telnet, there may already be four active sessions. Try connecting again at a later time.
2. I forgot or lost the password.
  - Reinstall the switch firmware as described in the Appendix. Otherwise, contact Linksys Technical Support for help.

# Appendix

## Upgrading Firmware via the Serial Port

You can upgrade system firmware by connecting your computer to the serial port on the Switch and using a console interface package that supports the XModem protocol.

1. Restart the system by using the Restart System command, or by pulling out the power cord to reset the power, waiting five seconds, and plugging it back in.
2. When the system initialization screen appears as shown below, press “**D**” to download system firmware, and then indicate the code type (<r> Runtime image or <d> Diagnostic image).

```
POST Version V2.55.A03 8/18/2000
----- Power-On Self Test (POST) -----
Int. Loopback Testing SCC2 UART Channel ...PASS
Testing the System SDRAM ...PASS
Int. Loopback Testing _____UART Channel ...PASS
Int. Loopback Testing _____UART Channel ...PASS
CPU Self Test ...PASS
FlashROM CheckSum Test ...PASS

!!! If you want to download image file, Please press <D>
to download:
!!!          Download Runtime image, press <r>
!!!          Download Diagnostic image, press <d>
!!!          Clear the system parameter block, press <c>
Please input the Baud Rate as following:
Press 1: Baud Rate = 9600
Press 2: Baud Rate = 19200
Press 3: Baud Rate = 38400
Press 4: Baud Rate = 57600
Press 5: Baud Rate = 115200
Select a number and then press <ENTER> !!! 5
Please change local console BaudRate to exact rate and
press <ENTER>!!!
```

3. Change your baud rate to the selected value, and press **Enter** to enable download. From the terminal emulation program, select the file you want to download, set the protocol to XModem, and then initialize downloading.

**Note:** If you use Windows Hyperterminal, disconnect it. Set the baud rate, and reconnect it.

**Note:** The download file should be a binary file or an image file; otherwise, the agent will not accept it.

4. After the file has been downloaded, the console screen will display information similar to that shown below. Press **Enter** to download to permanent memory, and change the baud rate back to 19200. Press **Enter** to start decompressing the new firmware, and then press **Enter** to open the Logon screen.

```
XModem Download to 0x00400020: ... SUCCESS !
(P)ermanent or (T)emporary Download: [P]
Update RunTime Image at 0x03040000 ... .. SUCCESS !
Change to original Baud Rate and Press <ENTER> to Run
Application !!!
Decompress now..... !!!
run-time code starting now. !!! Starting System ...
MAINBOARD OCTOPUS0 RAMBIST TEST ..... PASS!
MAINBOARD OCTOPUS1 RAMBIST TEST ..... PASS!
MAINBOARD OCTOPUS2 RAMBIST TEST ..... PASS!
MAINBOARD OCTOPUS3 RAMBIST TEST ..... PASS!
MAINBOARD DOLPHIN RAMBIST TEST ..... PASS!
MAINBOARD STARFISH RAMBIST TEST ..... PASS!

Press <Enter> to start UI
```

**Your firmware has now been updated.**

# Glossary

**10BaseT** - An Ethernet standard that uses twisted wire pairs.

**100BaseTX** - IEEE physical layer specification for 100Mbps over two pairs of Category 5 UTP wire.

**1000BASE-T** - Provides half-duplex (CSMA/CD) and full-duplex 1000Mbps Ethernet service over Category 5e links as defined by ANSI/TIA/EIA-568-A. Topology rules for 1000Base-T are the same as those used for 100Base-TX. Category 5e link lengths are limited to 100 meters by the ANSI/TIA/EIA-568-A cabling standard. Only one CSMA/CD repeater will be allowed in a collision domain.

**Adapter** - Printed circuit board that plugs into a PC to add capabilities or connectivity to a PC. In a networked environment, a network interface card (NIC) is the typical adapter that allows the PC or server to connect to the intranet and/or Internet.

