Wireless Ethernet Bridge

Use this guide to install:

WET11

User Guide

LINKSYS®

Table of Contents

Chapter 1: Introduction

The Linksys Wireless Ethernet Bridge

Tailor-made for the home or small office network, the Wireless Ethernet Bridge extends wireless connectivity to any Ethernet-ready network device, such as a printer, scanner, desktop or notebook PC. The Wireless Ethernet Bridge simply and efficiently transmits data between your wired Ethernet and wireless networks.

The Wireless Ethernet Bridge gives you the freedom to place any standard network resource virtually anywhere in your office.

Based on signal strength, it dynamically shifts between 11, 5.5, 2, and 1Mbps network speeds for maximum availability and reliability of connection. So you've got the flexibility and performance you need from your wireless network.

Features

- An All-in-One Wireless Solution for Any Ethernet-Ready Network Device
- Interoperable with 802.11b (DSSS) 2.4GHz-Compliant Equipment
- No Additional Drivers Are Needed
- Up to 11 Mbps High-Speed Transfer Rate
- Dynamically Shifts between 11, 5.5, 2, and 1Mbps for Maximum Adaptability
- Assurance of Constant Connection via Direct Sequence Spread Spectrum (DSSS)
- Conveniently Eliminates Cables and Network Wires Used by Network Devices
- Equipped with One Standard 10Base-T Interface for Connection with Any Ethernet-Ready Networked Resource
- Supports up to 50 Remote Clients
- Capable of up to 128-Bit WEP Encryption
- Setup Wizard for Easy Installation
- Free Technical Support—24 Hours a Day, 7 Days a Week, Toll-Free US Calls
- 1-Year Limited Warranty

Package Contents

Figure 1-1

- One Wireless Ethernet Bridge
- One External Antenna
- One Power Adapter
- One Category 5 Ethernet Network Cable
- One Setup CD-ROM with User Guide
- One Quick Installation
- One Registration Card

Chapter 2: Getting to Know the Wireless Ethernet Bridge

The Wireless Ethernet Bridge's Back Panel

Figure 2-1

Reset   The Reset button resets the Bridge to its factory default settings.

X-II   The X-II selection switch offers a choice between two settings. Use the X setting if you are connecting the Bridge to a network card or other Ethernet device. Use the II setting if you are connecting the Bridge to a hub or switch.

LAN   The LAN port is where you will connect your Ethernet network cable.

Power   The Power port is where you will connect your power.

The Wireless Ethernet Bridge's Front Panel LEDs

PWR   *Green.* The PWR LED will light up when the Bridge is powered on.

DIAG   *Green.* The DIAG LED will light up when there is a connection error. Re-establish the connection to eliminate the error.

LAN   *Green.* The LAN LED will be lit steadily when the Bridge is connected to the LAN. The LED will blink when there is LAN traffic.

WLAN   *Green.* The WLAN LED indicates the status of the link to the wireless local area network (WLAN). The WLAN LED will be lit steadily when the Bridge is connected to the WLAN. The LED will blink when there is WLAN traffic.

Figure 2-2

Chapter 3: Planning Your Wireless Network

Network Topology

A wireless LAN is exactly like a regular LAN, except that each network device in the LAN uses a Wireless Ethernet Bridge to connect to the network without using wires. Computers in a wireless LAN must be configured to share the same radio channel.

The Wireless Ethernet Bridge provides LAN access for wireless network devices. An integrated wireless and wired LAN is called an Infrastructure configuration. A group of Wireless Ethernet Bridge users and an access point compose a Basic Service Set (BSS). Each PC equipped with an Wireless Ethernet Bridge in a BSS can talk to any computer in a wired LAN infrastructure via the Bridge.

An infrastructure configuration extends the accessibility of a Wireless Ethernet Bridge to a wired LAN, and doubles the effective wireless transmission range for two Wireless Ethernet Bridge PCs. Since the access point is able to forward data within its BSS, the effective transmission range in an infrastructure LAN is doubled.

The use of a unique ID in a Basic Service Set is essential.

The Wireless LAN infrastructure configuration is appropriate for enterprise-scale wireless access to a central database, or as a wireless application for mobile users.

Roaming

Infrastructure mode also supports roaming capabilities for mobile users. More than one BSS can be configured as an Extended Service Set (ESS). This continuous network allows users to roam freely within an ESS. All Wireless Ethernet Bridge PCs within one Extended Service Set must be configured with the same SSID.

Selecting a feasible radio channel and optimum access point position is recommended. Proper access point positioning combined with a clear radio signal will greatly enhance performance.

Ad-Hoc versus Infrastructure Mode

Unlike wired networks, wireless networks have two different modes in which they may be set up: **Infrastructure** and **Ad-Hoc**. Choosing between these two modes depends on whether or not the wireless network needs to share data or peripherals with a wired network or not.

If the computers on the wireless network need to be accessible by a wired network or need to share a peripheral, such as a printer, with the wired network computers, the wireless network should be set up in the **Infrastructure** mode. The basis of Infrastructure mode centers around an **access point**, which serves as the main point of communications in a wireless network (see Figure 3-1). Access points transmit data to PCs equipped with wireless network card, which can **roam** within a certain radial range of the access point. Multiple access points can be arranged to work in succession to extend the roaming range, and can be set up to communicate with your Ethernet hardware as well.
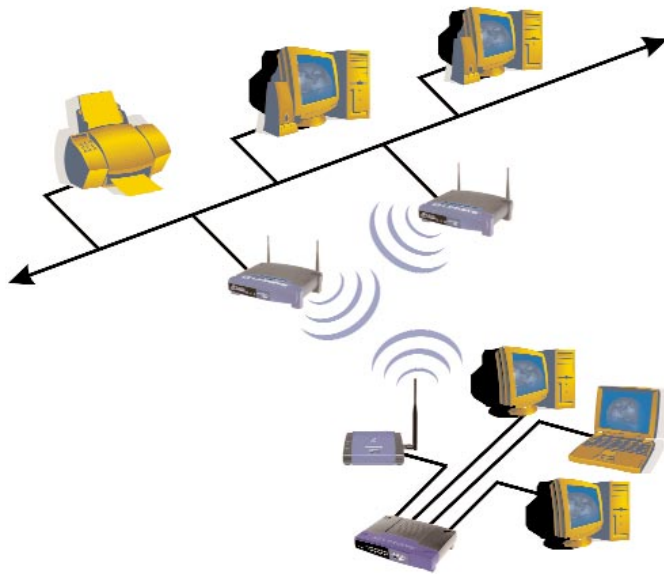
Figure 3-1

