

Instant Wireless®

## Wireless Signal Booster

WSB24

### Package Contents

- One Linksys Wireless Signal Booster
- Two Signal Booster Cables
- Two Power Adapters
- One Quick Installation and User Guide
- One Wireless Access Point, WAP11



**Note:** The images in this document show the Wireless Signal Booster being connected to an Access Point; the same directions can be followed when connecting the Wireless Signal Booster to a wireless Router.



The Wireless Signal Booster with Access Point

### Connecting the Wireless Signal Booster to Your Linksys Access Point/Router

A. With your Access Point/Router powered off, place the Wireless Signal Booster on top of the Access Point/Router.

B. Disconnect the Access Point's/Router's antennas.



**B**

C. Connect the Signal Booster Cables from the Access Point's/Router's antenna ports to the Wireless Signal Booster's cable ports.



**C**

D. Connect the antennas to the Wireless Signal Booster's antenna ports.



**D**

E. Connect the appropriate power adapters to both the Access Point/Router and Wireless Signal Booster.



**E**

F. Now you are ready to use the Wireless Signal Booster in your wireless network.

## COPYRIGHT & TRADEMARKS

Copyright © 2002 Linksys, All Rights Reserved. All other trademarks and brand names are the property of their respective proprietors.

### LIMITED WARRANTY

Linksys guarantees that every Wireless Signal Booster WSB24 is free from physical defects in material and workmanship under normal use for one year from the date of purchase. If the product proves defective during this warranty period, call Linksys Customer Support in order to obtain a Return Authorization Number. **BE SURE TO HAVE YOUR PROOF OF PURCHASE ON HAND WHEN CALLING. RETURN REQUESTS CANNOT BE PROCESSED WITHOUT PROOF OF PURCHASE.** When returning a product, mark the Return Authorization Number clearly on the outside of the package and include a copy of your original proof of purchase. All customers outside of the United States of America and Canada shall be held responsible for shipping and handling charges.

IN NO EVENT SHALL LINKSYS' LIABILITY EXCEED THE PRICE PAID FOR THE PRODUCT FROM DEFECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THE PRODUCT, ITS ACCOMPANYING SOFTWARE, OR ITS DOCUMENTATION. LINKSYS DOES NOT ISSUE REFUNDS. WARRANTY DOES NOT COVER NATURAL DISASTERS OR ACTS OF NATURE.

Linksys makes no warranty or representation, expressed, implied, or statutory, with respect to its products or the contents use of this documentation and all accompanying software, and specially disclaims its quality, performance, merchantability, or fitness for any particular purpose. Linksys reserves the right to revise or update its products, software, or documentation without obligation to notify any individual or entity. Please direct all inquiries to :  
Linksys P.O.Box 18558, Irvine, CA 92623

**CAUTION : ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED IN THIS MANUAL COULD VOID YOUR AUTHORIZATION TO USE THIS DEVICE.**

## FCC STATEMENT

The Wireless Signal Booster WSB24 has been tested and found to comply with the limits 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 in accordance with 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 can be determined 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 and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## Regulatory information / Disclaimers

Installation and use of this Wireless LAN device must be in strict accordance with the instructions included in the user documentation provided with the product. Any changes or modifications (including the antennas) made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment. The manufacturer is not responsible for any radio or television interference caused by unauthorized modification of this device, or the substitution of the connecting cables and equipment other than manufacturer specified. It is the responsibility of the user to correct any interference caused by such unauthorized modification, substitution or attachment. Manufacturer and its authorized resellers or distributors will assume no liability for any damage or violation of government regulations arising from failing to comply with these guidelines.

**CAUTION: To maintain compliance with FCC's RF exposure guidelines, this equipment should be installed and operated with minimum distance 20cm between the radiator and your body. Use on the supplied antenna. Unauthorized antenna, modification, or attachments could damage the transmitter and may violate FCC regulations.**

## MPE Statement (Safety Information)

Your device contains a low power transmitter. When device is transmitted it sends out Radio Frequency (RF) signal.

## Safety Information

In order to maintain compliance with the FCC RF exposure guidelines, this equipment should be installed and operated with minimum distance 20cm between the radiator and your body. Use only with supplied antenna. Unauthorized antenna, modification, or attachments could damage the transmitter and may violate FCC regulations.

## Caution Statement of the FCC Radio Frequency Exposure

This Wireless LAN radio device has been evaluated under FCC Bulletin OET 65C and found compliant to the requirements as set forth in CFR 47 Sections 2.1091, 2.1093, and 15.247(b)(4) addressing RF Exposure from radio frequency devices. The radiation output power of this Wireless LAN device is far below the FCC radio frequency exposure limits. Nevertheless, this device shall be used in such a manner that the potential for human contact during normal operation-as a mobile or portable device but use in a body-worn way is strictly prohibit. When using this device, a certain separation distance between antenna and nearby persons has to be kept to ensure RF exposure compliance. In order to comply with the RF exposure limits established in the ANSI C95.1 standards, the distance between the antennas and the user should not be less than 20cm.

## 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.

<b>Sales Information</b>	800-546-5797 (LINKSYS)
<b>Technical Support</b>	800-326-7114
<b>RMA Issues</b>	949-261-1288
<b>Fax</b>	949-261-8868
<b>Email</b>	support@linksys.com
<b>Web</b>	http://www.linksys.com
<b>FTP Site</b>	ftp.linksys.com

Instant Wireless® Series

# Wireless Network Access Point



Use this guide to install: WAP11 ver. 2.6

User Guide

 **LINKSYS**®

#### COPYRIGHT & TRADEMARKS

Copyright © 2002 Linksys, All Rights Reserved. Instant Wireless, Linksys, and the Linksys logo are registered trademarks of Linksys Group, Inc. Microsoft, Windows, and the Windows logo are registered trademarks of Microsoft Corporation. All other trademarks and brand names are the property of their respective proprietors.

#### LIMITED WARRANTY

Linksys guarantees that every Wireless Network Access Point is free from physical defects in material and workmanship under normal use for one year from the date of purchase.

If the product proves defective during this warranty period, go to the Linksys website at [www.linksys.com](http://www.linksys.com) for complete Return Merchandise Authorization (RMA) assistance. You can also call Linksys Technical Support in order to obtain a RMA Number. 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. When returning a product, mark the RMA Number clearly on the outside of the package and include a copy of your original proof of purchase. All customers located outside of the United States of America and Canada shall be held responsible for shipping and handling charges.

IN NO EVENT SHALL LINKSYS' LIABILITY EXCEED THE PRICE PAID FOR THE PRODUCT FROM DIRECT, INDIRECT, SPECIAL, INCIDENTAL, 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 makes no warranty or representation, expressed, implied, or statutory, with respect to its products or the contents or use of this documentation and all accompanying software, and specifically disclaims its quality, performance, merchantability, or fitness for any particular purpose. Linksys reserves the right to revise or update its products, software, or documentation without obligation to notify any individual or entity. Please direct all inquiries to:

Linksys P.O. Box 18558, Irvine, CA 92623.

#### 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.

UG-WAP11 ver. 2.6-111402D JL



# Table of Contents

Chapter 1: Introduction	1
The Instant Wireless Network Access Point	1
Features	1
Chapter 2: Planning Your Wireless Network	2
Network Topology	2
Ad-Hoc versus Infrastructure Mode	2
Chapter 3: Getting to Know the Wireless Network Access Point	4
The Wireless Network Access Point's Ports	4
The Wireless Network Access Point's LEDs	5
Chapter 4: Connecting the Wireless Network Access Point	6
Chapter 5: Setting Up the Wireless Network Access Point	7
Chapter 6: Configuring the Wireless Network Access Point	15
The Setup Tab	15
The Password Tab	21
The Status Tab	22
The Log Tab	24
The Help Tab	25
The Filter Tab	26
The Wireless Tab	28
Appendix A: Troubleshooting	31
Frequently Asked Questions	31
Appendix B: Setting Up the TCP/IP Protocol	35
Setting Up TCP/IP in Windows	35
TCP/IP Setup for Windows 98 and Millennium	36
TCP/IP Setup for Windows 2000	37
TCP/IP Setup for Windows XP	38

## 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.

## EC DECLARATION OF CONFORMITY (EUROPE)

Linksys Group declares that the Instant Wireless® Series products included in the Instant Wireless® Series conform to the specifications listed below, following the provisions of the EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC:

- ETS 300-826, 301 489-1 General EMC requirements for Radio equipment.
- EN 609 50 Safety
- ETS 300-328-2 Technical requirements for Radio equipment.