**ARP** (Address Resolution Protocol) - A TCP/IP protocol used to figure out a host's Ethernet address from its Internet address.

**Auto-negotiate** - To automatically determine the correct settings. The term is often used with communications and networking. For example, Ethernet 10/100 cards, hubs, and switches can determine the highest speed of the node they are connected to and adjust their transmission rate accordingly.

**Backbone** - The part of a network that connects most of the systems and networks together and handles the most data.

**Bandwidth** - The transmission capacity of a given facility, in terms of how much data the facility can transmit in a fixed amount of time; expressed in bits per second (bps).

**BOOTP** (BOOTstrap Protocol) - A TCP/IP protocol that lets a device connected to the network be automatically configured and booted up. An IP address is automatically assigned for a specific length of time.

**CAT 3** - ANSI/EIA (American National Standards Institute/Electronic Industries Association) Standard 568 is one of several standards that specify

“categories” (the singular is commonly referred to as “CAT”) of twisted pair cabling systems (wires, junctions, and connectors) in terms of the data rates that they can sustain. CAT 3 cable has a maximum throughput of 16Mbps and is usually utilized for 10BaseT networks.

**CAT 5** - ANSI/EIA (American National Standards Institute/Electronic Industries Association) Standard 568 is one of several standards that specify “categories” (the singular is commonly referred to as “CAT”) of twisted pair cabling systems (wires, junctions, and connectors) in terms of the data rates that they can sustain. CAT 5 cable has a maximum throughput of 100Mbps and is usually utilized for 100BaseTX networks.

**CAT 5e** - The additional cabling performance parameters of return loss and far-end crosstalk (FEXT) specified for 1000Base-T and not specified for 10Base-T and 100Base-TX are related to differences in the signaling implementation. 10Base-T and 100Base-TX signaling is unidirectional—signals are transmitted in one direction on a single wire pair. In contrast, Gigabit Ethernet is bi-directional—signals are transmitted simultaneously in both directions on the same wire pair; that is, both the transmit and receive pair occupy the same wire pair.

**Data Packet** - One frame in a packet-switched message. Most data communications is based on dividing the transmitted message into packets. For example, an Ethernet packet can be from 64 to 1518 bytes in length.

**DHCP** (Dynamic Host Configuration Protocol) - A protocol that lets network administrators manage centrally and automate the assignment of Internet Protocol (IP) addresses in an organization's network. Using the Internet's set of protocol (TCP/IP), each machine that can connect to the Internet needs a unique IP address. When an organization sets up its computer users with a connection to the Internet, an IP address must be assigned to each machine. Without DHCP, the IP address must be entered manually at each computer, and, if computers move to another location in another part of the network, a new IP address must be entered. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network. DHCP uses the concept of a “lease” or amount of time that a given IP address will be valid for a computer. The lease time can vary depending on how long a user is likely to require the Internet connection at a particular location. It's especially useful in education and other environments where users change frequently. Using very short leases, DHCP can dynamically reconfigure networks in which there are more computers than there are available IP addresses.

DHCP supports static addresses for computers containing Web servers that need a permanent IP address.

**DVMRP** (Distance-Vector Multicast Routing Protocol) - Used for routing multicast messages through the Internet.

**Dynamic Routing** - The ability for a router to forward data via a different route based on the current conditions of the communications circuits. For example, it can adjust for overloaded traffic or failing lines and is much more flexible than static routing, which uses a fixed forwarding path.

**Ethernet** - IEEE standard network protocol that specifies how data is placed on and retrieved from a common transmission medium. Has a transfer rate of 10Mbps. Forms the underlying transport vehicle used by several upper-level protocols, including TCP/IP and XNS.

**Fast Ethernet** - A 100 Mbps technology based on the 10Base-T Ethernet CSMA/CD network access method.

**Full Duplex** - The ability of a device or line to transmit data simultaneously in both directions.

**GARP** (General Attributes Registration Protocol) - A standard for registering or deregistering client attributes for client services within a bridged LAN.

