LINKSYS®

A Division of Cisco Systems, Inc.

24 Port 10/100 + 2-Port Gigabit Switch

with WebView

User Guide

WIRED

Model No. **SRW224**

CISCO SYSTEMS

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How to Use this Guide

Your guide to the 24-port 10/100 + 2-Port Gigabit Switch with WebView has been designed to make understanding networking with the switch easier than ever. Look for the following items when reading this User Guide:

This checkmark means there is a note of interest and is something you should pay special attention to while using the Switch.

This exclamation point means there is a caution or warning and is something that could damage your property or the Switch.

This question mark provides you with a reminder about something you might need to do while using the Switch.

In addition to these symbols, there are definitions for technical terms that are presented like this:

word: *definition.*

Also, each figure (diagram, screenshot, or other image) is provided with a figure number and description, like this:

Figure 0-1: Sample Figure Description

Figure numbers and descriptions can also be found in the "List of Figures" section.

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Chapter 1: Introduction

Welcome

Thank you for choosing the 24-port 10/100 + 2-Port Gigabit Switch with WebView. This Switch will allow you to network better than ever.

This new Linksys rackmount switch delivers non-blocking, wire speed switching for your 10, and 100 megabit network clients, plus multiple options for connecting to your network backbone. Twenty-four 10/100 ports wire up your workstations, while the two integrated 10/100/1000BaseTX ports connect to other switches and the backbone at Gigabit speeds. And the mini GBIC port allows future expansion to alternate transmission media like optical fiber.

It features WebView monitoring and configuration via your web browser, making it easy to manage the 26 VLANs and up to 7 trunking groups. Or if you prefer, you can use the integrated console port to configure the switch. The non-blocking, wire-speed switching forwards packets as fast as your network can deliver them.

All ports have automatic MDI/MDI-X crossover detection. Each port independently and automatically negotiates for best speed and whether to run in half- or full-duplex mode. Head-of-line blocking prevention keeps your high-speed clients from bogging down in lower-speed traffic and fast store-and-forward switching prevents damaged packets from being passed on into the network.

Use the instructions in this User Guide to help you connect the Switch, set it up, and configure it to bridge your different networks. These instructions should be all you need to get the most out of the 24-port 10/100 + 2-Port Gigabit Switch with WebView.

What's in this Guide?

This user guide covers the steps for setting up and using the Switch.

- Chapter 1: Introduction
  This chapter describes the Switch's applications and this User Guide.
- Chapter 2: Getting to Know the Switch
  This chapter describes the physical features of the Switch.
- Chapter 3: Connecting the Switch
  This chapter describes how to connect the Switch.
- Chapter 4: Configuration using the Console Interface
  This chapter instructs you on how to use the Switch's console interface for configuring the Switch.
- Chapter 5: Configuring the Switch through the Web Utility
  This chapter shows you how to configure the Switch usign the Web Utility.
- Appendix A: Fast Ethernet and Gigabit Ethernet
  This appendix describes the various Ethernets.
- Appendix B: Cabling
  This appendix discusses different types of cabling.
- Appendix C: Windows Help
  This appendix describes how you can use Windows Help for instructions about networking, such as installing the TCP/IP protocol.
- Appendix D: Glossary
  This appendix gives a brief glossary of terms frequently used in networking.
- Appendix E: Specifications
  This appendix provides the Switch's technical specifications.
- Appendix F: Warranty Information
  This appendix supplies the Switch's warranty information.
- Appendix G: Regulatory Information
  This appendix supplies the Switch's regulatory information.

- Appendix H: Contact Information
  This appendix provides contact information for a variety of Linksys resources, including Technical Support.

Chapter 2: Getting to Know the Switch

The Front Panel

The Switch's LEDs and ports are located on the front panel.

Figure 2-1: Front Panel

LEDs

System	Green. Lights to indicate the power is being supplied to the Switch.
LINK/ACT	Green. Lights to indicate a functional network link through the corresponding port (1 through 24) with an attached device. Blinks to indicate that the Switch is actively sending or receiving data over that port.

Ports

LAN (1-24)	The **LAN** (Local Area Network) ports connect to Ethernet network devices, such as other switches or routers.
Gigabit1 /Gigabit2 / miniGBIB	The switch is equipped with two Gigabit ports and a mini GBIC port that is shared with Gigabit Port 2. If Gigabit Port 2 is being used, the minGBIC port cannot be used. They link to high-speed network peripheral system or clients at speeds of up to 1000Mbps.
Gigabit	Green. Lights to indicate the port is working in Gigabit mode.
Console	The Console port is where you connect a serial cable from a PC's serial port.

The Back Panel

The power port is located on the back panel of the Switch.

Figure 2-2: Back Panel

Power The **Power** port is where you will connect the power cord.

The Side Panel

The security slot is located on a side panel.

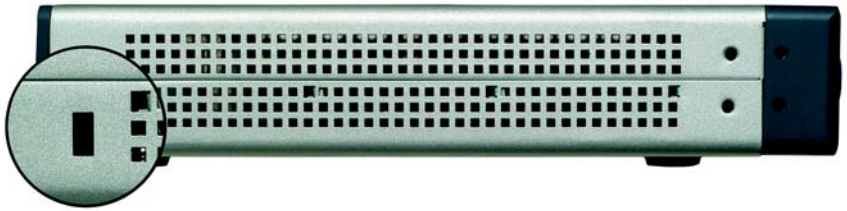

Figure 2-3: Side Panel

Security Slot The security slot is where you can attach a lock so the Switch will be protected from theft.

RJ-45 Ports

The Switch is equipped with twenty-four auto-sensing RJ-45 ports. These RJ-45 ports support network speeds of either 10Mbps or 100Mbps, and can operate in half and full-duplex modes. 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. You will need to use Category 5 (or better) cable. For more information on twisted-pair cabling, refer to the Twisted-Pair Cabling section.

The Gigabit Expansion Ports

The Switch is equipped with one miniGBIC port and two Gigabit Ethernet ports that provide for the installation of one expansion module. These ports provide links to high-speed network segments or individual workstations at speeds of up to 1000Mbps (Gigabit Ethernet).

To establish a Gigabit Ethernet connection, you will need to install an MGBT1, MGBSX2, or MGBLH1 Gigabit expansion module and use Category 5e cabling or fiber optic cabling. for more information on fiber optic cabling, refer to the Fiber Optic Cabling section.

The Console Port

The Switch is equipped with a serial port labeled CONSOLE (located on the front of the switch) that allows you to connect to a computer's serial port (for configuration purposes) using the provided serial cable. You can use HyperTerminal to manage the Switch using the console port.

With this and many other Linksys products, your networking options are limitless. Go to the Linksys website at www.linksys.com for more information about products that work with the Switch.

Chapter 3: Connecting the Switch

Overview

This chapter will explain how to connect network devices to the Switch. For an example of a typical network configuration, see the application diagram shown in Figure 3-1.

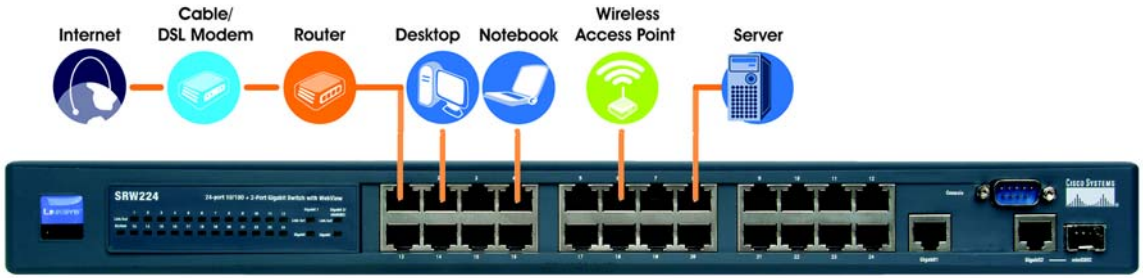

Figure 3-1: Typical Network Configuration

When you connect your network devices, make sure you don't exceed the maximum cabling distances, which are listed in the following table:

Maximum Cabling Distances.

Table 1: Maximum Cabling Distances

From	To	Maximum Distance
Switch	Switch or Hub	100 meters (328 feet)
Hub	Hub	5 meters (16,4 feet)
Switch or Hub	Computer	100 meters (328 feet)

*A hub refers to any type of 100Mbps hub, including regular hubs and stackable hubs. A 10Mbps hub connected to another 10Mbps hub can span up to 100 meters (328 feet)

Pre-Installation Considerations

Fast Ethernet Considerations

If you will be using the Switch for Fast Ethernet (100Mbps) applications, you must observe the following guidelines:

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 cable length using Category 5 cable is 328 feet (100 meters).

Positioning the Switch

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

- Make sure that the switch is accessible and that the cables can be connected easily.
- 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 clearance of two inches (50 mm).
- Do not stack free-standing Switches more than four units high.
- Connect Network Devices

Hardware Installation

To connect network devices to the Switch, follow these instructions:

1. Make sure all the devices you will connect to the Switch are powered off.
2. Connect a Category 5 Ethernet network cable to one of the numbered ports on the Switch.
3. Connect the other end to a PC or other network device.