Note: This equipment is intended to be used in all EU and EFTA countries. Outdoor use may be restricted to certain frequencies and/or may require a license for operation. For more details, contact Linksys Corporate Compliance.

Note: Combinations of power levels and antennas resulting in a radiated power level of above 100 mW are considered as not compliant with the above mentioned directive and are not allowed for use within the European community and countries that have adopted the European R&TTE directive 1999/5/EC and/or the CEPT recommendation Rec 70.03. For more details on legal combinations of power levels and antennas, contact Linksys Corporate Compliance.

- Linksys Group vakuuttaa täten että Instant Wireless IEEE 802.11 PC Card tyypinen laite on direktiivin 1999/5/EY, direktiivin 89/336/EEC ja direktiivin 73/23/EEC oleellisten vaatimusten ja sitä koskevien näiden direktiivien muiden ehtojen mukainen.
- Linksys Group déclare que la carte PC Instant Wireless IEEE 802.11 est conforme aux conditions essentielles et aux dispositions relatives à la directive 1999/5/EC, la directive 89/336/EEC, et à la directive 73/23/EEC.
- Belgique B L'utilisation en extérieur est autorisé sur le canal 11 (2462 MHz), 12 (2467 MHz), et 13 (2472 MHz).  
Dans le cas d'une utilisation privée, à l'extérieur d'un bâtiment, au-dessus d'un espace public, aucun enregistrement n'est nécessaire pour une distance de moins de 300m. Pour une distance supérieure à 300m un enregistrement auprès de l'IBPT est requise. Pour une utilisation publique à l'extérieur de bâtiments, une licence de l'IBPT est requise. Pour les enregistrements et licences, veuillez contacter l'IBPT.
- France F: Bande de fréquence restreinte: seuls les canaux 10, 11, 12, 13 (2457, 2462, 2467, et 2472 MHz respectivement) doivent être utilisés en France. Toute utilisation, qu'elle soit intérieure ou extérieure, est soumise à autorisation. Vous pouvez contacter l'Autorité de Régulation des Télécommunications (<http://www.art-telecom.fr>) pour la procédure à suivre.
- France F: Restricted frequency band: only channels 10, 11, 12, 13 (2457, 2462, 2467, and 2472 MHz respectively) may be used in France. License required for every indoor and outdoor installations. Please contact ART for procedure to follow.
- Deutschland D: Anmeldung im Outdoor-Bereich notwendig, aber nicht genehmigungspflichtig. Bitte mit Händler die Vorgehensweise abstimmen.
- Germany D: License required for outdoor installations. Check with reseller for procedure to follow.
- Italia I: E' necessaria la concessione ministeriale anche per l'uso interno. Verificare con i rivenditori la procedura da seguire. L'uso per installazione in esterni non e' permessa.
- Italy I: License required for indoor use. Use with outdoor installations not allowed.
- the Netherlands NL License required for outdoor installations. Check with reseller for procedure to follow.
- Nederlands NL Licentie verplicht voor gebruik met buitenantennes. Neem contact op met verkoper voor juiste procedure.

Appendix C: Glossary	39
Appendix D: Specifications	47
Environmental	48
Appendix E: Warranty Information	49
Appendix F: Contact Information	50

# Chapter 1: Introduction

## The Instant Wireless Network Access Point

Don't be bound by cabling restrictions any longer! The Wireless Access Point from Linksys delivers the freedom to configure your network *your* way. Utilization of “state-of-the-art” wireless technology gives you the ability to set up workstations in ways you never thought possible; no cables to install means less expense and less hassle.

The Wireless Access Point's high-powered antennas offer a wide range of operation, so you get seamless roaming throughout your wireless LAN infrastructure. An advanced user authentication feature ensures a high level of network security, and Windows-based diagnostics and statistic tools ensure that you'll always be in control. The Wireless Access Point is easy-to-install and easy-to-use—just plug it in and you're ready to go!

When all of these features come together in one compact, lightweight, and power-efficient unit, you have the ultimate in flexible networking—the Linksys Wireless Access Point.

## Features

- High-Speed Data Transfer Rates of up to 11Mbps
- Interoperable with IEEE 802.11b (DSSS), 2.4GHz Compliant Equipment
- Provides Roaming, Best Access Point Selection, Load Balancing, and Network Traffic Filtering
- Wireless Access Point Roaming and Bridging
- Hardware Wired Equivalent Privacy (WEP)
- Free Software Driver Upgrades
- Compatible with Virtually All Major Operating Systems
- Free Technical Support—24 Hours a Day, 7 Days a Week, Toll-Free US Calls
- 1-Year Limited Warranty

# Chapter 2: Planning Your Wireless Network

## Network Topology

A wireless local area network (WLAN) is exactly like a regular local area network (LAN), except that each computer in the WLAN uses a wireless device to connect to the network. Computers in a WLAN share the same frequency channel and SSID, which is an identification name for wireless devices.

## 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**. An infrastructure configuration is a WLAN and wired LAN communicating to each other through an access point. An ad-hoc configuration is wireless-equipped computers communicating directly with each other. 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 accessed 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 **infrastructure** mode. (See Figure 2-1.) The basis of infrastructure mode centers around an *access point*, which serves as the main point of communications in a wireless network. Access points transmit data to PCs equipped with wireless network cards, which can *roam* within a certain radial range of the access point. Multiple access points can be arranged in succession to extend the roaming range, and can be set up to communicate with your Ethernet (wired) hardware as well.



Figure 2-1

## Wireless Network Access Point

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. (See Figure 2-2.) 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 2-2

# Chapter 3: Getting to Know the Wireless Network Access Point

## The Wireless Network Access Point's Ports

The Access Point's ports, where a network cable is connected, are located on the Access Point's rear panel.



Figure 3-1

### Dipole Antenna Connectors

These two round connections are where the antennas are connected to the Access Point.

### LAN

This **LAN** (Local Area Network) port connects to Ethernet network devices, such as a hub, switch, or router.

### Power

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

### Reset Button

There are two ways to reset the Access Point's factory defaults. Briefly press the Reset Button for approximately ten seconds, or use the *Password* tab of the Access Point's Web-based Utility.



**Important:** Resetting the Access Point will erase all of your settings (WEP Encryption, Wireless, and LAN settings, etc.) and replace them with the factory defaults.

## The Wireless Network Access Point's LEDs



Figure 3-2

<b>Power</b>	<i>Red.</i> The <b>Power</b> LED lights up when the Access Point is powered on.
<b>ACT</b>	<i>Green.</i> If the LED is flickering, the Access Point is actively sending or receiving data to or from one of the devices on the wireless network.
<b>LINK</b>	<i>Orange.</i> The <b>LINK</b> LED serves two purposes. If the LED is continuously lit up, the Access Point is successfully connected to a device through the LAN port. If the LED is flickering, it is an indication of any wired network activity.



## Chapter 4: Connecting the Wireless Network Access Point

1. Locate an optimum location for the Access Point. The best place for the Access Point is usually at the center of your wireless network, with line of sight to all of your mobile stations.
2. Fix the direction of the antenna. Try to place it in a position which can best cover your wireless network. Normally, the higher you place the antenna, the better the performance will be. The antenna's position enhances the receiving sensitivity. Both antennas should be perpendicular to the ground and parallel to each other.
3. Connect the included Category 5 Ethernet network cable to the Access Point. Then, connect the other end of the Ethernet cable to a switch or hub. The Access Point will then be connected to your 10/100 network.
4. Connect the AC power adapter to the Access Point's Power port. Only use the power adapter supplied with the Access Point. Use of a different adapter may result in product damage.