If the wireless network is relatively small and needs to share resources only with the other computers on the wireless network, then the **Ad-Hoc** mode can be used. Ad-Hoc mode allows computers equipped with wireless transmitters and receivers to communicate directly with each other, eliminating the need for an access point. The drawback of this mode is that in Ad-Hoc mode, wireless-equipped computers are not able to communicate with computers on a wired network. And, of course, communication between the wireless-equipped computers is limited by the distance and interference directly between them.
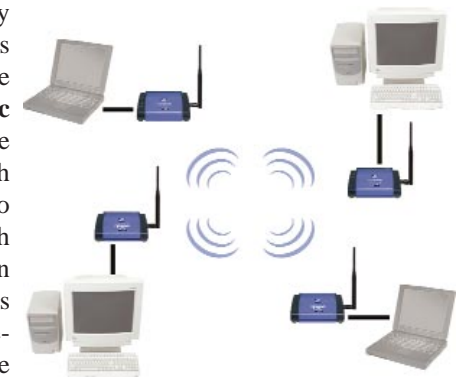
Figure 3-2

Figure 3-2 shows a typical scenario of four Wireless Ethernet Bridges in ad-hoc mode. Figure 3-3 shows a typical wireless bridging scenario using two Wireless Ethernet Bridges. Each wireless network is connected to a Wireless Ethernet Bridge through a switch. A separate notebook computer is equipped with a wireless PC card and can communicate with both wireless networks as long as it has the same SSID and channel as both wireless networks.

Figure 3-3

Chapter 4: Connecting the Wireless Ethernet Bridge

1. Plug the included Ethernet network cable into the LAN port on the back panel of the Bridge.

Figure 4-1

2. The **X-II** selection switch offers a choice between two settings. Slide the **X-II** selection switch to the **X** position if you are connecting the Bridge to a network card or other Ethernet device. Slide the **X-II** selection switch to the **II** position if you are connecting the Bridge to a hub or switch.

3. Plug the other end of the Ethernet network cable into the RJ-45 port on the PC you wish to use to configure the Bridge.

4. Plug the supplied power cable into the Power port on the back panel of the Bridge. Then plug the other end into an electrical outlet.

5. Proceed to the next section, "Chapter 5: Setting Up the Wireless Ethernet Bridge."

6. After configuration, unplug the Ethernet network cable from the PC, and plug it into the RJ-45 port on the Ethernet-ready network device you wish to add to the wireless network.

The hardware installation is complete.

Chapter 5: Setting Up the Wireless Ethernet Bridge

Now that you've connected the Wireless Ethernet Bridge to your wired network, you are ready to set it up. The Setup Wizard will guide you through all the steps necessary.

1. Insert the **Setup Wizard CD-ROM** into your PC's CD-ROM drive. The Setup Utility should run automatically, and the screen in Figure 5-1 should appear. If it does not, click the **Start** button and choose **Run.** In the field that appears, enter **D:\setup.exe** (where "D" is the letter of your CD-ROM drive).

Figure 5-1

Click the **Setup** button to continue using the Setup Wizard. Click the **User Guide** button to open the pdf version of this User Guide. Click the **Linksys Web** button to access the Linksys website using an active Internet connection. Click the **Exit** button to exit the Setup Wizard.

2. The screen shown in Figure 5-2 shows the two ways to configure the Bridge using this Setup Wizard. Optimally, you should perform this setup through a PC on your wired network. You can also set up the Bridge through one of the PCs on your wireless network. Click the **Next** button to continue or the **Exit** button to exit the Setup Wizard.

Figure 5-2

3. The screen shown in Figure 5-3 displays a list of Wireless Ethernet Bridges on your network, along with the status information for each Bridge. (If you have only one Bridge on your network, it will be the only one displayed.) Select the **Bridge** you are currently installing by clicking its name in the Selection box. Write down the IP address of the Wireless Ethernet Bridge, so you can use it to access the Web-Based Utility later. Click the **Yes** button to continue or the **Exit** button to exit the Setup Wizard.

Figure 5-3

4. For security purposes, you will be asked for your user name and password in order to access the Bridge. In lowercase letters, enter **admin** in the *Password* field (later you can change the password through the Web-Based Utility). Click the **Yes** button to continue or the **No** button to return to the previous screen.

Figure 5-4

5. The screen shown in Figure 5-5 shows a choice of two wireless modes. Click the **Infrastructure Mode** radio button if you want your wireless computers to network with computers on your wired network using a wireless access point. Click the **Ad-Hoc Mode** radio button if you want multiple wireless computers to network directly with each other. Do not use the Ad-Hoc mode if you want to network your wireless computers with computers on your wired network. Click the **Next** button to continue or the **Back** button to return to the previous screen.
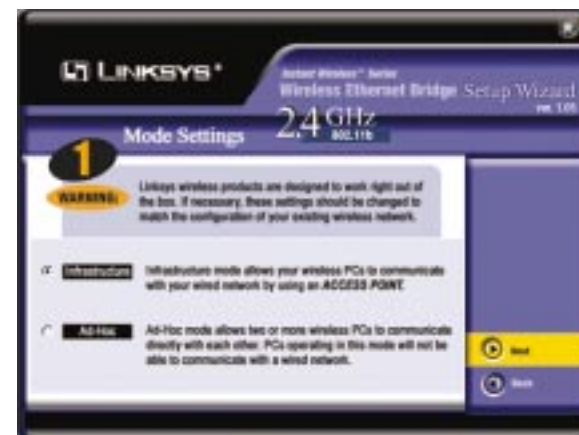
Figure 5-5

6. The *Basic Settings* screen will now appear. Enter your wireless network's **SSID**, and select the **Channel** at which the network broadcasts its wireless signal. Enter a unique **Bridge Name** for the Bridge. Then click the **Next** button to continue or the **Back** button to return to the previous screen.