4. Repeat steps 2 and 3 to connect additional devices.

5. If you are using the Gigabit port, connect a Category 5e Ethernet network cable to the Gigabit port on the Switch, and connect the other end to a Gigabit server or other network device.

6. If you are using the mini-GBIC port, then connect the mini-GBIC module to the mini-GBIC port. For detailed instructions, refer to the module's documentation.

IMPORTANT: Make sure to use the power cord that is supplied with the Switch. Use of a different power cord could damage the Switch.

7. Connect the supplied power cord to the Switch's power port, and plug the other end into an electrical outlet.

8. Power on the devices connected to the Switch. Each active port's corresponding LED will light up on the Switch.

NOTE: If you need to reset the Switch, remove the power cord from the back of the Switch and then reconnect it.

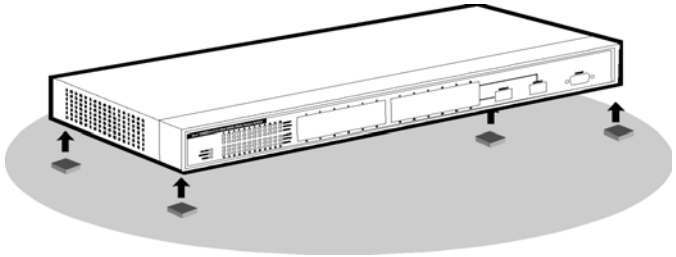

Figure 3-2: Attaching the Rubber Feet to the Bottom of the Switch

Placement Options

There are two ways to physically install the Switch, either set the Switch on its four rubber feet for desktop placement or mount the Switch in a standard-sized, 19-inch high rack for rack-mount placement.

Desktop Placement

1. Attach the rubber feet to the recessed areas on the bottom of the Switch. See Figure 3-1.

2. Place the Switch on a desktop near an AC power source.

3. Keep enough ventilation space for the Switch and check the environmental restrictions mentioned in specifications as you are placing the Switch.

4. Connect the Switch to network devices according to the Hardware Installation instructions, above.

IMPORTANT: Make sure to use the screws supplied with the mounting brackets. Using incorrect screws could damage the Switch and would invalidate your warranty.

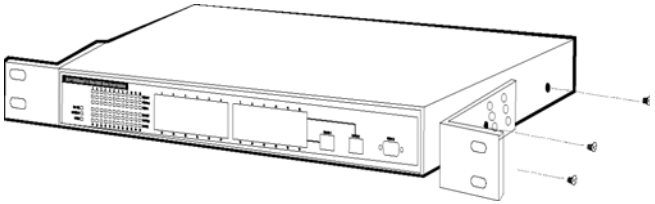

Figure 3-3: Attaching the Brackets to the Switch (Front Panel Forward)

Rack-Mount Placement

To rack-mount the Switch in any standard 19-inch rack, follow the instructions described below.

1. Place the Switch on a hard flat surface with the front panel faced towards your front side
2. Attach a rack–mount bracket to one side of the Switch with the supplied screws. Figure 3-2 shows how to attach brackets to one side of the Switch.
3. Secure the brackets tightly.
4. Follow the same steps to attach the other bracket to the opposite side.
5. After the brackets are attached to the Switch, use suitable screws to securely attach the brackets to any standard 19-inch rack as shown in Figure 3-3.
6. Connect the Switch to network devices according to the Hardware Installation instructions.

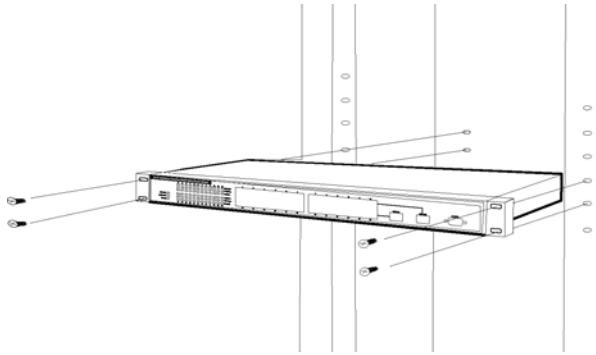

Figure 3-4: Mounting the Switch in A Rack

Uplinking the Switch

To uplink the Switch, connect one end of a Cat5 (or better) cable into one of the 24 10/100 ports, and then connect the other end of the cable into the peripheral device's uplink port. MDI/MDIX will automaticlaly detect the speed and cable type.

The hardware installation is complete,. Proceed to Chapter 4: Setting Up the 24-port 10/100 + 2-Port Gigabit Switch with WebView, for directions on how to set up the Switch.

Chapter 4: Configuration using the Console Interface

Overview

The Switch features a menu-driven console interface for basic switch configuration. You can easily manage your network from the screens through the console port. Before you can use the console interface, you will need to configure the HyperTerminal application.

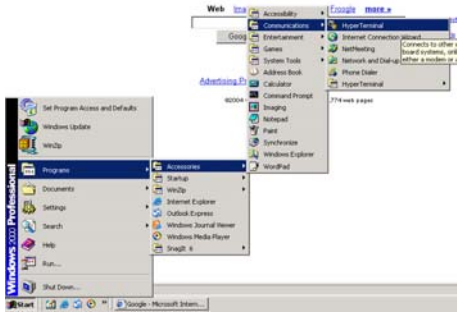

Figure 4-1: Finding HyperTerminal

Configuring the HyperTerminal Application

1. Click the **Start** button. Select **Accessories** and then **Communications**. HyperTerminal should be one of the options listed in this menu. Select **HyperTerminal**. Running the Hyper Terminal utility program.

2. Enter a name for this connection. In the example below, the name of connection is SRW224. Select an icon for the application. Click **OK**.

3. Select a port to communicate with the switch. Select **COM1**, **COM2**, or **TCP/IP**.

4. Set the serial port settings, as follows, then click **OK**.

   Bits per Second: **19200**

   Databits: **8**

   Parity: **None**

   Stop bits: **1**

   Flow control: **None**

Figure 4-2: Connection Description

Figure 4-3: Connect To

Configuring the Switch through the Console Interface

Login

When you finish configuring the Hyper Terminal, the Login screen will appear. The first time you open the Web-Based Utility, use the default username **admin**, and leave the password blank. Click the **Login** button. You can set a new password later from the Password Setting screen.

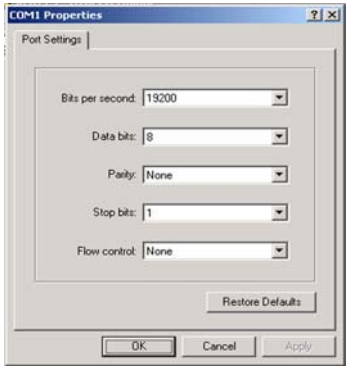

Figure 4-4: COM1 Properties

Switch Screens

The Switch screens consist of a series of menus. Each menu has several options, which are listed vertically. A highlight in each menu lets you select the option you wish to choose; pressing the Enter key activates the highlighted option.

To navigate through the Console Interface use the Up Arrow or Down Arrow keys to move up or down, use the Enter key to select, and the Esc key to return to the previous selection; menu options and any values entered or present will get highlighted. Note that the bottom of the window always has a listing of the appropriate key strokes.

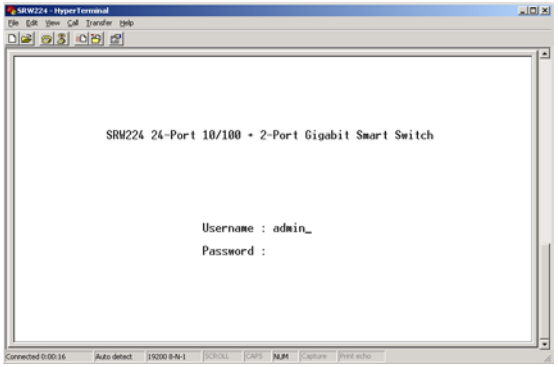

Figure 4-5: Login

Switch Main Menu

The Switch Main Menu screen displays four menu choices: System Configuration, Port Status, Port Configuration, and Logout.

Figure 4-6: Switch Main Menu

System Configuration

System Configuration displays:

1. System Information
2. Advanced Switch Configuration
3. Password Setting
4. IP Configuration
5. Firmware Update
6. Restore System Default Setting
7. Reboot System
0. Return to Main Menu.

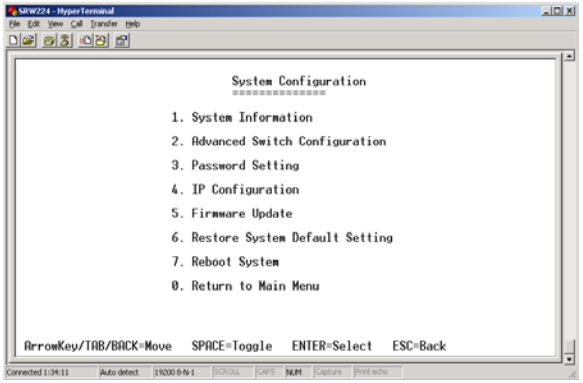

Figure 4-7: System Configuration

System Information

In System Information, you can check the Firmware Version.