Now that the hardware installation is complete, proceed to "Chapter 5: Setting Up the Wireless Network Access Point" for directions on how to set up the Access Point.



**Note:** In order for all other wireless devices to communicate with the Access Point, those devices must be operating in the infrastructure mode. If any wireless devices are configured in the ad-hoc mode, they *will not* be recognized by the Access Point.

## Chapter 5: Setting Up the Wireless Network Access Point



**Have You:** Connected the Access Point to a hub, switch, or router on your wired network as shown in "Chapter 4: Connecting the Wireless Network Access Point"?

Now that you've connected the Access Point to your wired network, you are ready to begin setting it up. This Setup Wizard will take you through all the steps necessary to get the Access Point connecting your wireless network to your wired network and communicating more efficiently.



**Note:** While the Access Point has been designed to work correctly right out of the box, setting it up on a wireless computer will require you to use the Linksys default settings. These settings can then be changed through the Web-based Utility.

1. Insert the Setup Wizard CD into your PC's CD-ROM drive. Optimally, your PC should be on your wired network.
2. The screen in Figure 5-1 should appear on your monitor. If it does not, this means the autorun is not functioning. Start the autorun manually by clicking the **Start** button, selecting **Run**, and typing **D:\setup.exe** (if "D" is your PC's CD-ROM drive). Click the **Setup** button to run the Setup Wizard. Clicking the **User Guide** button opened this User Guide. To access the Linksys website on an active Internet connection, click the **LINKSYS WEB** button, or to exit this Setup Wizard, click the **Exit** button.



Figure 5-1

3. You can configure the Access Point through any PC connected to your Ethernet network. Make sure the Access Point is connected to one of your network switches or hubs. Click the **Next** button to continue or **Exit** to exit the Setup Wizard.

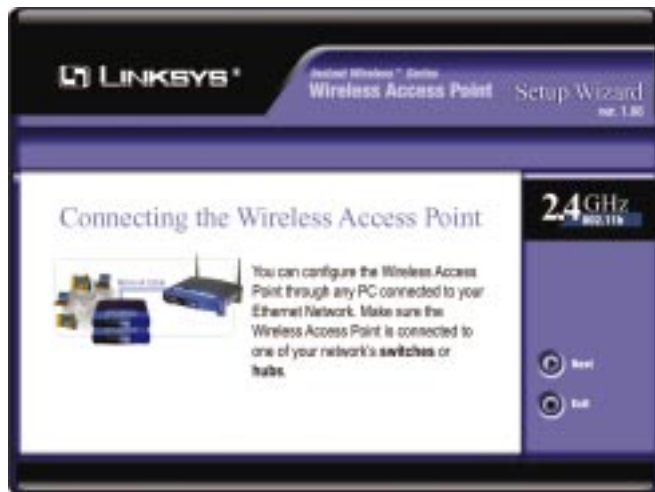


Figure 5-2

4. The next screen to appear, shown in Figure 5-3, will display a list of access points on your network, along with the status information for each access point. If there is only one access point on your network, it will be the only one displayed. If there are more than one displayed, select the Access Point by clicking on it, and click the **Yes** button to continue or **No** to exit the Setup Wizard.



Figure 5-3

5. On the *Enter Network Password* screen, enter the default password, **admin**, in the *Password* field. Then click the **OK** button. For added security, remember to change this password later through the Web-based Utility's *Password* screen.



Figure 5-4

6. As shown in Figure 5-5, the *IP Settings* screen will appear next. Enter an IP Address and Subnet Mask appropriate to your network. Then enter a unique name in the *AP Name* field. Click the **Next** button to continue or **Back** to return to the previous page.

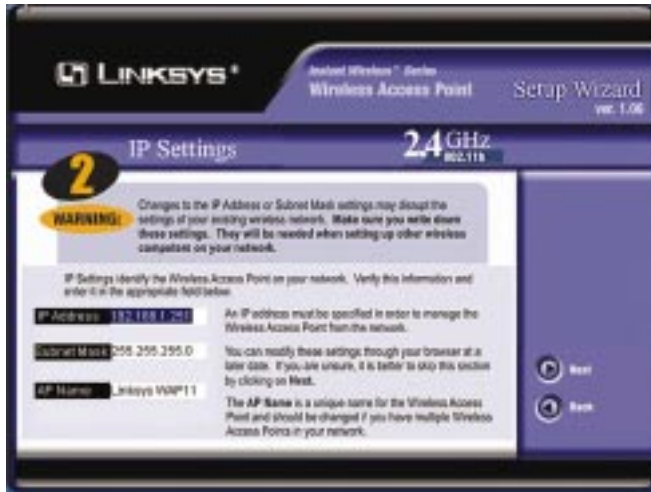


Figure 5-5

- **IP Address.** This IP address must be unique to your network. (The default IP address is 192.168.1.251.) As this is a private IP address, there is no need to purchase a separate IP address from your service provider.
- **Subnet Mask.** The Access Point's Subnet Mask must be the same as your Ethernet network.
- **AP Name.** You may assign any name to the Access Point. Unique, memorable names are helpful, especially if you are using multiple access points on the same wireless network.

7. As shown in Figure 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. Then, click the **Next** button to continue or **Back** to return to the previous page.

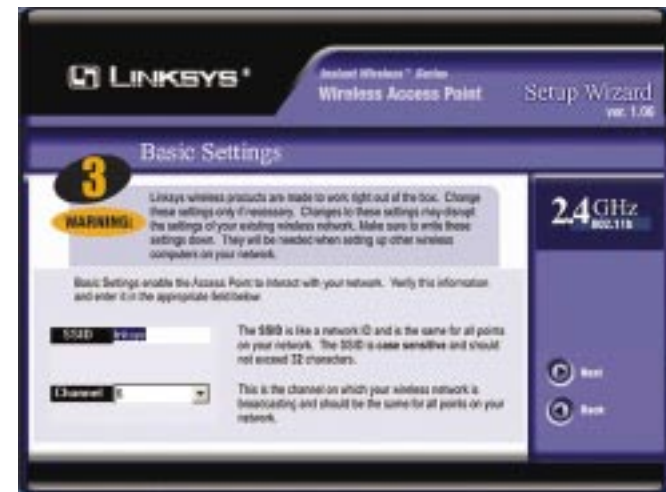


Figure 5-6

- **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, which may be any keyboard character. 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.

8. The *Security Settings* screen (Figure 5-7) will appear next. From this screen, you will set the Wired Equivalent Privacy (WEP) encryption for your wireless network. Select a WEP configuration method and a passphrase. Click the **Next** button to continue or **Back** to return to the previous page.

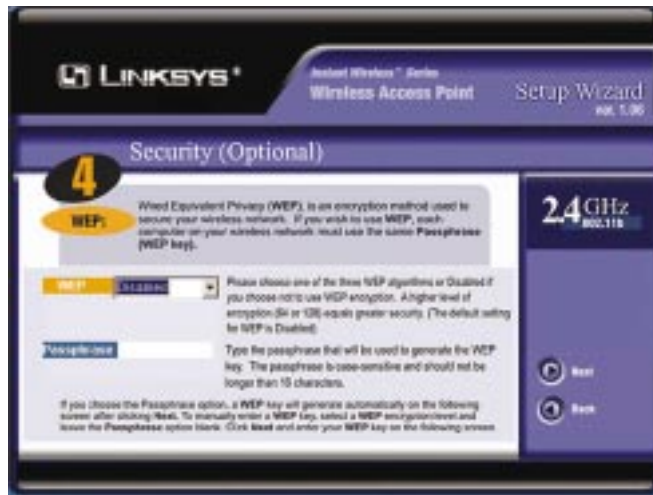


Figure 5-7

- **WEP (Disable/64-bit (10 hex digits)/128-bit 26 hex digits).** In order to utilize WEP encryption, select the WEP setting from the pull-down menu, **64-bit (10 hex digits)** or **128-bit (26 hex digits)**. If you do not wish to utilize WEP encryption, make sure **Disabled** is selected. The Access Point's WEP encryption is unique to Linksys and may conflict with other vendors' WEP encryption.
- **Passphrase.** Instead of manually entering WEP keys, you can enter a Passphrase. This Passphrase is used to generate one or more WEP keys. It is case-sensitive and should not be longer than 16 alphanumeric characters. (The Passphrase function is compatible with Linksys wireless products only. If you want to communicate with non-Linksys wireless products, you will need to enter your WEP keys manually on the non-Linksys wireless products.)