• **SSID** - The SSID is the unique name shared among all points in a wireless network. The SSID must be identical for all points in the wireless network. It is case-sensitive and must not exceed 32 characters (use any of the characters on the keyboard). Make sure this setting is the same for all points in your wireless network.

• **Channel** - Select the appropriate channel from the list provided to correspond with your network settings, between 1 and 11 (in North America). All points in your wireless network must use the same channel in order to function correctly.

• **Bridge Name** - You may assign any name to the Bridge. Unique, memorable names are helpful, especially if you are using multiple bridges on the same network.
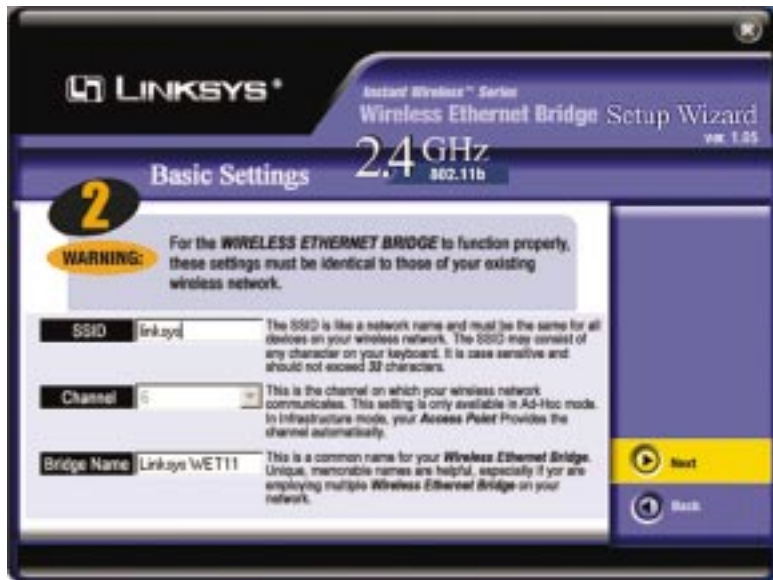
Figure 5-6

7. The *IP Settings* screen will appear next, shown in Figure 5-7. If your network has a DHCP server, click the radio button next to **Automatically obtain an IP address (DHCP)**. Click the **Next** button to continue or the **Back** button to return to the previous screen. Then proceed to step 8.

If your network does not have a DHCP server, click the radio button beside **Set IP configuration manually** to select this option. Enter an **IP Address**, **IP Mask**, and **Gateway** appropriate to your network. You must specify an IP address on this screen. If you are unsure about the IP Mask and Gateway, it is better to leave these two fields blank. Click the **Next** button to continue or the **Back** button to return to the previous screen. Then proceed to step 8.

• **IP Address** - This IP address must be unique to your network. Because this is a private IP address, there is no need to purchase a separate IP address from your Internet Service Provider (ISP).

• **IP Mask** - The Bridge's IP Mask (also known as Subnet Mask) must be the same as your Ethernet (wired) network.

• **Gateway** - Enter the IP address of your network's Gateway here.
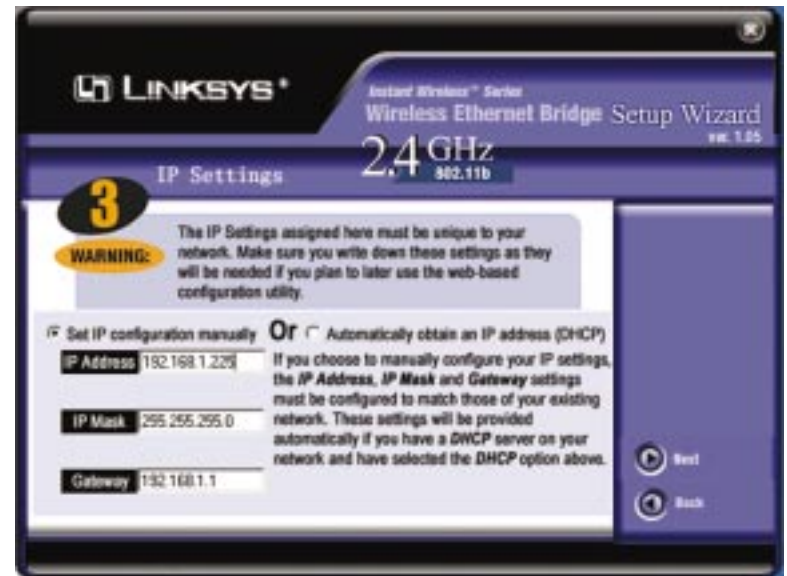
Figure 5-7

8. The *Security Settings* screen, shown in Figure 5-8, appears next. Set the Wired Equivalent Privacy (WEP) encryption for your wireless network by selecting a WEP configuration method.

• **WEP (Disabled/64-bit WEP/128-bit WEP)** - In order to utilize WEP encryption, select **64-bit** or **128-bit WEP** from the drop-down menu. If you do not want to use WEP encryption, choose **Disabled** (default). The Bridge's WEP encryption is unique to Linksys and may conflict with other manufacturers' WEP encryption.

If you select 64-bit or 128-bit WEP, you can create a WEP key automatically or manually. Go to step 9a to generate a WEP key automatically. Go to step 9b to create a WEP key manually.
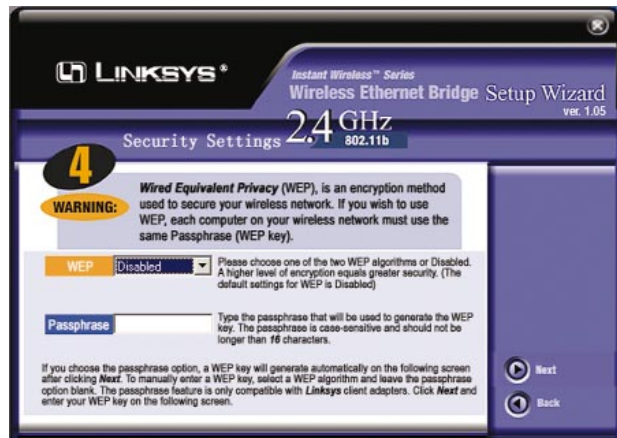
Figure 5-8

9a. Enter a passphrase.