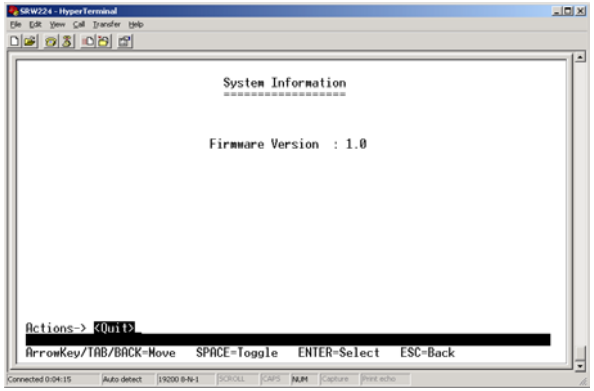

Figure 4-8: System Information

Advanced Switch Configuration

This screen allows you to make advanced switch configuration settings.

Broadcast Storm Filter. This allows you to filter by percentage the amount of broadcast traffic to your network to prevent a storm of too many broadcasts from being sent at the same time. Select **5%**, **10%**, or **20%**. Select **Off** to prevent filtering.

Collision Retry Forever. In a collision, a packet will be re-sent until it reaches its destination. To enable this feature, select **Enable**. To disable this feature, select **Disable**.

MAC Table Auto-Aging. If there is no response froma network device when searching for a MAC address within the chosen time, the switch will remove the MAC address from the MAC address table. Select 150 sec, 300 sec, or 600 sec. To disable this feature, select Disable.

MAC Table Hashing. Select from a choice of two algorithm types used to check the MAC address table to determine which MAC address is associated with what port or destination on the network. Select **Direct Map** or **CRC** (Cyclical Redundancy Checking) **Hash**.

Console Auto Logout Time. The console will log out after the chosen time. Select 5 min, 10 min, or 20 min. Select Never to disable the feature.

Web Auto Logout Time. The Web interface will log out after the chosen time. Select 5 min, 10 min, or 20 min.

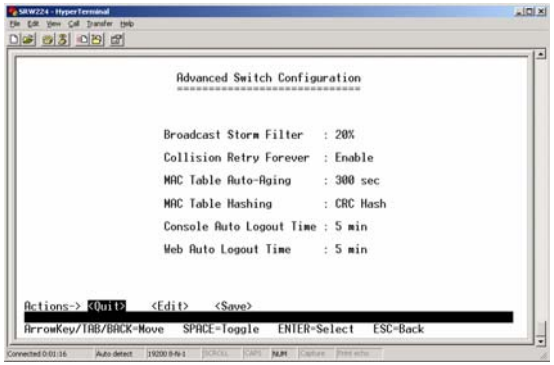

Figure 4-9: Advanced Switch Configuration

Password Configuration

This screen allows you to set a password for your Switch.

Password Protection. To set a password for your network, select **Enable**. Enter your user name in the field, then the password. Enter the password again to confirm that it is correct. If you don't want to have a password to enter the network, select **Disable**. The Username and Password can only be a maximum of six characters, using the letters a through z, and numbers 0 through 9.

Figure 4-10: Password Setting

IP Configuration

IP information is displayed here.

- MAC Address. The MAC Address of the Switch is displayed.
- IP Address. This IP Address of the network is displayed. (The default IP address is 192.168.1.254.) Verify that the address you enter is correct and does not conflict with another device on the network.
- Subnet Mask. The subnet mask of the network is displayed.
- Default Gateway. The default gateway of the network is displayed.

If you would like to change the IP address settings of the Switch, select **Edit** at he bottom of the screen.

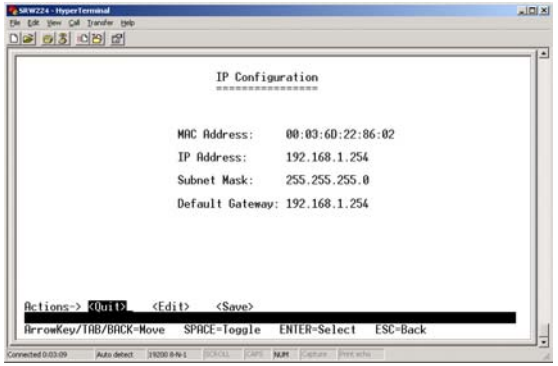

Figure 4-11: IP Configuration

Firmware Update

When new firmware becomes available, you can update the Switch. To update the firmware, select **Firmware Update**. When the message asks if you want to continue the update, select **Y** to continue or **N** if you want to cancel.

IMPORTANT: Do not disconnect the power during a firmware upgrade. Damage to Switch could occur.

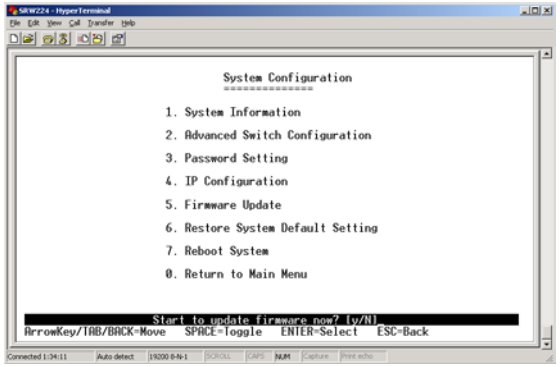

Figure 4-12: Firmware Update

After you select yes, the Switch will be set to receive the file. At the top of your screen, select **Transfer** from the Main Menu, then select **Send File**.

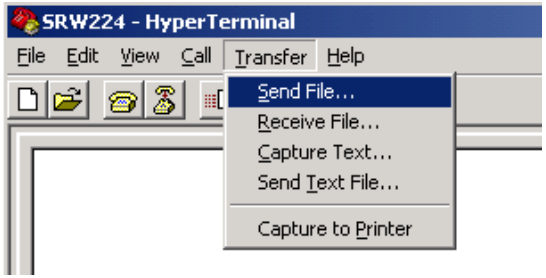

Figure 4-13: Main Menu

The Send File screen will appear. Click **Browse** to locate the firmware file. Select the **Xmodem** protocol from the Protocol drop-down menu. Click **Send** to send the firmware.

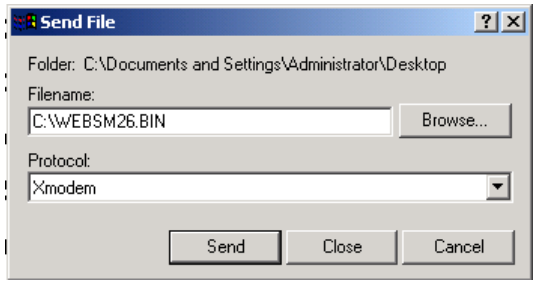

Figure 4-14: Send File

The Xmodem File Send for SRW224 screen will appear to display the status of the upgrade.

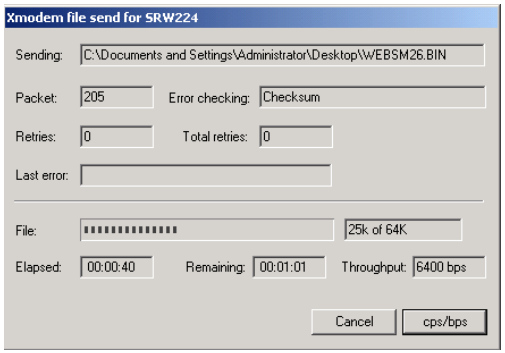

Figure 4-15: Xmodem File Send for SRW224

When you are prompted to restart the Switch, select **Y** to restart the Switch.

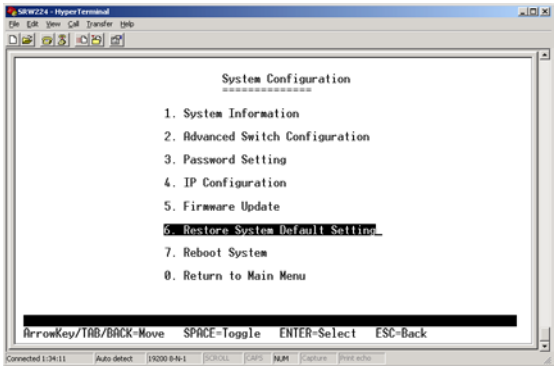

Figure 4-16: Restore System Default Setting

Restore System Default Setting

To restore the Switch back to the factory default settings, select Restore System Default Setting and press enter. A confirmation message will appear stating that All User Configuration data will be reset to Default. Continue? [y/n]. Press the “y” key to continue or the “n” key to cancel the restoration.

Reboot System

If you would like to reboot the Switch, select **Reboot System** and press **Enter**.