9. The second *Security Settings* screen, shown in Figure 5-8, shows the WEP key. If you entered a passphrase, then the *Key 1* field will display the automatically generated WEP key. If you did not enter a passphrase, then enter a WEP key in the *Key 1* field. Each point in your wireless network must use the same WEP key for the network to function properly. Click the **Next** button to continue or **Back** to return to the previous page.

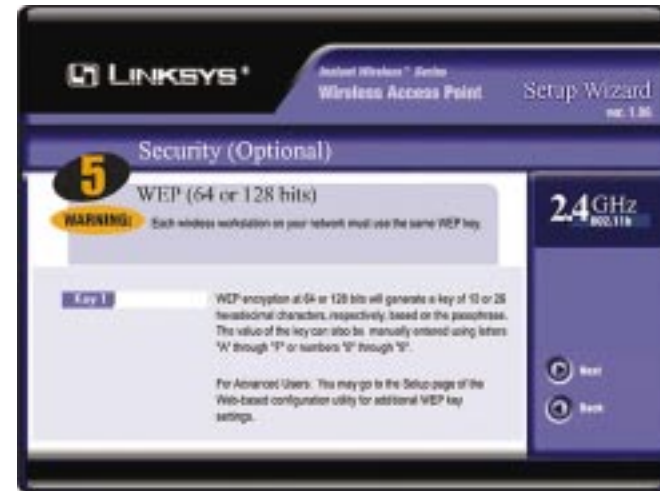


Figure 5-8

- **Key 1.** WEP keys enable you to create an encryption scheme for wireless LAN transmissions. If the WEP key hasn't been automatically generated, then manually enter a set of values. (Do not leave the field blank, and do not enter all zeroes. These are not valid key values.) 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".



10. The next screen (Figure 5-9) will allow you to review your settings. If these settings are correct, click the **Yes** button to save these settings. If there are any problems with the settings, click the **No** button to exit the Setup Wizard.



Figure 5-9

10. At this point, the configuration performed with the Setup Wizard is complete, as shown in Figure 5-10. To configure any other access points in your network, you can run this Setup Wizard again. Click the **Exit** button to exit the Setup Wizard.



Figure 5-10

## Chapter 6: Configuring the Wireless Network Access Point



**Note:** The Access Point is designed to function properly after using the Setup Wizard. This chapter is provided solely for those who wish to perform more advanced configuration or monitoring.

The Access Point has been designed to be functional right out of the box, with the default settings in the Setup Wizard. However, if you'd like to change these settings, the Access Point can be configured through your web browser with the Web-based Utility. This chapter explains how to configure the Access Point in this manner.

Open your web browser and type the IP Address you entered in the Setup Wizard (the default IP address is **192.168.1.251**). Press the **Enter** key and the following screen, shown in Figure 6-1, will appear. Leave the *User Name* field blank. The first time you open the Web-based Utility, use the default password **admin**. You can set a new password on the *Password* screen shown in Figure 6-7.



Figure 6-1

### The Setup Tab

The first screen that appears, shown in Figure 6-2, is the *Setup* tab. This allows you to change the Access Point's general settings. Change these settings as described here, and click the **Apply** button to apply your changes or **Cancel** to cancel your changes. If you require online help, click the **Help** button.

- **Firmware Version.** This displays the current version of the Access Point's firmware. Firmware should only be upgraded if you experience problems with the Access Point and can be upgraded from the *Help* tab.
- **AP Name.** You may assign any name to the Access Point. Unique, memorable names are helpful, especially if you are employing multiple access points on the same network. Verify this is the name you wish to use and click the **Apply** button to set it.



- **Obtain an IP Address Automatically.** Click this radio button to allow the Access Point to obtain a dynamic IP address from a DHCP server.
- **Specify an IP Address.** This IP address must be unique to your network. We suggest you use the default IP address of 192.168.1.251. As this is a private IP address, there is no need to purchase a separate IP address from your service provider. Verify the address and click the **Apply** button to save changes.
- **Subnet Mask.** The Access Point's Subnet Mask (or IP Mask) must be the same as your Ethernet network. Verify this is correct and click the **Apply** button to set it.
- **Gateway.** If you have assigned a static IP address to the Access Point, then enter the IP address of your network's Gateway, such as a router, in the *Gateway* field. If your network does not have a Gateway, then leave this field blank.

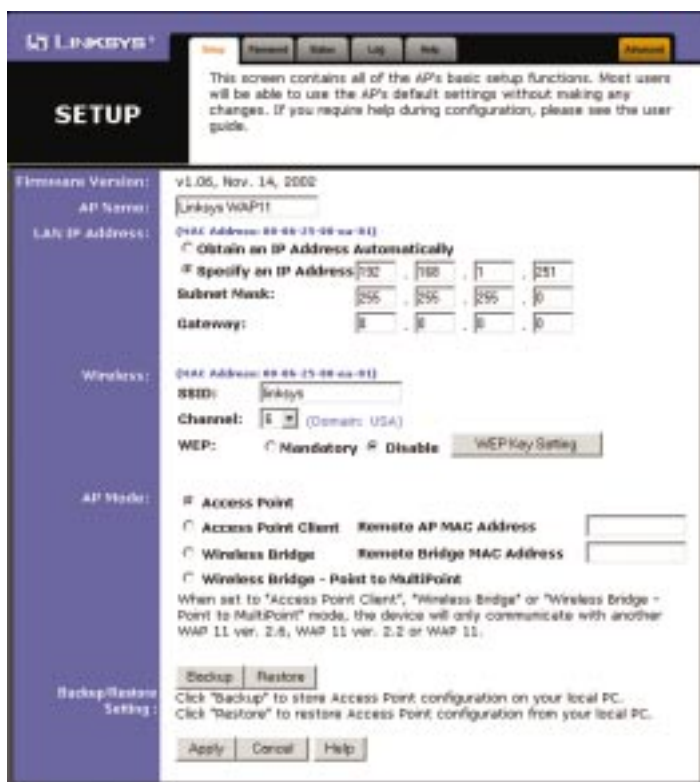


Figure 6-2

- **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 alphanumeric characters, which may be any keyboard character. 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.
- **WEP.** The WEP Encryption method is set to **Disable** by default. To enable WEP, click the **Mandatory** radio button, and then click the **WEP Key Setting** button to configure the WEP settings.

#### SETTING WEP ENCRYPTION:

If the *Disable* radio button is selected and you click the *WEP Key Setting* button, then the screen shown in Figure 6-3 will appear. Click the **OK** button to enable WEP encryption or **Cancel** to return to the *Setup* screen.



Figure 6-3

Set WEP Encryption through the Web-based Utility by clicking the **WEP Key Setting** button on the *Setup* screen as shown in Figure 6-2.

This will open the *WEP Key Setting* screen, Figure 6-4. From this screen, you can select the type of WEP encryption to use and set the Passphrase for that encryption.

From the pull-down menu at the top of the screen, select **64-bit** or **128-bit** WEP encryption.

The *Mode* pull-down menu will allow you to set the Passphrase in hexadecimal or ASCII characters. Hexadecimal characters on your keyboard are the letters "A" through "F" and the numbers "0" through "9", while ASCII characters are any character on your keyboard.



**Important:** Always remember that each point in your wireless network **MUST** use the same WEP encryption method and encryption key, or else your wireless network will not function properly.