• **Passphrase** - This is the code used when logging a wireless device onto the wireless network. The passphrase is case-sensitive and should not be longer than 16 alphanumeric characters. Based upon the passphrase created by you, WEP key settings are automatically generated. This passphrase is only compatible with other Linksys wireless products.

Click the **Next** button to continue or the **Back** button to return to the previous screen. Then on the *WEP Key Settings* screen, you will see the automatically generated WEP key. Click the **Next** button, and proceed to step 10.

9b. Leave the *Passphrase* field blank, and click the **Next** button to continue or the **Back** button to return to the previous screen.

If you selected 64-bit WEP, you will see Figure 5-9 (you will see a similar screen if you choose 128-bit WEP). Enter a WEP key. If you are using 64-bit WEP encryption, then the key must consist of exactly *10* hexadecimal characters in length. If you are using 128-bit WEP encryption, then the key must consist of exactly *26* hexadecimal characters in length. Valid hexadecimal characters are "0"-"9" and "A"-"F". Then click the **Next** button, and proceed to step 10.

Figure 5-9

10. The screen shown in Figure 5-10 allows you to review your settings. If these settings are correct, click the **Yes** button to save these settings. If any of these settings are wrong, click the **Back** button to make changes. Click the **Exit** button to exit the Setup Wizard.

Figure 5-10

11. The configuration using the Setup Wizard is complete. To configure any other Bridges on your network, run this Setup Wizard again. To exit the Setup Wizard, click the **Exit** button.

Figure 5-11

⚠️ **Important:** To activate the new settings, reset the Bridge. Turn off the Bridge, and wait a few seconds. Then power on the Bridge.

The Wireless Ethernet Bridge is now successfully set up for your network.

After you have reset the Bridge, unplug the Ethernet network cable from the PC, and plug it into the RJ-45 port of the Ethernet-ready network device you wish to add to the wireless network.

For more advanced configuration, keep the Bridge plugged into the PC, and proceed to "Chapter 6: Using the Wireless Ethernet Bridge Web-Based Utility."

Chapter 6: Using the Wireless Ethernet Bridge Web-Based Utility

Overview

The Bridge is designed to function properly after configuration using the Setup Wizard. However, if you would like to change these settings or make more advanced configuration changes, use your web browser and the Wireless Ethernet Bridge Web-Based Utility. This chapter explains how to use the Utility.

Starting the Web-Based Utility

1. Open your web browser, and enter the **IP address** of the Wireless Ethernet Bridge (see Figure 5-3). Press the **Enter** key, and the screen shown in Figure 6-1 will appear. In lowercase letters, enter **admin** in the *Password* field (the default password is admin). Click the **OK** button. You can set a new password on the *Admin* screen later.

Figure 6-1

2. The *INFO* screen of the Bridge's Utility will appear.

Figure 6-2

Configuring the Wireless Ethernet Bridge

The Utility provides five screens for configuring the Bridge's settings.

The Utility is comprised of five screens that allows you to configure different settings.

- **Info** screen - Displays the Bridge's current settings.
- **Wireless** screen - Use this tab to configure the wireless settings.
- **IP Addr** screen - Enables you to configure the IP address settings.
- **Admin** screen - Use this tab to change the password, reboot the Bridge, or reset all settings to factory defaults.
- **Help** screen - Provides explanations of various configuration settings, as well as contact information for Linksys.

INFO

The *INFO* screen displays the Bridge's current status and settings.

Figure 6-3

- **SSID** - Displays the wireless network's current SSID. If it displays "non-spec," then the Bridge is not connected to any wireless network.

- **Channel** - Displays the Bridge's current channel number.

- **BSSID** - Displays the wireless network's current BSSID. For infrastructure mode, the BSSID is the MAC address of the access point to which the Bridge is connected.

- **Transmission Rate** - Displays the transmission rate of the current connection.

- **Link Quality (%)** - When the Bridge is connected to a wired LAN, the percentage of connection integrity is displayed. (This is not available when using an ad-hoc or peer-to-peer connection.)

- **MAC Address** - Displays the Bridge's MAC address.

- **IP Address** - Displays the Bridge's IP address.

- **Firmware Revision** - Displays the version number of the Bridge's firmware.

The "Results of the most recent scan" section displays information about all devices detected by the Bridge.

- **SSID** - Displays the current SSID of a network device.

- **MAC Address** - Displays the wireless MAC address of a network device.

- **Channel** - Displays the current channel number of a network device.

- **Signal Strength (%)** - Displays the total available amount of signal measured above the noise. (This is not available when using an ad-hoc or peer-to-peer connection.)

- **Mode** - Displays the operating mode of a network device.

> **Note:** You may have to refresh this page to see any new settings.

WIRELESS

The *Wireless* screen allows you to configure your wireless settings. Any new settings will not take effect until the Bridge is rebooted. (To reboot the Bridge, click the **Admin** tab, and click the **Reboot** button.)

Figure 6-4

- **Operating mode** - Select the LAN mode, either Ad-hoc or Infrastructure.

- **SSID** - Displays the current Service Set Identification. The default SSID is **linksys**.

- **Channel** - Enables you to select a transmission channel. It is valid only when the Bridge is operating in Ad-hoc mode. All points on the network must be set to the same channel.

- **Transmission rate** - Displays a list of transfer rates (Megabits per second): 1, 2, 5.5, 11, or Automatic. The default setting, **Automatic**, allows the Bridge to automatically adjust the transfer speed for optimal performance and the longest operating range.

- **Access point density** (for infrastructure mode only) - Enables you to specify how many access points are near the Bridge. Use this setting to reduce channel overlap and interference.

  Low: 1-2 nearby access points
  Medium: 3-4 nearby access points
  High: 5 or more nearby access points

  When the Bridge is connected in an infrastructure network environment, a list of nearby access points is displayed at the bottom of the *INFO* screen.

- **WEP enabled** - Allows you to enable or disable Wired Equivalent Privacy (WEP) for encryption. You must check this box to enable WEP encryption.

- **WEP key length** - Once WEP enabled is checked, choose 64-bit or 128-bit WEP encryption here. Some access points do not support 128-bit encryption.

- **Passphrase** - This is the code used when logging a wireless device onto the wireless network. The passphrase is case-sensitive and should not be longer than 16 alphanumeric characters. WEP key settings are based upon the passphrase created by you. This passphrase is compatible with Linksys wireless products only.