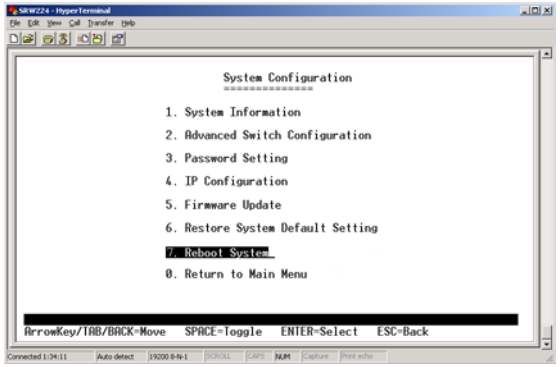

Figure 4-17: Reboot System

Return to Main Menu

Select **Return to Main Menu** if you want to return to the main menu.

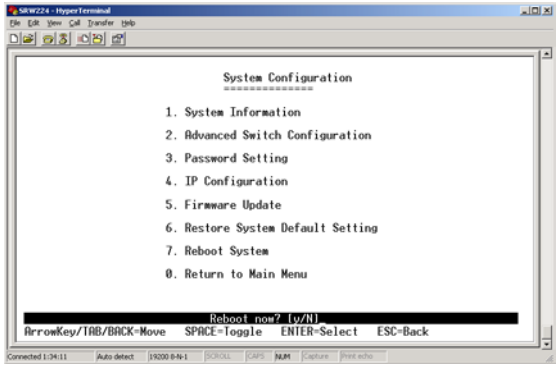

Figure 4-18: Return to Main Menu

Port Status

This screen allows you to view the status of a port. The Port, Enable, Link Status, Spd/Dpx, and Flow Control are displayed.

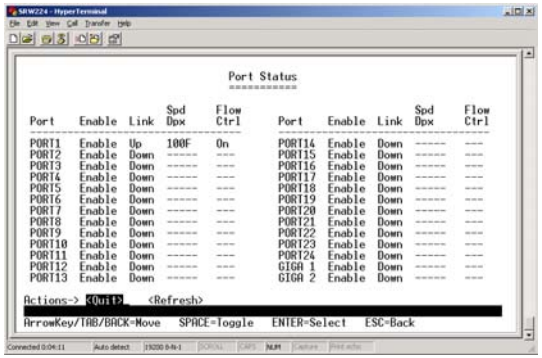

Figure 4-19: Port Status

Port Configuration

This screen allows you to change the status of a port. Select the port, then **Enable** the port you want to configure or **Disable** if you don't. For the Speed/Duplex, enter **10 Half**, **10 Full**, **100 Half**, **100 Full,** or **Auto** for Auto MDI/MDIX. For Flow Control, select **On** to control the flow of the packet transmission or **Off**.

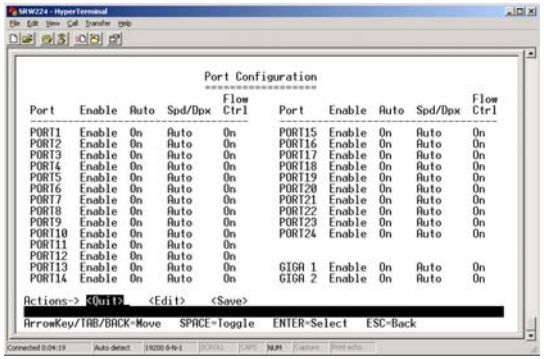

Figure 4-20: Port Configuration

Logout

Select Logout to log out of the console configuration utility.

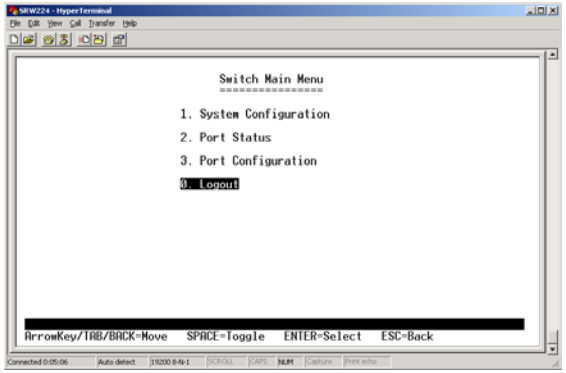

Figure 4-21: Logout

Chapter 5: Configuring the Switch through the Web Utility

Overview

Open your web browser and enter **192.168.1.254** into the address field. Press the **Enter** key and the Password screen will appear. The first time you open the Web-Based Utility, use the default username **admin**, and leave the password blank. Click the **Login** button. You can set a new password later from the Password Setting screen.

Figure 5-1: Addrees Field

The first screen that appears displays the Welcome Screen. This allows you to access the six tabs: System, Port, Trunk, VLAN, QoS, and Logout. Click a tab to view its contents.

Figure 5-2: Password Screen

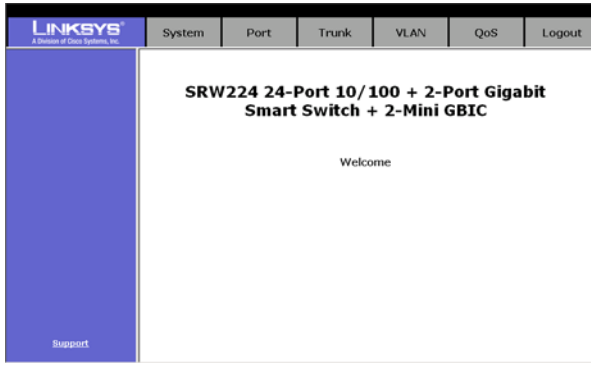

Figure 5-3: Welcome Screen

System Tab

The System tab displays the system information.

- Firmware version. The current firmware version is displayed.
- MAC Address. The MAC Address of the Switch is displayed.
- IP Address. This IP Address of the network is displayed. (The default IP address is 192.168.1.254. Verify the address. You can change the IP address, subnet mask, and default gateway here.
- Subnet Mask. The subnet mask of the network is displayed.
- Default Gateway. The default gateway of the network is displayed.

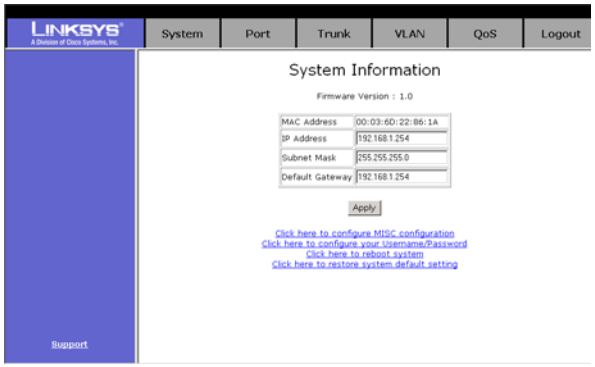

Figure 5-4: System Tab-System Information

Click the **Apply** button after you have verified that the information is correct.

These following links are available on this tab:

To configure the advanced switch configuration, click the **Click here to configure MISC configuration** link.

To configure your username and password, click the **Click here to configure your Username/Password** link. (Figure 5-6)

To reboot your system, click the **Click here to reboot system** link.

To restore the Switch back to the default settings, click the **Click here to restore system default setting** link.

Advanced Switch Configuration (Figure 5-5.)

This screen allows you to make advanced switch configuration settings.

Broadcast Storm Filter. This allows you to filter by percentage the amount of broadcast traffic to your network to prevent a storm of too many broadcasts from being sent at the same time. Select **5%**, **10%**, or **20%** from the drop-down menu. Select **Off** to prevent filtering.

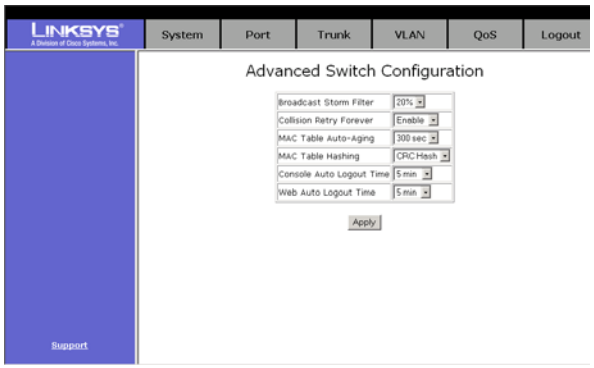

Figure 5-5: System Tab-MISC Configuration

Collision Retry Forever. In a collision, a packet will be re-sent until it reaches its destination. To enable this feature, select **Enable** from the drop-down menu. To disable this feature, select **Disable**.

MAC Table Auto-Aging. If there is no response froma network device when searching for a MAC address within the chosen time, the switch will remove the MAC address from the MAC address table. Select 150 sec, 300 sec, or 600 sec from the drop-down menu. To disable this feature, select Disable.

MAC Table Hashing. Select from a choice of two algorithm type used to check the MAC address table to determine which MAC address is associated with what port or destination on the network. Select **Direct Map** or **CRC** (Cyclical Redundancy Checking) **Hash** from the drop-down menu.

Console Auto Logout Time. The console will log out after the chosen time. Select 5 min, 10 min, or 20 min from the drop-down menu. Select Never to disable the feature.

Web Auto Logout Time. The Web interface will log out after the chosen time. Select 5 min, 10 min, or 20 min from the drop-down menu.

Password Setting

This screen allows you to set a password for your Switch.