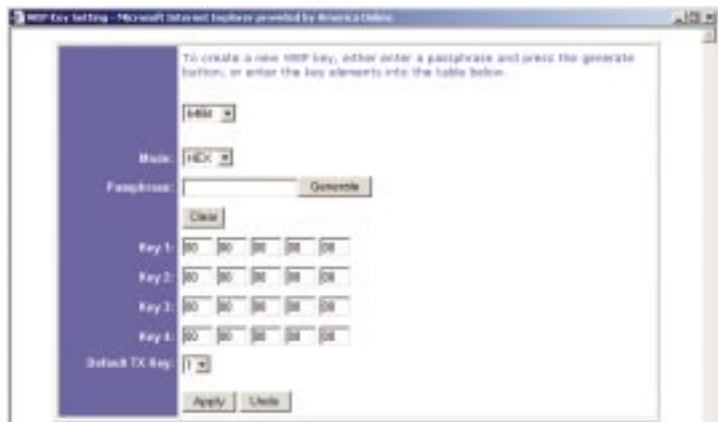


Figure 6-4

There are two ways to create WEP encryption keys. The first method is by typing a Passphrase into that field and clicking the **Generate** button. This will generate WEP encryption keys based upon that passphrase. A second method is to manually enter the WEP encryption keys in the available fields.

Click the **Clear** button to clear the *Passphrase* and *Key 1-4* fields.

In the *Default TX Key* drop-down menu, select the number of the key you want to use.

Click the **Apply** button to apply your changes, or click **Undo** to cancel your most recent change.

#### SETTING THE AP MODE:

The Access Point offers four modes of operation: Access Point, Access Point Client, Wireless Bridge, and Wireless Bridge Point to MultiPoint. For all bridging modes, make sure the channel, SSID, and WEP keys are the same.

- **Access Point** - The *Operational Mode* is set to **Access Point** by default. This connects your wireless PCs to a wired network. In most cases, no change is necessary.
- **Access Point Client** - When set to Access Point Client mode, the Access Point Client is able to talk to one remote access point within its range. This mode allows the Access Point Client to act as a client of a remote access point. The Access Point Client cannot communicate directly with any wire-

less clients. A separate network attached to the Access Point Client can then be wirelessly bridged to the remote access point. Enter the required LAN MAC address of the remote access point in the *Remote AP MAC Address* field.

- **Wireless Bridge** - If you are trying to make a wireless connection between two wired networks, as shown in Figure 6-5, select **Wireless Bridge**. This mode connects two physically separated wired networks with two access points.

To configure a Wireless Bridge environment, click **Wireless Bridge** and enter the LAN MAC address of the remote access point in the *Remote Bridge MAC Address* field. The remote access point also needs to be set up as a Wireless Bridge.

**Note:** All devices on each wired network must be connected through a hub or switch.



**Note:** In Wireless Bridge mode, the Access Point can **ONLY** be accessed by another access point in Wireless Bridge mode. In order for your other wireless devices to access the Access Point, you must reset it to Access Point mode. The two modes are mutually exclusive.

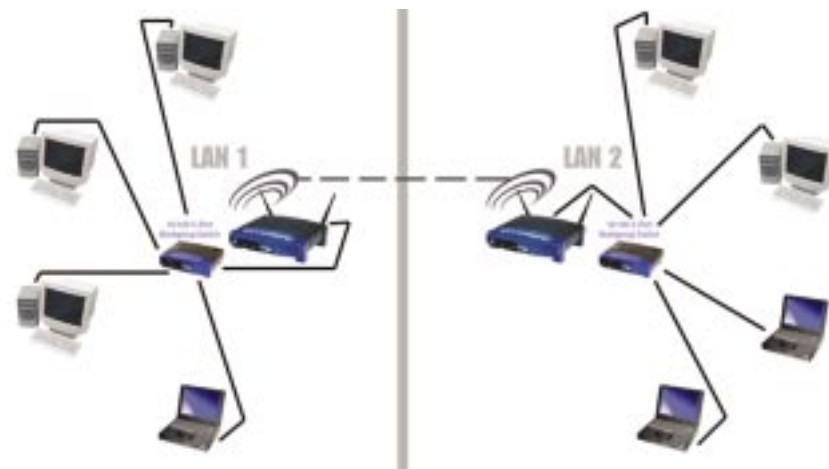


Figure 6-5

- **Wireless Bridge Point to MultiPoint**- If you are trying to make a wireless connection between more than two wired networks, as shown in Figure 6-6,

select **Wireless Bridge Point to MultiPoint**. This mode allows you to construct a network that has multiple access points bridging wirelessly.

To configure a Wireless Bridge Point to MultiPoint environment, click **Wireless Bridge Point to MultiPoint** for the access point used in LAN 1. No MAC address binding is needed. Then, set the access points in LAN 2 and LAN 3 to Wireless Bridge, and have them look for the MAC address of the access point in LAN 1.

Only one of the access points must be in Point to MultiPoint mode. For all other bridged access points, select the **Wireless Bridge** option, and enter the Remote LAN MAC Address of the Access Point set to Point to MultiPoint.



**Note:** Linksys recommends bridging no more than three remote LANs in Wireless Bridge Point to MultiPoint mode. Bridging additional remote LANs will result in a significant decrease in bandwidth.

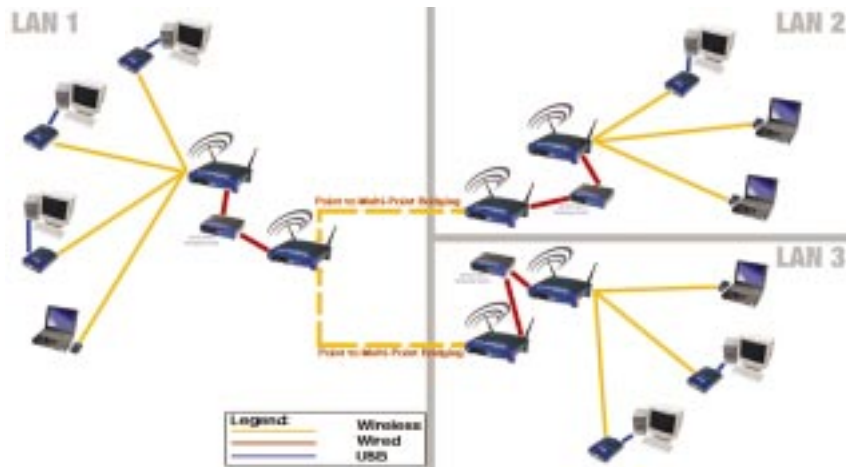


Figure 6-6

- **Backup and Restore.** Clicking the **Backup** button will store the Access Point's configuration to your PC's hard drive. You can restore this information by clicking the **Restore** button.

Click the **Apply** button to apply your changes or **Cancel** to cancel your changes. If you require online help, click the **Help** button.

## The Password Tab

The *Password* tab, shown in Figure 6-7, allows you to change the Access Point's password and restore factory defaults.

Changing the password for the Access Point is as easy as typing the password into the *AP Password* field. Then, type it again into the second field to confirm.

To restore the Access Point's factory default settings, click the **Yes** button beside *Restore Factory Defaults*.



**Important:** Restoring the Access Point's factory defaults will erase all of your settings (WEP Encryption, Wireless and LAN settings, etc.), replacing them with the factory defaults. Do not reset the Access Point if you want to retain these settings



Figure 6-7

Click the **Apply** button to apply your changes or **Cancel** to cancel your changes. If you require online help, click the **Help** button.

## The Status Tab

The *Status* tab, shown in Figure 6-8, will display current information on the Access Point, its settings, and its performance.