- **WEP keys 1-4** - Enables you to create an encryption scheme for wireless LAN transmissions. Manually enter a set of values for each key. 128-bit encryption requires more system resources than 64-bit encryption. Use 64-bit encryption for better performance.

  If you are using 64-bit WEP encryption, then each key must consist of exactly *10* hexadecimal characters in length.

  If you are using 128-bit WEP encryption, then each key must consist of exactly *26* hexadecimal characters in length.

  Valid hexadecimal characters are "0"-"9" and "A"-"F". A *WEP key* field that is left blank is a key of all zeroes.

- **WEP key to use** - Sets which WEP key (1-4) to use when sending data. Make sure the receiver is using the same key.

- **Deny unencrypted data** - When this box is checked, the Bridge ignores unencrypted data transmissions.

- **Shared key authentication** - Two authentication modes are available. When the box is checked, shared key authentication is enabled. You must set a WEP key to exchange data. When the box is unchecked, there is public access to this Bridge.

Click the **Apply** button to save your changes, or click the **Cancel** button to cancel your changes.

Note: You may have to refresh this page to see any new settings.

IP ADDR

The *IP Addr* screen is used to configure the IP address used by the web and TFTP servers running on the Bridge. For static mode, the IP address settings are given on-screen. For DHCP mode, the settings on the IP Addr screen will be overridden by a DHCP server on your network. Any new settings will not take effect until the Bridge is rebooted. (To reboot the Bridge, click the **Admin** tab, and click the **Reboot** button.)
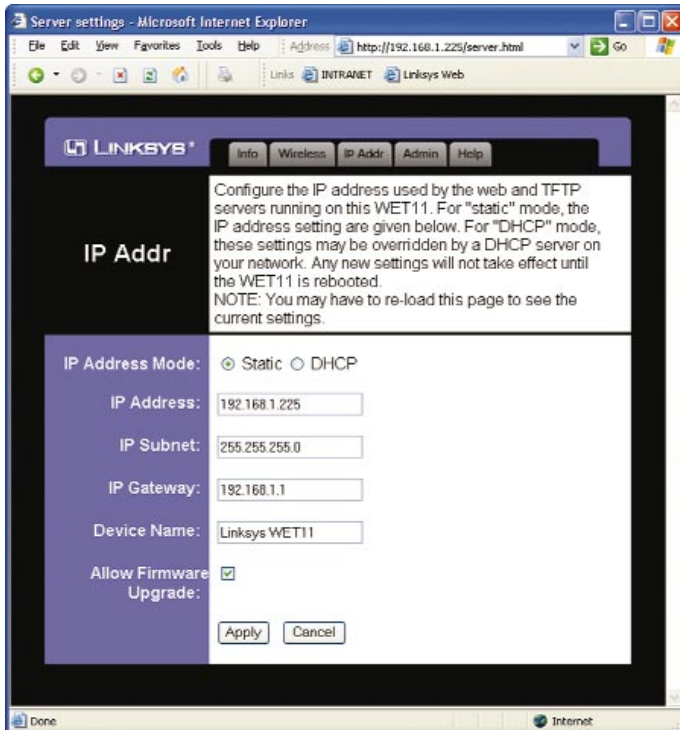
Figure 6-5

- **IP Address Mode** - Enables you to select the IP address mode: Static or DHCP (Dynamic Host Configuration Protocol). DHCP mode enables the DHCP server on your network to override the current IP address settings.

- **IP Address** - Sets the Bridge's IP address.

- **IP Subnet** - Sets the Bridge's Subnet Mask address.

- **IP Gateway** - Sets the IP address of your network's Gateway.

- **Device Name** - Sets the Bridge's name. The default name is **Linksys WET11**.

- **Allow Firmware Upgrade** - When the box is checked, the Bridge accepts firmware upgrades.

Click the **Apply** button to save your changes, or click the **Cancel** button to cancel your changes.

> **Note:** You may have to refresh this page to see any new settings.

ADMIN

The *Admin* screen allows you to change the password, reboot the Bridge, or reset all settings to their factory defaults. If you have changed any settings, it is necessary to reboot the Bridge for the new settings to take effect (click the **Reboot** button). Any changes in these three settings: password, device name, and enabling uploads, however, are effective immediately.
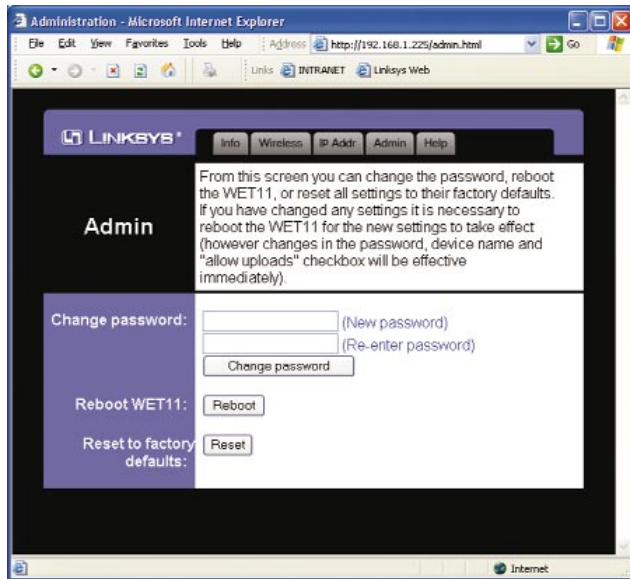
Figure 6-6

- **Change password** - Set or change the network password required to access the utility. The default password is **admin**.

- **Reboot WET11** - After you have made changes through any of the screens, click this button to enable the new settings.

- **Reset to factory defaults** - Resets all configuration settings to their default values.

Note: You may have to refresh this page to see any new settings.