Password Protection. To set a password for your network, select **Enable** from the drop-down menu. Enter your user name in the field, then the password. Enter the password again to confirm that it is correct. If you don't want to have a password to configure the Switch, select **Disable**.

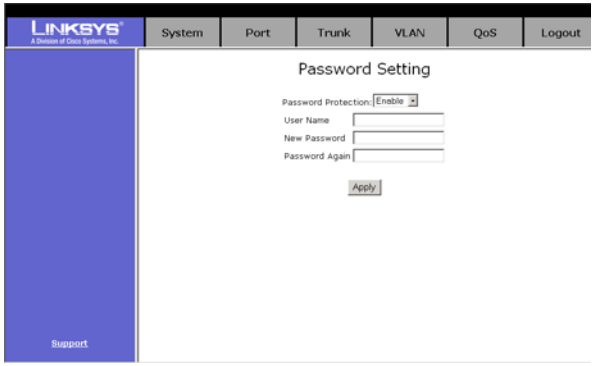

Figure 5-6: System Tab-Username/Password Setting

Port Tab

This tab allows you to view the status of a port. The Port, Enable, Link Status, Spd/Dpx, and Flow Control are displayed.

Click **Click here to configure Speed/Duplex of each Port**, which is located at the bottom of the screen, to configure the ports.

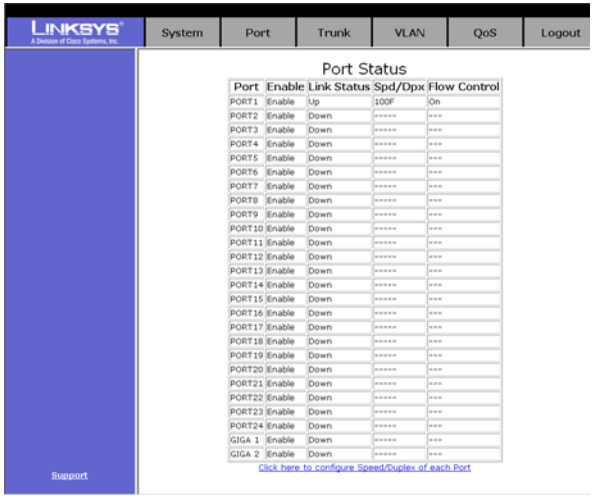

Figure 5-7: Port Tab-Port Status

Port Configuration

This screen allows you to change the status of a port.Select the port, then select **Enable** or **Disable** to enable or disable the port you want to configure. For the Speed/Duplex, enter **10 Half**, **10 Full**, **100 Half**, **100 Full,** or **Auto** (turns Auto MDI/MDIX on or off). For Flow Control, select **On** to control the flow of the packet transmission or **Off**.

Click **Apply** when finished with your changes.

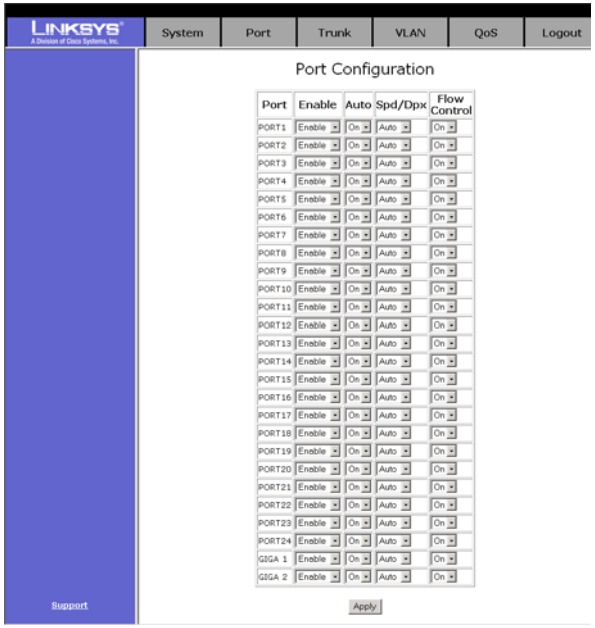

Figure 5-8: Port Tab-Port Configuration

Trunk Tab

This tab allows you to configure the trunk group. Select the port, then select if it is a normal port, then select the group you want to add the port to.

Click Apply when finished with your changes.

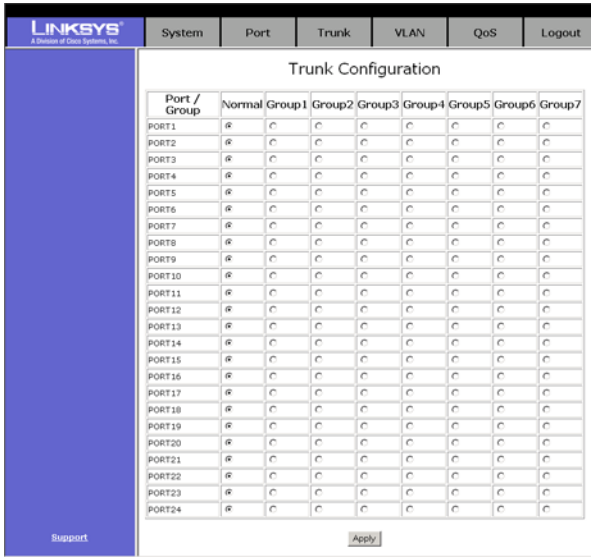

Figure 5-9: Trunk Configuration

VLAN Tab

VLAN Configuration

This tab allows you to configure the VLAN feature.

To configure the VLAN, select **PortBased** or **802.1Q** from the drop-down menu. To disable this feature, select **Disable**. I

802.1Q VLAN Mode

The VLAN Group list will display the existing VLAN groups. To add a VLAN group, click **Add New**. To delete a group from the list, click **Delete**. Click **Click Advanced 802.1Q VLAN Setting** to change settings.

Click **Apply** to save the changes.

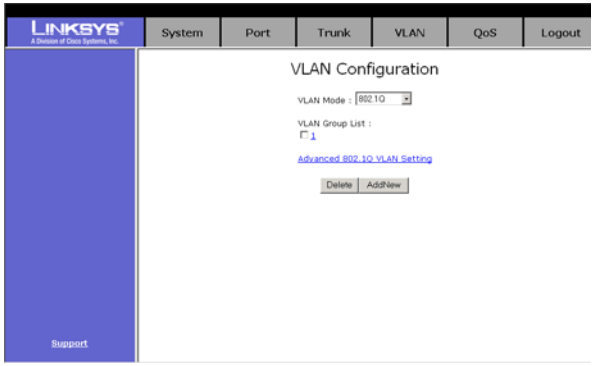

Figure 5-10: 802.1Q VLAN

Advanced 802.1Q VLAN Setting

For each port, select **Drop** or **Forward** for Nonmember and Untagged.

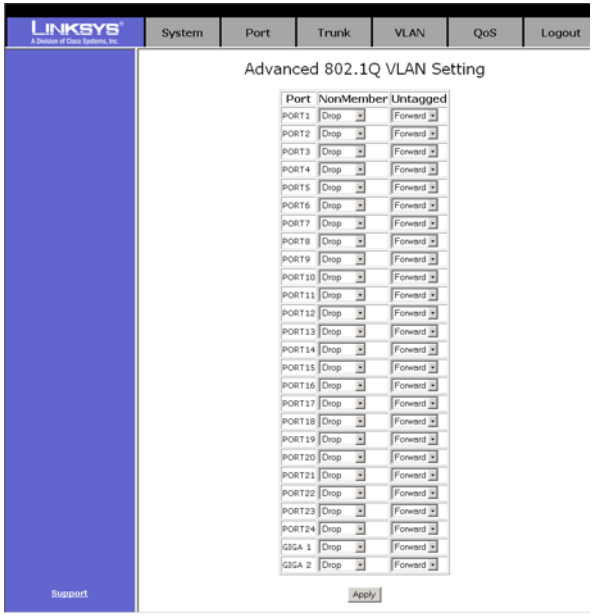

Figure 5-11: Advanced 802.1Q VLAN Setting

Edit a 802.1Q VLAN Group

To add an 802.1QVLAN group, enter an identifying number between 1 and 255 in the *VLAN ID* field. Select **Tagged** from the drop-down menu under the port for each port that you want to add. Click **Apply** to save the changes.

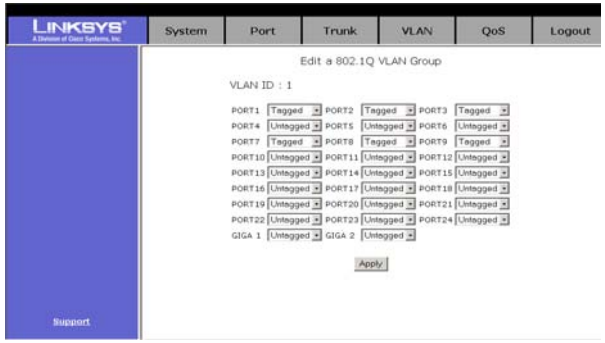

Figure 5-12: Edit a 802.1Q VLAN Group

If you change from an 802.1q VLAN mode to a Port-based VLAN mode, this screen will appear.