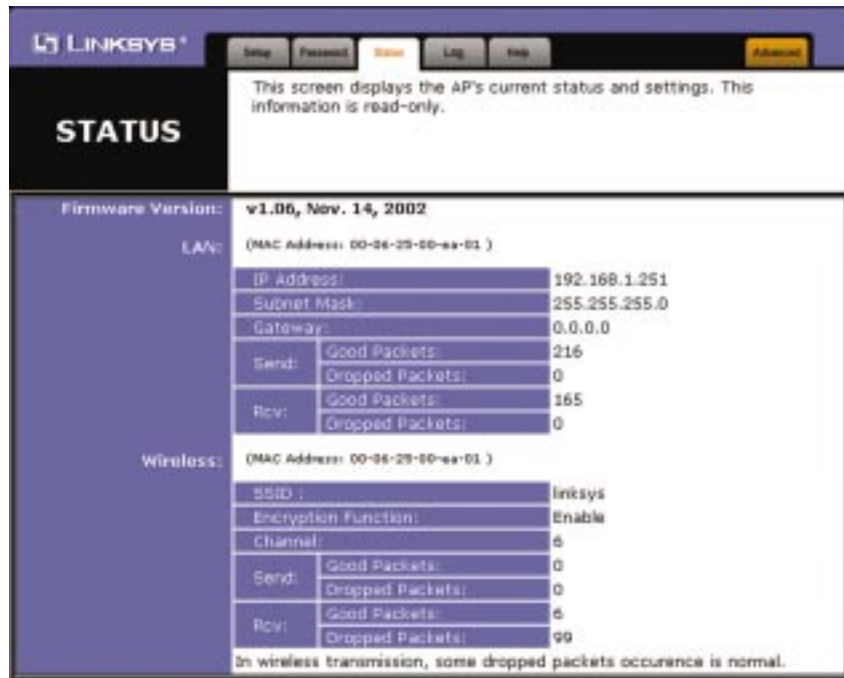


Figure 6-8

- **Firmware Version.** This displays the current version of the Access Point's firmware. Firmware should only be upgraded if you experience problems with the Access Point and can be upgraded from the *Help* tab.

## LAN

- **IP Address.** This IP address is the unique IP address of the Access Point.
- **Subnet Mask.** The Access Point's Subnet Mask (also known as an IP Mask), matches the Subnet Mask of your Ethernet network.

- **Gateway.** This displays the IP address of your network's Gateway.
- **Send and Recv.** The *Send* and *Recv* fields display the number of successful or dropped packets that have been sent or received.

## Wireless

- **SSID.** The unique name shared among all points in your wireless network is displayed here.
- **Encryption Function.** The encryption method you chose in the Setup Wizard or changed from the *Setup* tab of this Web-based Utility is displayed here.
- **Channel.** The wireless channel shared by all wireless devices connected to this Access Point is displayed here.
- **Send and Recv.** The *Send* and *Recv* fields display the number of successful or dropped packets that have been sent or received. Some packet loss is normal in wireless networking.

## The Log Tab

To view a log of the Access Point's activity, select the **Log** tab, shown in Figure 6-9.

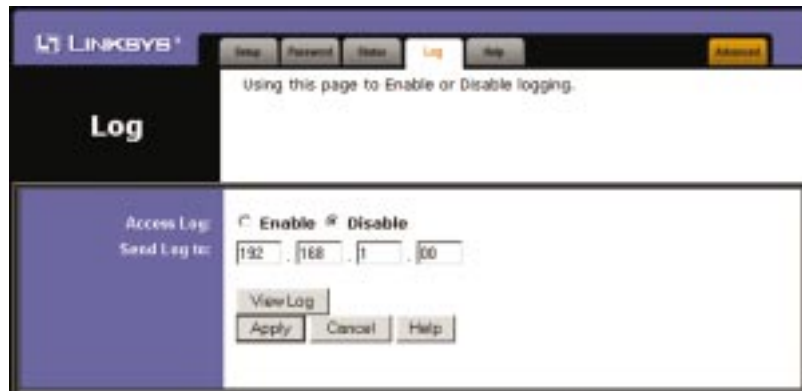


Figure 6-9

To enable permanent logging activity, click the **Enable** radio button beside *Access Log*. The default setting for this function is **Disable**.

If you have chosen to monitor the Access Point's traffic, then you can designate a PC that will receive permanent log files periodically. In the *Send Log to* field, enter the IP address of this PC. To view these permanent logs, you must use Logviewer software, which can be downloaded free of charge from [www.linksys.com](http://www.linksys.com).

To see a temporary log of the Access Point's most recent activities, click the **View Log** button.

Click the **Apply** button to apply your changes or **Cancel** to cancel your changes. If you require online help, click the **Help** button.

## The Help Tab

For help on the various tabs in this Web-based Utility, along with upgrading the Access Point's firmware and viewing this User Guide, click the **Help** tab, shown in Figure 6-10.

The help files for the various tabs in this Web-based Utility are listed by tab name on the lefthand side of the screen.

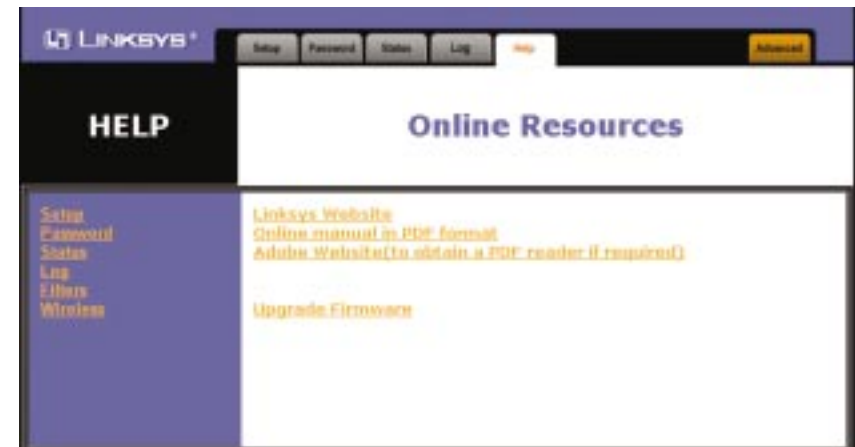


Figure 6-10

Click the **Linksys Website** link to connect to the Linksys homepage for Knowledgebase help files and information about other Linksys products, provided you have an active Internet connection.

For an **Online manual in PDF format**, click that text link. The User Guide will appear in Adobe pdf format. If you do not have the Adobe PDF Reader installed on your computer, click the **Adobe Website** link or go to the Setup Wizard CD-ROM to download this software. (To access the Adobe website, you will need an active Internet connection.) To download from the CD-ROM, click the **Start** button and select **Run**. Type **D:\Acrobat** (if "D" is the letter of your CD-ROM drive).



New firmware versions are posted at [www.linksys.com](http://www.linksys.com) and can be downloaded for free. If the Access Point is not experiencing difficulties, then there is no need to download a more recent firmware version, unless that version has a new feature that you want to use. Loading new firmware does not always enhance the speed or quality of your Internet connection.



**Note:** When you upgrade the Access Point's firmware, you may lose the Access Point's current configuration settings.

To upgrade the Access Point's firmware:

1. Download the firmware upgrade file from the Linksys website.
2. Extract the firmware upgrade file.
3. Click the **Upgrade Firmware** button on the *Help* screen.
4. Enter the location of the firmware upgrade file in the *File Path* field, or click the **Browse** button to find the firmware upgrade file.
5. Double-click the firmware upgrade file.
6. Click the **Upgrade** button, and follow the on-screen instructions.

Click the **Cancel** button to cancel the firmware upgrade.

## The Filter Tab

To access the *Filter* tab, first click the **Advanced** tab. The *Filter* tab, shown in Figure 6-11, allows you to control which computers may or may not communicate with the Access Point—depending on their MAC addresses.

To enable filtering of computers by their MAC Addresses, click the **Enable** radio button. To disable this feature, click the **Disable** radio button.

Next, determine if the Access Point will **deny** access only to the MAC addresses you will specify, OR if the Access Point will **allow** access only to the MAC Addresses you will specify. Click the radio button next to the option that is appropriate.

Above the *MAC Address* fields, there is a pull-down menu. This pull-down menu is for selecting the number of computers on your wireless network. For computers one through ten on your wireless network, **1~10** is selected by default. If you have more than ten computers on your wireless network, use this pull-down menu to select **11~20**, **21~30**, etc., up to a maximum of 50 MAC Addresses.



Figure 6-11

Then, type the MAC Address(es) you wish to filter in the *MAC Address* fields.

When you've completed making any changes on this tab, click the **Apply** button to save those changes or **Undo** to cancel your changes. For more information on this tab, click the **Help** button.