HELP

The *HELP* screen offers additional explanations about the terms used on each screen of the Utility, plus contact information for additional assistance.
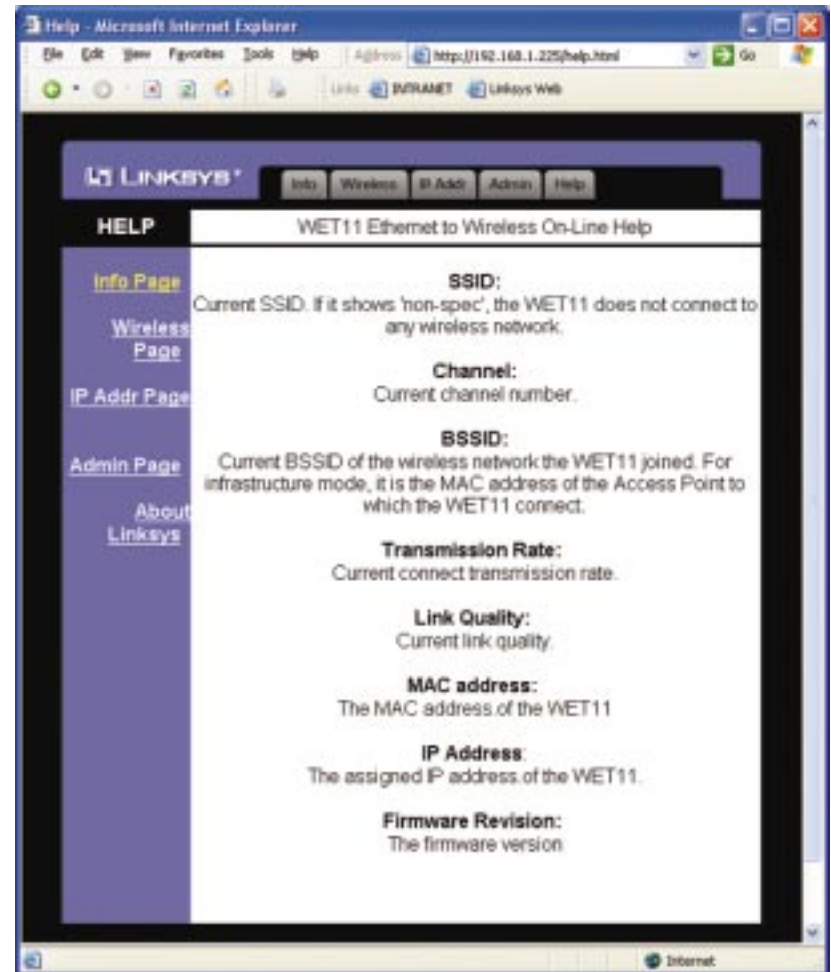
Figure 6-7

Appendix A: Troubleshooting

Common Problems and Solutions

This section provides possible solutions to problems regarding the installation and operation of the Wireless Ethernet Bridge. If you can't find an answer here, check the Linksys website at *www.linksys.com*.

1. **I can't connect to the access point.**
    Open the Web-Based Utility. Click the **Wireless** tab and perform the following steps:
    • Verify that the operating mode is set to Infrastructure mode.
    • Make sure that the SSID is the same as the SSID of the access point.
    • Make sure that all of the WEP settings are the same as the WEP settings of the access point.

2. **I don't know how to change the Bridge's IP address.**
    You have two ways to change the Bridge's IP address.
    • Open the Web-Based Utility. Click the **IP Addr** tab, and change the IP address there.
    • If you encounter problems, power the Bridge off and on again, or push the Reset button. Then try to change the IP address again.

3. **The Bridge-enabled PC won't communicate with a wireless-enabled PC or printer.**
    Perform the following steps:
    • Check that the wireless-enabled PC or printer is on the same wireless network as the PC using the Bridge.
    • Make sure that the SSID and operating mode are the same for all devices connected to the same wireless network.
    • If the wireless LAN settings are okay, make sure that all the devices are on the same IP network.

4. **The Web-Based Utility doesn't detect the Bridge.**
    Make sure that the Ethernet cable is properly connected and that the LAN LED is lit. If the LED is not lit, change the position of the X-II selection switch on the Bridge's rear panel. Use the X setting if you are connecting the Bridge to a network card or other Ethernet device. Use the II setting if you are connecting the Bridge to a hub or switch.

5. **The Web-Based Utility won't open.**
    Make sure that you have a LAN card (also known as a network adapter) installed on the PC so you can use the Web-Based Utility.

6. **The Web-Based Utility does not recognize my password.**
    The password is case-sensitive. Make sure you are using the correct case(s) when entering the password.

    If you forget your password, you can push the Bridge's Reset button. This will reset the password to the default setting; however, all other Bridge settings will be reset to the factory defaults as well. To use the default settings, leave the *User Name* field blank, and enter **admin** in the *Password* field.

Frequently Asked Questions

Can I run an application from a remote computer over the wireless network?
This will depend on whether or not the application is designed to be used over a network. Consult the application's user guide to determine if it supports operation over a network.

Can I play multiplayer games with other users of the wireless network?
Yes, as long as the game supports multiple players over a LAN. Refer to the game's user guide for more information.

What is the IEEE 802.11b standard?
It is one of the IEEE standards for wireless networks. The 802.11b standard allows wireless networking hardware from different manufacturers to communicate, provided that the hardware complies with the 802.11b standard. The 802.11b standard states a maximum data transfer rate of 11Mbps and an operating frequency of 2.4GHz.

What IEEE 802.11b features are supported?
The product supports the following IEEE 802.11 functions:
•   CSMA/CA plus Acknowledge protocol
•   Multi-Channel Roaming
•   Automatic Rate Selection
•   RTS/CTS feature
•   Fragmentation
•   Power Management

What is ad-hoc mode?

When a wireless network is set to ad-hoc mode, the wireless-equipped computers are configured to communicate directly with each other. The ad-hoc wireless network will not communicate with any wired network.

What is infrastructure mode?

When a wireless network is set to infrastructure mode, the wireless network is configured to communicate with a wired network through a wireless access point.

What is roaming?

Roaming is the ability of a portable computer user to communicate continuously while moving freely throughout an area greater than that covered by a single wireless network access point. Before using the roaming function, the workstation must make sure that it is the same channel number as the wireless network access point of the dedicated coverage area.