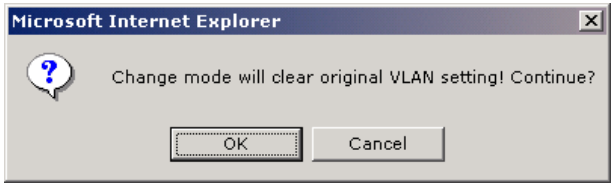

Figure 5-13: Mode Change

PortBased VLAN Mode

The VLAN Group list will display the existing VLAN groups.To add a VLAN group, click **Add New**. To delete a group from the list, click **Delete**.

Click **Apply** to save the changes.

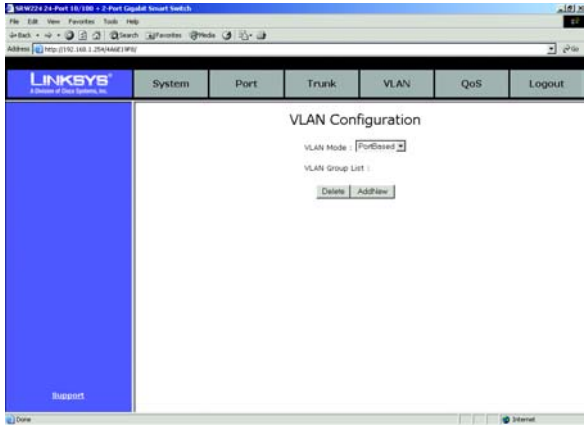

Figure 5-14: Port Based VLAN

Add a PortBased VLAN Group

To add a PortBased VLAN group, enter an identifying number between 1 and 255 in the *Group ID* field. Select **Member** from the drop-down menu under the port for each port that you want to add. Click **Apply** to save the changes.

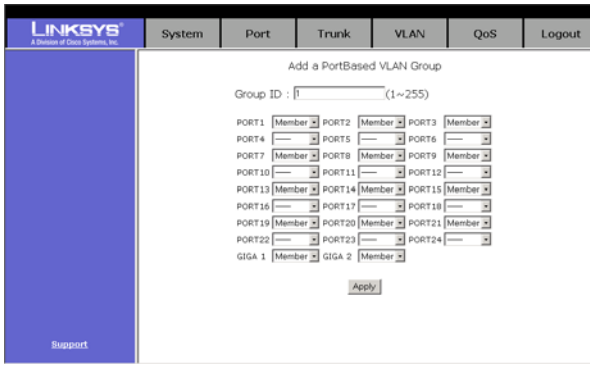

Figure 5-15: Add a Port Base VLAN Group

QoS Configuration

This screen allows you to configure the QoS. Select the *QoS Mode* of **High Low = 3:1**, **Disable QoS Priority**, **High Empty Then Low**, **High Low = 3:1**, **High Low = 5:1**, **High Low = 7:1** from the drop-down menu. Select the *Static Port Ingress Priority* of **High** or **Low** from the drop-down menu, for the port you want to configure. Select **Off** for the port to remain unchanged. For *802/1p Priority [7-0]*, select from **0** to **7**, then select **High** or **Low** from the drop-down menu.

Click **Apply** to save the changes.

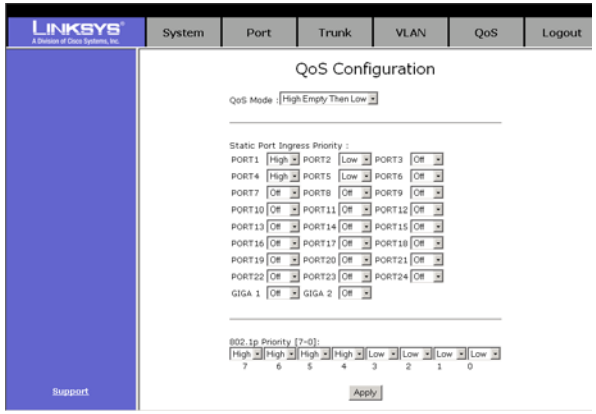

Figure 5-16: QoS Configuration

Logout Tab

Click **Logout OK** to logout. Click **back** to go to the previous screen.

Figure 5-17: Logout Tab

Appendix A: Fast Ethernet and Gigabit Ethernet

About Fast Ethernet

1. As the demand for desktop video, multimedia development, imaging, and other speed-intensive applications continues to rise, the need for high performance, fault tolerant LAN technology will become more critical.

2. Standard Ethernet, which has been the most popular networking technology to date with a maximum data throughput of 10Mbps (Megabits per second), is becoming insufficient to handle the latest video, multimedia, and other speed-intensive client/server LAN applications.

3. Among the solutions to the problem of network speed, Fast Ethernet has emerged as the most viable and economical. Capable of sending and receiving data at 100Mbps, it is more than fast enough to handle even the most demanding video and other real-time applications.

4. Although there are a number of different competing Fast Ethernet implementations, 100BaseTX is by far the most popular. Operating on two pairs of Category 5 unshielded twisted-pair (UTP) cabling, 100BaseTX supports high speed signaling and is relatively inexpensive. Because it uses four wires for data transmission and the same packet format, packet length, error control, and management information as 10BaseT, 100BaseTX can be made to communicate with slower 10BaseT equipment when routed through a switch.

5. This backwards compatibility is one of 100BaseTX's major advantages over other forms of Fast Ethernet; it allows critical, speed-dependent network segments to be upgraded to 100BaseTX speeds as needed without re-wiring, refitting, and retraining an entire site. Networks can now mix both slow and fast network segments for different users or departments. Publishing, R&D, video, multimedia, or accounting departments can enjoy a 100Mbps pace, while other corporate segments can operate at slower and more affordable 10Mbps speeds.

About Gigabit Ethernet

Gigabit Ethernet runs at speeds of 1Gbps (Gigabit per second), ten times faster than 100Mbps Fast Ethernet, but it still integrates seamlessly with 100Mbps Fast Ethernet hardware. Users can connect Gigabit Ethernet hardware with either fiber optic cabling or copper Category 5 cabling, with fiber optics more suited for network backbones. As the new Gigabit standard gradually integrates into existing networks, current computer applications will enjoy faster access time for network data, hardware, and Internet connections.

Appendix B: Cabling

Overview

Twisted Pair Cabling and Fiber Optic Cabling are discussed in this appendix.

Twisted Pair Cabling

There are different grades, or categories, of twisted-pair cabling. Category 5 is the most reliable and is highly recommended. Straight-through cables are used for connecting computers to a hub. Crossover cables are used for connecting a hub to another hub (there is an exception: some hubs have a built-in uplink port that is crossed internally, which allows you to link or connect hubs together with a straight-through cable instead).

You can buy pre-made Category 5 cabling, or cut and crimp your own. Category 5 cables can be purchased or crimped as either straight-through or crossover cables. A Category 5 cable has 8 thin, color-coded wires inside that run from one end of the cable to the other. All 8 wires are used. In a straight-through cable, wires 1, 2, 3, and 6 at one end of the cable are also wires 1, 2, 3, and 6 at the other end. In a crossover cable, the order of the wires change from one end to the other: wire 1 becomes 3, and 2 becomes 6. See the diagrams on the next page for more detailed information on straight-through and crossover cabling.

To determine which wire is wire number 1, hold the cable so that the end of the plastic RJ-45 tip (the part that goes into a wall jack first) is facing away from you. Face the clip down so that the copper side faces up (the springy clip will now be parallel to the floor).When looking down on the copper side, wire 1 will be on the far left.

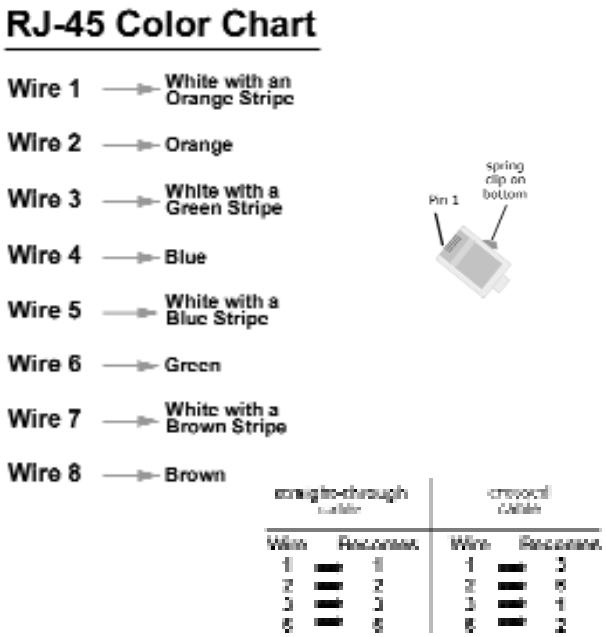

Figure B-1: Cable Charts

Crimping your own Network Cables

The processes for straight-through cabling and crossed-over cabling are illustrated below.