## The Wireless Tab



Figure 6-12

Before making any changes to the *Wireless* tab, shown in Figure 6-12, please check your wireless settings on your other systems, as these changes will alter the effectiveness of the Access Point. In most cases, these wireless settings do not need to be changed.

- **Beacon Interval.** This value indicates the frequency interval of the beacon. A beacon is a packet broadcast by the Access Point to keep the network synchronized. A beacon includes the wireless LAN service area, the AP address, the Broadcast destination addresses, a time stamp, Delivery Traffic Indicator Maps, and the Traffic Indicator Message (TIM).

## Wireless Network Access Point

- **RTS Threshold.** This value should remain at its default setting of 2346. Should you encounter inconsistent data flow, only minor reductions are recommended.
- **Fragmentation Threshold.** This value specifies the maximum size for a packet before data is fragmented into multiple packets. It should remain at its default setting of 2346. A smaller setting means smaller packets, which will create more packets for each transmission. Only minor reductions of this value are recommended.
- **DTIM Interval.** This value indicates the interval of the Delivery Traffic Indication Message (DTIM). A DTIM field is a countdown field informing clients of the next window for listening to broadcast and multicast messages. When the Access Point has buffered broadcast or multicast messages for associated clients, it sends the next DTIM with a DTIM Interval value. Access Point Clients hear the beacons and awaken to receive the broadcast and multicast messages.
- **Basic Rates.** The basic rate is the minimum speed at which a wireless client is allowed to connect to the Access Point.
- **Transmission Rates.** The transmission rates should be set depending on the speed of your wireless network. You must select **1-2 (Mbps)** if you have older 802.11 compliant equipment on your network, such as wireless adapters that support only 1 or 2 Mbps. Selecting 1-2 (Mbps), however, does NOT limit the transmission rates of faster adapters.
- **Preamble Type.** The preamble defines the length of the CRC block for communication between the Access Point and a roaming wireless network adapter. (High network traffic areas should use the shorter preamble type.) Select the appropriate preamble type and click the **Apply** button to set it. All wireless points (nodes) on your network should use the same preamble type.
- **Authentication Type.** You may choose between **Open System**, **Shared Key**, and **Both**. The Authentication Type default is set to **Open System**. Shared Key is when both the sender and the recipient share a secret key. All points on your network must use the same authentication type. It is recommended that you use the default setting.
- **Antenna Selection.** This selection is for choosing which antenna transmits data. By default, the Diversity Antenna selection, used to increase reception, is chosen.

- **SSID Broadcast.** For security purposes, this selection can be disabled, allowing only those wireless network adapters with the Access Point's SSID to communicate with the Access Point. By default, this selection is enabled, allowing all wireless network adapters in your wireless network to communicate with the Access Point.



**Important:** The Access Point will not be recognized by “site-survey” utilities, such as the Microsoft® Windows® XP Zero Configuration Utility, if SSID Broadcast is disabled.

When you've completed making any changes on this tab, click the **Apply** button to save those changes or **Cancel** to cancel your changes. For more information on this tab, you can click the **Help** button.

## Appendix A: Troubleshooting

This chapter provides a list of questions and answers regarding the operation of the Access Point. Read the description below to solve your problems. If you can't find an answer here, check the Linksys website at [www.linksys.com](http://www.linksys.com).

### Frequently Asked Questions

**Can the Access Point act as my DHCP Server?**

No. The Access Point is nothing more than a wireless hub, and as such, cannot be configured to handle DHCP capabilities.

**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 (local area network). 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.

### What is a MAC Address?

The Media Access Control (MAC) 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. For all practical purposes, this number is usually permanent. Unlike IP addresses, which can change every time a computer logs on to the network, the MAC address of a device stays the same, making it a valuable identifier for the network.

## Appendix B: Setting Up the TCP/IP Protocol

### Setting Up TCP/IP in Windows

Before a computer can communicate with the Access Point, it must be configured with the TCP/IP protocol. If you know how to set up TCP/IP on your computers, do so now. Otherwise, use the guidelines below to help get TCP/IP installed on all of the computers that need to communicate with the Access Point. If you are unable to successfully install TCP/IP on one or more computers after following the directions, contact the manufacturer of your computer's network operating system for further assistance. Check with your network administrator for your TCP/IP settings.

The directions below provide general guidelines for coming up with IP addresses and subnet masks. Check with your network administrator to see if you need to use specific IP addresses or DHCP settings.

First, each computer on the network will require an IP address, which is a series of numbers, separated by periods, identifying the PC on the network. To make things simple, it is recommended you use the following numbering scheme:

192.168.1.X

In this example, X is a unique, arbitrarily assigned number from 1 to 254. Each computer must have its own unique X number. Note: Never use 0 or 255 for X. These numbers are reserved by TCP/IP for other uses.

For example, if you have three computers, you could number them as follows:

192.168.1.17  
192.168.1.44  
192.168.1.126

In this case, 17, 44, and 126 are arbitrary numbers between 1 and 254.

Each computer will also require a subnet mask, which is a numerical "filter" that tells a computer what kinds of TCP/IP data packets to accept. If you're not sure which mask to use, the following mask is recommended:

255.255.255.0



The following instructions are provided as examples for reference only. For complete instructions on installing and troubleshooting TCP/IP, consult your Windows operating system documentation.

### TCP/IP Setup for Windows 98 and Millennium

1. Click the **Start** button, and select **Settings**. Open the **Control Panel**. Inside the Control Panel, double-click the **Network** icon.
2. If the *TCP/IP Protocol* is listed for your network adapter, go to step five. Otherwise, click the **Add** button.
3. When the *Component Type* window appears, select **Protocol**, and click the **Add** button.
4. Select **Microsoft** in the *Manufacturers* list and choose **TCP/IP** in the *Network Protocols* list. Then, click the **OK** button.
5. When the *Network* window reappears, click **TCP/IP**, and then click the **Properties** button.
6. Select **Specify an IP Address**.
7. Enter an IP Address for the computer, along with a Subnet Mask. Click the **OK** button. If you do not have these values, consult your network administrator.
8. When the *Network* window reappears, click the **OK** button. Restart your machine. TCP/IP has now been successfully installed.

### TCP/IP Setup for Windows 2000

1. At the Windows 2000 desktop, right-click **My Network Places**. Then, right-click **Local Area Connection**. Choose **Properties**.
2. If the *TCP/IP Protocol* is listed for your network adapter, go to step five. Otherwise, click the **Install** button.
3. When the *Component Type* window appears, select **Protocol**, and click the **Install** button.
4. Select **Internet Protocol (TCP/IP)** from the list, and click the **OK** button.
5. When the *Network* window reappears, select **TCP/IP**, and click the **Properties** button.
6. Select **Use the following IP Address**.
7. Enter an IP Address for the computer, along with a Subnet Mask and Default Gateway. Then, click the **OK** button. If you do not have these values, consult your network administrator.
8. When the *Network* window reappears, click the **OK** button. Restart your computer. TCP/IP has now been successfully installed.

## TCP/IP Setup for Windows XP

1. At the Windows XP desktop, click **Start**. Then click the **Control Panel** icon. Click **Network and Internet Connections**. Click **Network Connections**. Then double-click the appropriate **Local Area Connection**, and click the **Properties** button.
2. If the *TCP/IP Protocol* is listed for your network adapter, go to step five. Otherwise, click the **Install** button.
3. Select **Protocol**, and then click the **Add** button.
4. Select **Internet Protocol (TCP/IP)** from the list, and click the **OK** button.
5. Select **TCP/IP**, and click the **Properties** button.
6. Select **Use the following IP Address**.
7. Enter an IP address for the computer, along with a Subnet mask and Default gateway address. Then, click the **OK** button. If you do not have these values, consult your network administrator.
8. When you're finished, click the **Close** button. Restart your computer. TCP/IP has now been successfully installed.

## Appendix C: Glossary

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

**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.

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

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

**Beacon Interval** - A beacon is a packet broadcast by the Access Point to keep the network synchronized. A beacon includes the wireless LAN service area, the AP address, the Broadcast destination addresses, a time stamp, Delivery Traffic Indicator Maps, and the Traffic Indicator Message (TIM).