To achieve true seamless connectivity, the wireless LAN must incorporate a number of different functions. Each node and wireless network access point, for example, must always acknowledge receipt of each message. Each node must maintain contact with the wireless network even when not actually transmitting data. Achieving these functions simultaneously requires a dynamic RF networking technology that links wireless network access points and nodes. In such a system, the user's end node undertakes a search for the best possible access to the system. First, it evaluates such factors as signal strength and quality, as well as the message load currently being carried by each wireless network access point and the distance of each wireless network access point to the wired backbone. Based on that information, the node next selects the right wireless network access point and registers its address. Communications between end node and host computer can then be transmitted up and down the backbone.

As the user moves on, the end node's RF transmitter regularly checks the system to determine whether it is in touch with the original wireless network access point or whether it should seek a new one. When a node no longer receives acknowledgment from its original wireless network access point, it undertakes a new search. Upon finding a new wireless network access point, it then re-registers, and the communication process continues.

What is ISM band?

The FCC and their counterparts outside of the U.S. have set aside bandwidth for unlicensed use in the ISM (Industrial, Scientific and Medical) band. Spectrum in the vicinity of 2.4 GHz, in particular, is being made available worldwide. This presents a truly revolutionary opportunity to place convenient high speed wireless capabilities in the hands of users around the globe.

What is Spread Spectrum?

Spread Spectrum technology is a wideband radio frequency technique developed by the military for use in reliable, secure, mission-critical communications systems. It is designed to trade off bandwidth efficiency for reliability, integrity, and security. In other words, more bandwidth is consumed than in the case of narrowband transmission, but the trade-off produces a signal that is, in effect, louder and thus easier to detect, provided that the receiver knows the parameters of the spread-spectrum signal being broadcast. If a receiver is not tuned to the right frequency, a spread-spectrum signal looks like background noise. There are two main alternatives, Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS).

What is DSSS? What is FHSS? And what are their differences?

Frequency Hopping Spread Spectrum (FHSS) uses a narrowband carrier that changes frequency in a pattern that is known to both transmitter and receiver. Properly synchronized, the net effect is to maintain a single logical channel. To an unintended receiver, FHSS appears to be short-duration impulse noise. Direct Sequence Spread Spectrum (DSSS) generates a redundant bit pattern for each bit to be transmitted. This bit pattern is called a chip (or chipping code). The longer the chip, the greater the probability that the original data can be recovered. Even if one or more bits in the chip are damaged during transmission, statistical techniques embedded in the radio can recover the original data without the need for retransmission. To an unintended receiver, DSSS appears as low power wideband noise and is rejected (ignored) by most narrowband receivers.

Would the information be intercepted while transmitting on air?

Instant Wireless products feature two-fold protection in security. On the hardware side, as with Direct Sequence Spread Spectrum technology, it has the inherent security feature of scrambling. On the software side, Instant Wireless products offer the encryption function (WEP) to enhance security and access control. Users can set it up depending upon their needs.

Can Instant Wireless products support file and printer sharing?
Instant Wireless products perform the same function as LAN products. Therefore, Instant Wireless products can work with NetWare, Windows NT/2000, or other LAN operating systems to support printer or file sharing.

What is WEP?
WEP is Wired Equivalent Privacy, a data privacy mechanism based on a 40/64 bit shared key algorithm, as described in the IEEE 802.11 standard.

Appendix B: Glossary

Ad-hoc Network - An ad-hoc network is a group of computers, each with a wireless adapter, connected as an independent 802.11 wireless LAN. Ad-hoc wireless computers operate on a peer-to-peer basis, communicating directly with each other without the use of an access point. Ad-hoc mode is also referred to as an Independent Basic Service Set (IBSS) or as peer-to-peer mode, and is useful at a departmental scale or SOHO operation.

Default Gateway - The router used to forward all traffic that is not addressed to a station within the local subnet.

DHCP (**D**ynamic **H**ost **C**onfiguration **P**rotocol) - A protocol that lets network administrators centrally manage 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.

DNS - The Domain Name System (DNS) is the way that Internet domain names are located and translated into Internet Protocol (IP) addresses. A domain name is a meaningful and easy-to-remember "handle" for an Internet address.

DSSS (**D**irect-**S**equence **S**pread **S**pectrum) - DSSS generates a redundant bit pattern for all transmitted data. This bit pattern is called a chip (or chipping code). Even if one or more bits in the chip are damaged during transmission, statistical techniques embedded in the receiver can recover the original data without the need for retransmission. To an unintended receiver, DSSS appears as low power wideband noise and is rejected (ignored) by most narrowband receivers. However, to an intended receiver (i.e. another wireless LAN endpoint), the DSSS signal is recognized as the only valid signal, and interference is inherently rejected (ignored).

Dynamic IP Address - An IP address that is automatically assigned to a client station in a TCP/IP network, typically by a DHCP server. Network devices that serve multiple users, such as servers and printers, are usually assigned static IP addresses.

ESS (**E**xtended **S**ervice **S**et) - A set of more than two or more BSSs (multiple access points) forming a single network.

FHSS (**F**requency **H**opping **S**pread **S**pectrum) - FHSS continuously changes (hops) the carrier frequency of a conventional carrier several times per second according to a pseudo-random set of channels. Because a fixed frequency is not used, and only the transmitter and receiver know the hop patterns, interception of FHSS is extremely difficult.

Firmware - Code that is written onto read-only memory (ROM) or programmable read-only memory (PROM). Once firmware has been written onto the ROM or PROM, it is retained even when the device is turned off.

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.

IEEE 802.11b - One of the IEEE standards for wireless networks. The 802.11b standard allows wireless networking hardware from different manufacturers to communicate, provided that the hardware complies with the 802.11b standard. The 802.11b standard states a maximum data transfer rate of 11Mbps and an operating frequency of 2.4GHz.

Infrastructure Network - An infrastructure network is a group of computers or other devices, each with a wireless adapter, connected as an 802.11 wireless LAN. In infrastructure mode, the wireless devices communicate with each other and to a wired network by first going through an access point. An infrastructure wireless network connected to a wired network is referred to as a Basic Service Set (BSS). A set of two or more BSS in a single network is referred to as an Extended Service Set (ESS). Infrastructure mode is useful at a corporation scale, or when it is necessary to connect the wired and wireless networks.