**GMRP** (GARP Multicast Registration Protocol) - Allows network devices to register endstations with multicast groups. GMRP requires that any participating network devices or endstations comply with the IEEE 802.1p standard.

**GVRP** (GARP VLAN Registration Protocol) - Defines a way for switches to exchange VLAN information in order to register VLAN members on ports across the network.

**Half Duplex** - Data transmission that can occur in two directions over a single line, but only one direction at a time.

**Hardware** - Hardware is the physical aspect of computers, telecommunications, and other information technology devices. The term arose as a way to distinguish the “box” and the electronic circuitry and components of a computer from the program you put in it to make it do things. The program came to be known as the software.

**Hub** - The device that serves as the central location for attaching wires from workstations. Can be passive, where there is no amplification of the signals; or active, where the hubs are used like repeaters to provide an extension of the cable that connects to a workstation.

**HyperTerminal** - A basic communications program that is an accessory for all Windows operating systems, starting with Windows 95. It enables your computer to communicate with other compatible devices, using either a standard RS-232 cable, null modem cable, or modem. It can also be referred to as a VT100 or ANSI terminal application.

**IEEE** - The Institute of Electrical and Electronics Engineers. The IEEE describes itself as “the world’s largest technical professional society—promoting the development and application of electrotechnology and allied sciences for the benefit of humanity, the advancement of the profession, and the well-being of our members.”

The IEEE fosters the development of standards that often become national and international standards. The organization publishes a number of journals, has many local chapters, and has several large societies in special areas, such as the IEEE Computer Society.

**IGMP** (Internet Group Management Protocol) - A multicast host registration protocol that allows any host to inform its local router that it wants to receive transmissions addressed to a specific multicast group.

**LAN** - A local area network (LAN) is a group of computers and associated devices that share a common communications line and typically share the resources of a single processor or server within a small geographic area (for example, within an office building).

**Latency** - The time delay between when the first bit of a packet is received and the last bit is forwarded.

**Layer 2** - Data Link layer in the ISO 7-Layer Data Communications Protocol. This is directly related to the hardware interface for network devices and passes traffic based on MAC addresses.

**Layer 3** - Network layer in the ISO 7-Layer Data Communications Protocol. This layer handles the routing functions for data moving from one open system to another.

**MAC Address** - The MAC (Media Access Control) address is your computer’s unique hardware number.

**Mbps** (MegaBits Per Second) - One million bits per second; unit of measurement for data transmission.



**Multicast Routing Protocol** - A routing protocol that supports multicast packets (one to many).

**Multicasting** - Sends data to a group of nodes instead of a single destination.

**Network** - A system that transmits any combination of voice, video, and/or data between users.

**NIC** (Network Interface Card) - A board installed in a computer system, usually a PC, to provide network communication capabilities to and from that computer system. Also called an adapter.

**Port** - A pathway into and out of the computer or a network device such as a switch or router. For example, the serial and parallel ports on a personal computer are external sockets for plugging in communications lines, modems, and printers.

**Port Trunk** - Defines a network link aggregation and trunking method, which specifies how to create a single high-speed logical link that combines several lower-speed physical links.

**RIP** (Routing Information Protocol) - A simple routing protocol that is part of the TCP/IP protocol suite. It determines a route based on the smallest hop count between source and destination. RIP is a distance vector protocol that routinely broadcasts routing information to its neighboring routers and is known to waste bandwidth. AppleTalk, DECnet, TCP/IP, NetWare, and VINES all use incompatible versions of RIP.

**RJ-45** (Registered Jack-45) - A connector similar to a telephone connector that holds up to eight wires, used for connecting Ethernet devices.

**RMON** (Remote MONitoring) - RMON provides comprehensive network monitoring capabilities. It eliminates the polling required in standard SNMP, and can set alarms on a variety of traffic conditions, including specific error types.