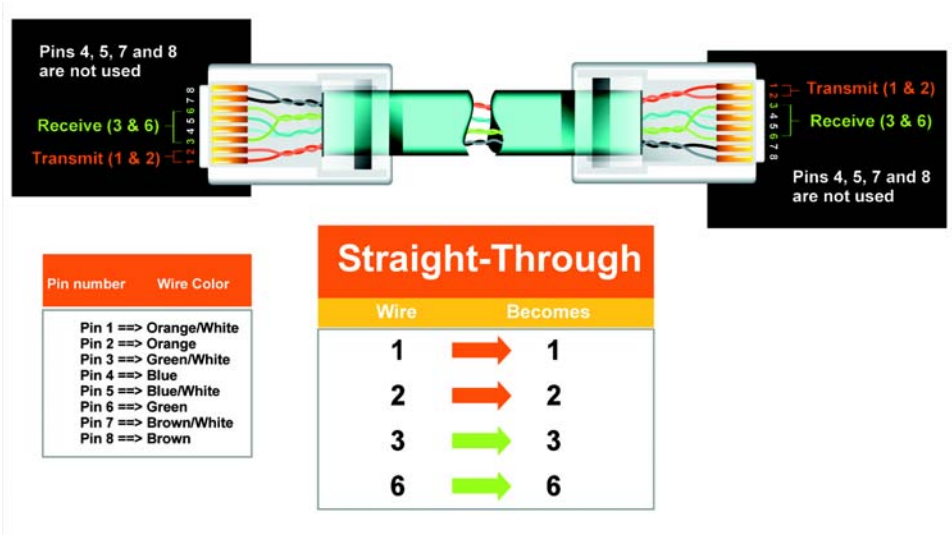

Figure B-2: Straight-Through Cable

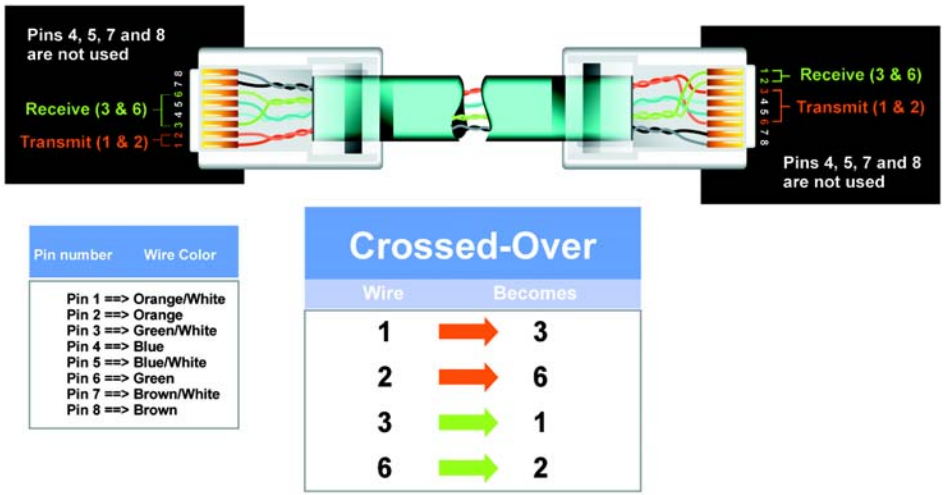

Figure B-3: Crossed-Over Cable

Fiber Optic Cabling

Fiber optic cabling is made from flexible, optically efficient strands of glass and coated with a layer of rubber tubing, fiber optics use photons of light instead of electrons to send and receive data. Although fiber is physically capable of carrying terabits of data per second, the signaling hardware currently on the market can handle no more than a few gigabits of data per second.

Fiber cables come with two main connector types. The most commonly used fiber optic cable is multi-mode fiber cable (MMF), with a 62.5 micron fiber optic core. Single-mode fiber cabling is somewhat more efficient than multi-mode but far more expensive, due to its smaller optic core that helps retain the intensity of traveling light signals. A fiber connection always require two fiber cables: one transmits data, and the other receives it.

Each fiber optic cable is tipped with a connector that fits into a fiber port on a network adapter, hub, or switch. In the U. S., most cables use a square SC connector that slides and locks into place when plugged into a port or connected to another cable. In Europe, the round ST connector is more prevalent.

You must use the Linksys MGBT1, MGBSX1, or MGBLH1 miniGBIC modules with the Linksys SRW224. The MGBSX1 and the MGBLH1 require fiber cabling with LC connectors. The MGBT1 requires a Category 5 Ethernet Cable with an RJ-45 connector.

Appendix D: Glossary

Adapter - A device that adds network functionality to your PC.

AES (**A**dvanced **E**ncryption **S**tandard) - A security method that uses symmetric 128-bit block data encryption.

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 device or network.

Bit - A binary digit.

Boot - To start a device and cause it to start executing instructions.

Bridge - A device that connects different networks.

Broadband - An always-on, fast Internet connection.

Browser - An application program that provides a way to look at and interact with all the information on the World Wide Web.

Buffer - A shared or assigned memory area that is used to support and coordinate different computing and networking activities so one isn't held up by the other.

Byte - A unit of data that is usually eight bits long

Cable Modem - A device that connects a computer to the cable television network, which in turn connects to the Internet.

CSMA/CA (**C**arrier **S**ense **M**ultiple **A**ccess/**C**ollision **A**voidance) - A method of data transfer that is used to prevent data collisions.

CTS (**C**lear **T**o **S**end) - A signal sent by a wireless device, signifying that it is ready to receive data.

Daisy Chain - A method used to connect devices in a series, one after the other.

Database - A collection of data that is organized so that its contents can easily be accessed, managed, and updated.

DDNS (**D**ynamic **D**omain **N**ame **S**ystem) - Allows the hosting of a website, FTP server, or e-mail server with a fixed domain name (e.g., www.xyz.com) and a dynamic IP address.

Default Gateway - A device that forwards Internet traffic from your local area network.

DHCP (**D**ynamic **H**ost **C**onfiguration **P**rotocol) - A networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time, instead of assigning permanent IP addresses.

DMZ (**Dem**ilitarized **Z**one) - Removes the Router's firewall protection from one PC, allowing it to be "seen" from the Internet.

DNS (**D**omain **N**ame **S**erver) - The IP address of your ISP's server, which translates the names of websites into IP addresses.

Domain - A specific name for a network of computers.

Download - To receive a file transmitted over a network.

DSL (**D**igital **S**ubscriber **L**ine) - An always-on broadband connection over traditional phone lines.

DSSS (**D**irect-**S**equence **S**pread-**S**pectrum) - Frequency transmission with a redundant bit pattern resulting in a lower probability of information being lost in transit.

DTIM (**D**elivery **T**raffic **I**ndication **M**essage) - A message included in data packets that can increase wireless efficiency.

Dynamic IP Address - A temporary IP address assigned by a DHCP server.

Ethernet - A networking protocol that specifies how data is placed on and retrieved from a common transmission medium.

Finger - A program that tells you the name associated with an e-mail address.

Firewall - A set of related programs located at a network gateway server that protects the resources of a network from users from other networks.

Firmware - The programming code that runs a networking device.

Fragmentation -Breaking a packet into smaller units when transmitting over a network medium that cannot support the original size of the packet.

FTP (**F**ile **T**ransfer **P**rotocol) - A protocol used to transfer files over a TCP/IP network.

Full Duplex - The ability of a networking device to receive and transmit data simultaneously.

Gateway - A device that interconnects networks with different, incompatible communications protocols.

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

Hardware - The physical aspect of computers, telecommunications, and other information technology devices.

HTTP (**H**yper**T**ext **T**ransport **P**rotocol) - The communications protocol used to connect to servers on the World Wide Web.

Infrastructure - A wireless network that is bridged to a wired network via an access point.

IP (**I**nternet **P**rotocol) - A protocol used to send data over a network.

IP Address - The address used to identify a computer or device on a network.

IPCONFIG - A Windows 2000 and XP utility that displays the IP address for a particular networking device.

IPSec (**I**nternet **P**rotocol **Sec**urity) - A VPN protocol used to implement secure exchange of packets at the IP layer.

ISM band - Radio bandwidth utilized in wireless transmissions.

ISP (**I**nternet **S**ervice **P**rovider) - A company that provides access to the Internet.

LAN - The computers and networking products that make up your local network.

LEAP (**L**ightweight **E**xtensible **A**uthentication **P**rotocol) - A mutual authentication method that uses a username and password system.

MAC (**M**edia **A**ccess **C**ontrol) **Address** - The unique address that a manufacturer assigns to each networking device.

Mbps (**M**ega**B**its **P**er **S**econd) - One million bits per second; a unit of measurement for data transmission.

mIRC - An Internet Relay Chat program that runs under Windows.

Multicasting - Sending data to a group of destinations at once.

NAT (**N**etwork **A**ddress **T**ranslation) - NAT technology translates IP addresses of a local area network to a different IP address for the Internet.

NAT (**N**etwork **A**ddress **T**ranslation) **Traversal** -A method of enabling specialized applications, such as Internet phone calls, video, and audio, to travel between your local network and the Internet. STUN is a specific type of NAT traversal.

Network - A series of computers or devices connected for the purpose of data sharing, storage, and/or transmission between users.