IP Address - In the most widely installed level of the Internet Protocol (IP) today, an IP address is a 32-binary digit number that identifies each sender or receiver of information that is sent in packets across the Internet. When you request an HTML page or send e-mail, the Internet Protocol part of TCP/IP includes your IP address in the message (actually, in each of the packets if more than one is required) and sends it to the IP address that is obtained by looking up the domain name in the Uniform Resource Locator you requested or in the e-mail address you're sending a note to. At the other end, the recipient can see the IP address of the Web page requester or the e-mail sender and can respond by sending another message using the IP address it received.

IPCONFIG - A utility that provides for querying, defining and managing IP addresses within a network. A commonly used utility, under Windows NT and 2000, for configuring networks with static IP addresses.

ISP - An ISP (Internet service provider) is a company that provides individuals and companies access to the Internet and other related services such as website building and virtual hosting.

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).

MAC Address - The MAC (Media Access Control) address is a unique number assigned by the manufacturer to any Ethernet networking device, such as a network adapter, that allows the network to identify it at the hardware level.

mIRC - mIRC runs under Windows and provides a graphical interface for logging onto IRC servers and listing, joining, and leaving channels.

Network Mask - Also known as the "Subnet Mask."

PCMCIA - The PCMCIA (Personal Computer Memory Card International Association) is an industry group organized in 1989 to promote standards for a credit card-size memory or I/O device that would fit into a personal computer, usually a notebook or laptop computer.

Ping (**P**acket **IN**ternet **G**roper) - An Internet utility used to determine whether a particular IP address is online. It is used to test and debug a network by sending out a packet and waiting for a response.

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

Roaming - In an infrastructure mode wireless network, this refers to the ability to move out of one access point's range and into another and transparently reassociate and reauthenticate to the new access point. This reassociation and reauthentication should occur without user intervention and ideally without interruption to network connectivity. A typical scenario would be a location with multiple access points, where users can physically relocate from one area to another and easily maintain connectivity.

SOHO (**S**mall **O**ffice/**H**ome **O**ffice) - Refers to any small office or home office environment.

Static IP Address - A permanent IP address that is assigned to a node in a TCP/IP network.

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.

TCP (**T**ransmission **C**ontrol **P**rotocol) - A method (protocol) used along with the IP (Internet Protocol) to send data in the form of message units (datagram) between network devices over a LAN or WAN. While IP takes care of handling the actual delivery of the data (routing), TCP takes care of keeping track of the individual units of data (called packets) that a message is divided into for efficient delivery over the network. TCP is known as a "connection oriented" protocol due to requiring the receiver of a packet to return an acknowledgment of receipt to the sender of the packet resulting in transmission control.

TCP/IP (**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol) - The basic communication language or set of protocols for communications over a network (developed specifically for the Internet). TCP/IP defines a suite or group of protocols and not only TCP and IP.

UDP (**U**ser **D**atagram **P**rotocol) - A method (protocol) used along with the IP (Internet Protocol) to send data in the form of message units (datagram) between network devices over a LAN or WAN. While IP takes care of handling the actual delivery of the data (routing), UDP takes care of keeping track of the individual units of data (called packets) that a message is divided into for efficient delivery over the network. UDP is known as a "connection-less" protocol due to NOT requiring the receiver of a packet to return an acknowledgment of receipt to the sender of the packet (as opposed to TCP).

WEP (**W**ired **E**quivalent **P**rivacy) - A data privacy mechanism based on a 64-bit shared key algorithm, as described in the IEEE 802.11 standard.

WINIPCFG - Configuration utility based on the Win32 API for querying, defining, and managing IP addresses within a network. A commonly used utility, under Windows 95, 98, and Millennium, for configuring networks with static IP addresses.

WLAN - A group of computers and associated devices that communicate with each other wirelessly. If set to infrastructure mode, the WLAN can communicate with a wired network through a wireless network access point.

Appendix C: Specifications

Model Number   WET11

Standard   IEEE 802.11b, IEEE 802.3

Channels   11 Channels (US, Canada)
13 Channels (Europe)

Ports   One RJ-45 (10BaseT)
One Reverse SMA Antenna

Transmit   19 dBm

Receive Sensitivity   -83 dBm (typical)

Modulation   DSS, BPSK, QPSK, CCK

LEDs   Power, LAN, WLAN, Diag

Network Protocol   TCP/IP

Environmental

Dimensions   4.94" x 3.70" x 1.22"
(125.5 mm x 94 mm x 31 mm)

Unit Weight   7.1 oz. (0.2 kg)

Power   5V DC

Certifications   FCC Class B, CE Mark

Operating Temp.   32°F to 122°F (0°C to 50°C)

Storage Temp.   -13°F to 158°F (-25°C to 70°C)

Operating Humidity   10% to 90%, Non-Condensing

Storage Humidity   10% to 90%, Non-Condensing

Appendix D: Warranty Information

BE SURE TO HAVE YOUR PROOF OF PURCHASE AND A BARCODE FROM THE PRODUCT'S PACKAGING ON HAND WHEN CALLING. RETURN REQUESTS CANNOT BE PROCESSED WITHOUT PROOF OF PURCHASE.

IN NO EVENT SHALL LINKSYS'S LIABILITY EXCEED THE PRICE PAID FOR THE PRODUCT FROM DIRECT, INDIRECT, SPECIAL, INCI-DENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THE PRODUCT, ITS ACCOMPANYING SOFTWARE, OR ITS DOCUMENTATION. LINKSYS DOES NOT OFFER REFUNDS FOR ANY PRODUCT.

LINKSYS OFFERS CROSS SHIPMENTS, A FASTER PROCESS FOR PRO-CESSING AND RECEIVING YOUR REPLACEMENT. LINKSYS PAYS FOR UPS GROUND ONLY. ALL CUSTOMERS LOCATED OUTSIDE OF THE UNITED STATES OF AMERICA AND CANADA SHALL BE HELD RESPONSIBLE FOR SHIPPING AND HANDLING CHARGES. PLEASE CALL LINKSYS FOR MORE DETAILS.

Appendix E: Contact Information

For help with the installation or operation of this product, contact Linksys Technical Support at one of the phone numbers or Internet addresses below.

Sales Information	800-546-5797 (LINKSYS)
Technical Support	800-326-7114
RMA Issues	949-271-5461
Fax	949-265-6655
Email	support@linksys.com
Web	http://www.linksys.com
FTP Site	ftp.linksys.com

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