**SNMP** (Simple Network Management Protocol) - A widely used network monitoring and control protocol. Data is passed from SNMP agents, which are hardware and/or software processes reporting activity in each network device

(hub, router, bridge, etc.) to the workstation console used to oversee the network. The agents return information contained in a MIB (Management Information Base), which is a data structure that defines what is obtainable from the device and what can be controlled (turned off, on, etc.).

**STP** (Spanning Tree Protocol) - A technology that checks your network for any loops. A loop can often occur in complicated or back-up linked network systems. Spanning-tree detects and directs data along the shortest path, maximizing the performance and efficiency of the network.

**Static Routing** - Forwarding data in a network via a fixed path. Static routing cannot adjust to changing line conditions as can dynamic routing.

**Subnet Mask** - The method used for splitting IP networks into a series of subgroups, or subnets. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets.

**TFTP** (Trivial File Transfer Protocol) - A version of the TCP/IP FTP protocol that has no directory or password capability.

**Throughput** - The amount of data moved successfully from one place to another in a given time period.

**TX Rate** - Transmission Rate.

**Unicast Routing Protocol** - A routing protocol that does not support multicast.

**UTP** - Unshielded twisted pair is the most common kind of copper telephone wiring. Twisted pair is the ordinary copper wire that connects home and many business computers to the telephone company. To reduce crosstalk or electromagnetic induction between pairs of wires, two insulated copper wires are twisted around each other. Each signal on twisted pair requires both wires. Since some telephone sets or desktop locations require multiple connections, twisted pair is sometimes installed in two or more pairs, all within a single cable.

**VLAN** (Virtual LAN) - A logical association that allows users to communicate as if they were physically connected to a single LAN, independent of the actual physical configuration of the network.

# Specifications

Standards	IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE 802.3, IEEE 802.3ab, IEEE 802.3u, IEEE 802.3x, IEEE 802.1ad
Protocol	CSMA/CD
Ports	24 10/100 RJ-45 Ports 2 1000Base-T RJ-45 Ports 1 RS-232 DB-9 Port
Speed Per Port (Mbps)	
10/100 Ports	10 or 100 (Half Duplex) 20 or 200 (Full Duplex)
1000 Ports	1000 (Half Duplex) 2000 (Full Duplex)
Address Table	
MAC Address	32k
IP Address	64k
Max Frame Size	1522 Bytes
Buffer Memory	4MB
Back-Plane Bandwidth	9.6Gbps
Switch Technology	Store and Forward
IP Switching	Wired Speed IP Forwarding
Routing Protocol	RIP or RIP1, RIP2, OSPF v2
Multicast Protocol	GMRP, IGMP Snooping, IGMP, and DVMRP
Management Interface	RS-232, Telnet, Web, SNMP Application
SNMP Protocol	SNMP v1/v2, MIB II and Bridge MIB, MAUs MIB, IGMP MIB, DVMRP MIB, RIPII MIB, IP Forwarding Table MIB, RMON MIB, private MIB, OSPF v2 MIB
Cabling Type	
10/100	UTP Category 5 or Better
1000	UTP Category 5e or Better
LEDs	Power, SNMP, Console, Fan, TEMP Link, Status (per Port) Link, Act (per Gigabit Port) Status (Col, Act, FDX, 100)

## Environmental

Dimensions	16.93" x 13.78" x 1.75" (430 mm x 350 mm x 44.4 mm)
Unit Weight	8.38 lbs. (3.8 kg)
Power Input	100-240V AC, 50-60Hz
Power Consumption	100 watts
Certifications	FCC Class A, CE
Operating Temp.	0° C to 50° C (32° F to 122° F)
Storage Temp.	-40° C to 70° C (-40° F to 158° F)
Operating Humidity	20 % to 95 %, Non-Condensing
Storage Humidity	20 % to 95%, Non-Condensing

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