NNTP (**N**etwork **N**ews **T**ransfer **P**rotocol) - The protocol used to connect to Usenet groups on the Internet.

Node - A network junction or connection point, typically a computer or work station.

Packet - A unit of data sent over a network.

Passphrase - Used much like a password, a passphrase simplifies the WEP encryption process by automatically generating the WEP encryption keys for Linksys products.

Ping (**P**acket **IN**ternet **G**roper) - An Internet utility used to determine whether a particular IP address is online.

POP3 (**P**ost **O**ffice **P**rotocol **3**) - A standard mail server commonly used on the Internet.

Port - The connection point on a computer or networking device used for plugging in cables or adapters.

Power **o**ver **E**thernet (**PoE**) - A technology enabling an Ethernet network cable to deliver both data and power.

PPPoE (**P**oint to **P**oint **P**rotocol **o**ver **E**thernet) - A type of broadband connection that provides authentication (username and password) in addition to data transport.

PPTP (**P**oint-to-**P**oint **T**unneling **P**rotocol) - A VPN protocol that allows the Point to Point Protocol (PPP) to be tunneled through an IP network. This protocol is also used as a type of broadband connection in Europe.

RADIUS (**R**emote **A**uthentication **D**ial-**I**n **U**ser **S**ervice) - A protocol that uses an authentication server to control network access.

RJ-45 (**R**egistered **J**ack**-45**) - An Ethernet connector that holds up to eight wires.

Router - A networking device that connects multiple networks together.

RTP (**R**eal-time **T**ransport **P**rotocol) - A protocol that enables specialized applications, such as Internet phone calls, video, and audio, to occur in real time.

RTS (**R**equest **T**o **S**end) - A networking method of coordinating large packets through the RTS Threshold setting.

Server - Any computer whose function in a network is to provide user access to files, printing, communications, and other services.

SMTP (**S**imple **M**ail **T**ransfer **P**rotocol) - The standard e-mail protocol on the Internet.

SNMP (**S**imple **N**etwork **M**anagement **P**rotocol) - A widely used network monitoring and control protocol.

Software - Instructions for the computer. A series of instructions that performs a particular task is called a "program".

SOHO (**S**mall **O**ffice/**H**ome **O**ffice) - Market segment of professionals who work at home or in small offices.

SPI (**S**tateful **P**acket **I**nspection) **Firewall** - A technology that inspects incoming packets of information before allowing them to enter the network.

Static IP Address - A fixed address assigned to a computer or device that is connected to a network.

Static Routing - Forwarding data in a network via a fixed path.

Subnet Mask - An address code that determines the size of the network.

Switch - 1. A data switch that connects computing devices to host computers, allowing a large number of devices to share a limited number of ports. 2. A device for making, breaking, or changing the connections in an electrical circuit.

TCP (**T**ransmission **C**ontrol **P**rotocol) - A network protocol for transmitting data that requires acknowledgement from the recipient of data sent.

TCP/IP (**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol) - A set of instructions PCs use to communicate over a network.

Telnet - A user command and TCP/IP protocol used for accessing remote PCs.

TFTP (**T**rivial **F**ile **T**ransfer **P**rotocol) - A version of the TCP/IP FTP protocol that has no directory or password capability.

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

TKIP (**T**emporal **K**ey **I**ntegrity **P**rotocol) - a wireless encryption protocol that provides dynamic encryption keys for each packet transmitted.

Topology - The physical layout of a network.

TX Rate - Transmission Rate.

UDP (**U**ser **D**atagram **P**rotocol) - A network protocol for transmitting data that does not require acknowledgement from the recipient of the data that is sent.

Upgrade - To replace existing software or firmware with a newer version.

Upload - To transmit a file over a network.

URL (**U**niform **R**esource **L**ocator) - The address of a file located on the Internet.

VPN (**V**irtual **P**rivate **N**etwork) - A security measure to protect data as it leaves one network and goes to another over the Internet.

WAN (**W**ide **A**rea **N**etwork)- The Internet.

WINIPCFG - A Windows 98 and Me utility that displays the IP address for a particular networking device.

Appendix C: Windows Help

All wireless products require Microsoft Windows. Windows is the most used operating system in the world and comes with many features that help make networking easier. These features can be accessed through Windows Help and are described in this appendix.

TCP/IP

Before a computer can communicate within a network, TCP/IP must be enabled. TCP/IP is a set of instructions, or protocol, all PCs follow to communicate over a network. This is true for wireless networks as well. Your PCs will not be able to utilize wireless networking without having TCP/IP enabled. Windows Help provides complete instructions on enabling TCP/IP.

Shared Resources

If you wish to share printers, folder, or files over your network, Windows Help provides complete instructions on utilizing shared resources.

Network Neighborhood/My Network Places

Other PCs on your network will appear under Network Neighborhood or My Network Places (depending upon the version of Windows you're running). Windows Help provides complete instructions on adding PCs to your network.

Appendix E: Specifications

Standards	IEEE 802.3, IEEE 802.3u, IEEE 802.3ab
Ports	24 - 10/100 , 2 - 10/100/1000, 1 - MiniGBIC, 1-Console
Cabling Type	UTP CAT 5e or better
LEDs	System, Link/Act, Gigabit, Gigabit 1, Gigabit 2/miniGBIC
Dimensions (L x W x H)	17.01" x 1.77" x 13.74" (43 mm x 45 mm x 349 mm)
Unit Weight	8.6 lbs (3.9 kg)
Power	Voltage Range 100 ~ 240VAC, Frequency range 50 – 60Hz, 50W max
Certifications	FCC Class B, CE, UL
Operating Temp.	0ºC to 40ºC (32ºF to 104ºF)
Storage Temp.	-20ºC to 70ºC (-4ºF to 158ºF)
Operating Humidity	10% to 90% Non-Condensing
Storage Humidity	10% to 95% Non-Condensing

Appendix F: Warranty Information

LIMITED WARRANTY

Linksys warrants to You that, for a period of one year (the “Warranty Period”), your Linksys Product will be substantially free of defects in materials and workmanship under normal use. Your exclusive remedy and Linksys' entire liability under this warranty will be for Linksys at its option to repair or replace the Product or refund Your purchase price less any rebates. This limited warranty extends only to the original purchaser.

If the Product proves defective during the Warranty Period call Linksys Technical Support in order to obtain a Return Authorization Number, if applicable. BE SURE TO HAVE YOUR PROOF OF PURCHASE ON HAND WHEN CALLING. If You are requested to return the Product, mark the Return Authorization Number clearly on the outside of the package and include a copy of your original proof of purchase. RETURN REQUESTS CANNOT BE PROCESSED WITHOUT PROOF OF PURCHASE. You are responsible for shipping defective Products to Linksys. Linksys pays for UPS Ground shipping from Linksys back to You only. Customers located outside of the United States of America and Canada are responsible for all shipping and handling charges.

ALL IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THE WARRANTY PERIOD. ALL OTHER EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF NON-INFRINGEMENT, ARE DISCLAIMED. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to You. This warranty gives You specific legal rights, and You may also have other rights which vary by jurisdiction.

This warranty does not apply if the Product (a) has been altered, except by Linksys, (b) has not been installed, operated, repaired, or maintained in accordance with instructions supplied by Linksys, or (c) has been subjected to abnormal physical or electrical stress, misuse, negligence, or accident. In addition, due to the continual development of new techniques for intruding upon and attacking networks, Linksys does not warrant that the Product will be free of vulnerability to intrusion or attack.

TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT WILL LINKSYS BE LIABLE FOR ANY LOST DATA, REVENUE OR PROFIT, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, REGARDLESS OF THE THEORY OF LIABILITY (INCLUDING NEGLIGENCE), ARISING OUT OF OR RELATED TO THE USE OF OR INABILITY TO USE THE PRODUCT (INCLUDING ANY SOFTWARE), EVEN IF LINKSYS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT WILL LINKSYS’ LIABILITY EXCEED THE AMOUNT PAID BY YOU FOR THE PRODUCT. The foregoing limitations will apply even if any warranty or remedy provided under this Agreement fails of its essential purpose. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to You.

Please direct all inquiries to: Linksys, P.O. Box 18558, Irvine, CA 92623.

Appendix G: Regulatory Information

FCC STATEMENT

This product has been tested and complies with the specifications for a Class B 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

FCC Radiation Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

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.
The use of this device in a system operating either partially or completely outdoors may require the user to obtain a license for the system according to the Canadian regulations.

Appendix H: Contact Information

Need to contact Linksys? Visit us online for information on the latest products and updates to your existing products at:	http://www.linksys.com or ftp.linksys.com
Can't find information about a product you want to buy on the web? Do you want to know more about networking with Linksys products? Give our advice line a call at:	800-546-5797 (LINKSYS)
Or fax your request in to:	949-823-3002
If you experience problems with any Linksys product, you can call us at:	800-326-7114
Don't wish to call? You can e-mail us at:	support@linksys.com
If any Linksys product proves defective during its warranty period, you can call the Linksys Return Merchandise Authorization department for obtaining a Return Authorization Number at: (Details on Warranty and RMA issues can be found in the Warranty Information section in this Guide.)	949-823-3000