**Bit** - A binary digit. The value - 0 or 1-used in the binary numbering system. Also, the smallest form of data.

**Browser** - A browser is an application program that provides a way to look at and interact with all the information on the World Wide Web or PC. The word "browser" seems to have originated prior to the Web as a generic term for user interfaces that let you browse text files online.

**BSS (Basic Service Set)** - An infrastructure network connecting wireless devices to a wired network using a single access point.

**Buffer** - A buffer is a shared or assigned memory area used by hardware devices or program processes that operate at different speeds or with different sets of priorities. The buffer allows each device or process to operate without

being held up by the other. In order for a buffer to be effective, the size of the buffer and the algorithms for moving data into and out of the buffer need to be considered by the buffer designer. Like a cache, a buffer is a "midpoint holding place" but exists not so much to accelerate the speed of an activity as to support the coordination of separate activities.

**CSMA/CA (Carrier Sense Multiple Access/Collision Avoidance)** - In local area networking, this is the CSMA technique that combines slotted time-division multiplexing with carrier sense multiple access/collision detection (CSMA/CD) to avoid having collisions occur a second time. This works best if the time allocated is short compared to packet length and if the number of situations is small.

**CSMA/CD (Carrier Sense Multiple Access/Collision Detection)** - The LAN access method used in Ethernet. When a device wants to gain access to the network, it checks to see if the network is quiet (senses the carrier). If it is not, it waits a random amount of time before retrying. If the network is quiet and two devices access the line at exactly the same time, their signals collide. When the collision is detected, they both back off and each wait a random amount of time before retrying.

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

**DHCP (Dynamic Host Configuration Protocol)** - A protocol that lets network administrators manage centrally and automate the assignment of Internet Protocol (IP) addresses in an organization's network. Using the Internet's set of protocol (TCP/IP), each machine that can connect to the Internet needs a unique IP address. When an organization sets up its computer users with a connection to the Internet, an IP address must be assigned to each machine. Without DHCP, the IP address must be entered manually at each computer and, if computers move to another location in another part of the network, a new IP address must be entered. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network.

DHCP uses the concept of a "lease" or amount of time that a given IP address will be valid for a computer. The lease time can vary depending on how long a user is likely to require the Internet connection at a particular location. It's especially useful in education and other environments where users change frequently. Using very short leases, DHCP can dynamically reconfigure networks in which there are more computers than there are available IP addresses.

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

**Download** - To receive a file transmitted over a network. In a communications session, download means receive, upload means transmit.

**Driver** - A workstation or server software module that provides an interface between a device and the upper-layer protocol software running in the computer; it is designed for a specific device, and is installed during the initial installation of a network-compatible client or server operating system.

**DSSS (Direct-Sequence Spread-Spectrum)** - 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).

**DTIM (Delivery Traffic Indication Message)** - A DTIM field is a countdown field informing clients of the next window for listening to broadcast and multicast messages. When the AP has buffered broadcast or multicast messages for associated clients, it sends the next DTIM with a DTIM Interval value. AP Clients hear the beacons and awaken to receive the broadcast and multicast messages.

**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.

**Encryption** - A security method that applies a specific algorithm to data in order to alter the data's appearance and prevent other devices from reading the information.

**ESS (Extended Service Set)** - A set of more than two or more BSSs (multiple access points) forming a single network.

**Ethernet** - IEEE standard network protocol that specifies how data is placed on and retrieved from a common transmission medium. Has a transfer rate of

10 Mbps. Forms the underlying transport vehicle used by several upper-level protocols, including TCP/IP and XNS.

**FHSS (Frequency Hopping Spread Spectrum)** - FHSS continuously changes the center frequency of a conventional carrier several times per second according to a pseudo-random set of channels, while chirp spread spectrum changes the carrier frequency. Because a fixed frequency is not used, illegal monitoring of spread spectrum signals is extremely difficult, if not downright impossible depending on the particular method.

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

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

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

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

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

**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 several large societies in special areas, such as the IEEE Computer Society.

**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 (Internet Protocol) today, an IP address is a 32-binary digit number that identifies each sender or receiver of information that is sent in packet 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 requestor or the e-mail sender and can respond by sending another message using the IP address it received.

**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.

**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 (Media Access Control) Address** - 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.

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

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

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

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

**Packet** - A unit of data routed between an origin and a destination in 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.

**PC Card** - A credit-card sized removable module that contains memory, I/O, or a hard disk.

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

**RJ-45 (Registered Jack-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.

**Router** - Protocol-dependent device that connects subnetworks together. Routers are useful in breaking down a very large network into smaller subnetworks; they introduce longer delays and typically have much lower throughput rates than bridges.

**RTS (Request To Send)** - An RS-232 signal sent from the transmitting station to the receiving station requesting permission to transmit.

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

**Software** - Instructions for the computer. A series of instructions that performs a particular task is called a "program." The two major categories of software are "system software" and "application software." System software is made up of control programs such as the operating system and database management system (DBMS). Application software is any program that processes data for the user.

A common misconception is that software is data. It is not. Software tells the hardware how to process the data.

**SOHO (Small Office/Home Office)** - Market segment of professionals who work at home or in small offices.

**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).

**SSID (Service Set Identifier)** - A unique name shared among all points in a wireless network. The SSID must be identical for each point in the wireless network and is case-sensitive. Also known as "ESSID."

**Static IP Address** - A permanent IP address that is assigned to a node in an IP or 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.

**Switch** - 1. A data switch 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 (Transmission Control Protocol)** - 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** (Transmission Control Protocol/Internet Protocol) - 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.

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

**Topology** - A network's topology is a logical characterization of how the devices on the network are connected and the distances between them. The most common network devices include hubs, switches, routers, and gateways. Most large networks contain several levels of interconnection, the most important of which include edge connections, backbone connections, and wide-area connections.

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

**Upload** - To transmit a file over a network. In a communications session, upload means transmit, download means receive.

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

**WEP** (Wired Equivalent Privacy) - A data privacy mechanism based on a 64-bit, 128-bit, or 256-bit shared key algorithm, as described in the IEEE 802.11 standard.

## Appendix D: Specifications

<b>Standards</b>	IEEE 802.3 (10BaseT), IEEE 802.3u (100BaseTX) IEEE 802.11b (Wireless)
<b>Channels</b>	11 Channels (US, Canada) 13 Channels (Europe) 14 Channels (Japan)
<b>Ports</b>	One 10/100 RJ-45 Port
<b>Cabling Type</b>	UTP Category 5 or better
<b>Data Rate</b>	Up to 11Mbps (Wireless), 10/100Mbps (Ethernet)
<b>LEDs</b>	Power, Act, Link (Wired - Link/Activity)
<b>Transmit</b>	18 dBm
<b>Receive Sensitivity</b>	-84 dBm
<b>Modulation</b>	DSSS, BPSK, QPSK, CCK
<b>Network Protocols</b>	TCP/IP

Environmental

<b>Dimensions</b>	7.31" x 6.16" x 1.88" (186 mm x 154 mm x 48 mm)
<b>Power</b>	5V, 2.5 A
<b>Certifications</b>	FCC Class B, CE Mark
<b>Operating Temp.</b>	0°C to 40°C (32°F to 104°F)
<b>Storage Temp.</b>	0°C to 70°C (-4°F to 158°F)
<b>Operating Humidity</b>	10% to 85%, Non-Condensing
<b>Storage Humidity</b>	5% to 90%, Non-Condensing

## Appendix E: 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, INCIDENTAL, 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 PROCESSING 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 F: 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.

<b>Sales Information</b>	800-546-5797 (LINKSYS)
<b>Technical Support</b>	800-326-7114
<b>RMA (Return Merchandise Authorization) Issues</b>	www.linksys.com (or call 949-271-5461)
<b>Fax</b>	949-265-6655
<b>E-mail</b>	support@linksys.com
<b>Web</b>	http://www.linksys.com
<b>FTP Site</b>	ftp.linksys.com



<http://www.linksys.com>

© Copyright 2002 Linksys, All Rights Reserved.