LINKSYS®

A Division of Cisco Systems, Inc.

2.4 GHz
802.11g

WIRELESS

Wireless-G

Range Expander

User Guide

CISCO SYSTEMS

Model No. **WRE54G**

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> **WARNING:** This product contains chemicals, including lead, known to the State of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after handling.*

How to Use this User Guide

The user guide to the Wireless-G Range Expander has been designed to make understanding networking with the Range Expander easier than ever. Look for the following items when reading this User Guide:

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

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

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

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

> *word: definition.*

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

Figure 0-1: Sample Figure Description

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

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Chapter 1: Introduction

Welcome

Thank you for choosing the Wireless-G Range Expander. This Range Expander will allow you to expand your network beyond the range of your current access point or wireless router.

How does the Range Expander do this? Once on your network, the Range Expander repeats the signal to all devices within its range. By placing the Range Expander at the furthest edge of your access point or wireless router's signal, it could conceivably double the area of your network.

But what does all of this mean?

Networks are useful tools for sharing computer resources. You can access one printer from different computers and access data located on another computer's hard drive. Networks are even used for playing multiplayer video games. So, networks are not only useful in homes and offices, they can also be fun.

PCs equipped with wireless cards and adapters can communicate without cumbersome cables. By sharing the same wireless settings, within their transmission radius, they form a wireless network. While access points and wireless routers bridge wireless networks and wired networks, the Range Expander can then take that signal for networks that use the 802.11b and 802.11g standards and extend it beyond its current range.

Use the instructions in this Guide to help you connect the Range Expander, set it up, and configure it to expand the range of your Wireless-G and Wireless-B networks. These instructions should be all you need to get the most out of the Range Expander.

network: a series of computers or devices connected for the purpose of data sharing, storage, and/or transmission between users.

access point: a device that allows wireless-equipped computers and other devices to communicate with a wired network. Also used to expand the range of a wireless network.

router: a networking device that connects multiple networks together.

adapter: a device that adds network functionality to your PC.

802.11b: an IEEE wireless networking standard that specifies a maximum data transfer rate of 11Mbps and an operating frequency of 2.4GHz.

802.11g: an IEEE wireless networking standard that specifies a maximum data transfer rate of 54Mbps, an operating frequency of 2.4GHz, and backward compatibility with 802.11b devices.

What's in this User Guide?

This user guide covers the steps for setting up and using the Wireless-G Range Expander.

- Chapter 1: Introduction
  This chapter describes the Range Expander's applications and this User Guide.

- Chapter 2: Planning Your Wireless Network
  This chapter discusses a few of the basics about wireless networking.

- Chapter 3: Getting to Know the Wireless-G Range Expander
  This chapter describes the physical features of the Range Expander.

- Chapter 4: Connecting the Wireless-G Range Expander
  This chapter describes the steps for connecting the Range Expander to your wired or wireless network.

- Chapter 5: Setting up the Wireless-G Range Expander
  This chapter instructs you on how to use the Range Expander's Setup Wizard and configure the Range Expander.

- Chapter 6: Configuring the Wireless-G Range Expander
  This chapter shows you how to configure the Range Expander using the Web Utility.

- Appendix A: Troubleshooting
  This appendix describes some potential problems and solutions, as well as frequently asked questions, regarding installation and use of the Range Expander.

- Appendix B: Wireless Security
  This appendix discusses security issues regarding wireless networking and measures you can take to help protect your wireless network.

- Appendix C: Windows Help
  This appendix describes how you can use Windows Help for instructions about networking, such as installing the TCP/IP protocol.

- Appendix D: Glossary
  This appendix gives a brief glossary of terms frequently used in networking.

- Appendix E: Specifications
  This appendix provides the Range Expander's technical specifications.

- Appendix F: Warranty Information
  This appendix supplies the Range Expander's warranty information.

- Appendix G: Regulatory Information
  This appendix supplies the Range Expander's regulatory information.

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

Chapter 2: Planning Your Wireless Network

Network Topology

A wireless network is a group of computers, each equipped with one wireless adapter. Computers in a wireless network must be configured to share the same radio channel. Several PCs equipped with wireless cards or adapters can communicate with one another to form an ad-hoc network.

Linksys wireless adapters also provide users access to a wired network when using an access point or wireless router. An integrated wireless and wired network is called an infrastructure network. Each wireless PC in an infrastructure network can talk to any computer in a wired network infrastructure via the access point or wireless router.

An infrastructure configuration extends the accessibility of a wireless PC to a wired network, and can double the effective wireless transmission range for two wireless adapter PCs. Since an access point is able to forward data within a network, the effective transmission range in an infrastructure network can be doubled.

Roaming

Infrastructure mode also supports roaming capabilities for mobile users. Roaming means that you can move your wireless PC within your network and the access points will pick up the wireless PC's signal, providing that they both share the same channel and SSID.

Should you consider roaming, choose a feasible radio channel and optimum access point position. Proper access point positioning combined with a clear radio signal will greatly enhance performance.

ad-hoc: a group of wireless devices communicating directly with each other (peer-to-peer) without the use of an access point.

infrastructure: a wireless network that is bridged to a wired network via an access point.

roaming: the ability to take a wireless device from one access point's range to another without losing the connection.

SSID: your wireless network's name.

Network Layout

Linksys Wireless-B and Wireless-G access points and routers have been designed for use with 802.11b and 802.11g products. Products using the 802.11g and 802.11b standards can communicate with each other.

Access points and wireless routers are compatible with 802.11g and 802.11b adapters, such as the Notebook Adapters for your laptop computers, PCI Adapters for your desktop PCs, and USB Adapters for when you want to enjoy USB connectivity. Wireless products will also communicate with the wireless PrintServer.

When you wish to connect your wired network with your wireless network, network ports on access points and wireless routers can be connected to any of Linksys's switches or routers.

With these, and many other, Linksys products, your networking options are limitless. Go to the Linksys website at *www.linksys.com* for more information about wireless products.

Chapter 3: Getting to Know the Wireless-G Range Expander

The Front Panel

The Range Expander's adjustable antenna, LEDs, and Ethernet network port are located on the front panel.

Antenna

Make sure the antenna is positioned straight up into the air, no matter how the Range Expander is positioned.

LEDs

LINK   *Blue/Red*. The **LINK** LED lights up when the Range Expander is powered on. This LED will light up blue when the Range Expander has connected to an access point or wireless router. It will light up red when the Range Expander is not connect to any access point or wireless router.

ACTIVITY   *Blue*. The **ACTIVITY** LED lights up when the Range Expander is powered on. It will flash when there is wireless network activity.

Ethernet Network Port

The Ethernet network port is located underneath the lid below the Range Expander's LEDs. This port is used if you connect the Range Expander to a wired network for setup. The Ethernet network port has two small LEDs that light up green when the Range Expander is connected to a wired network.

Figure 3-1: Front Panel

Figure 3-1: Front Panel with Ethernet Network Cable Connected

The Side Panel

On the Range Expander's side panel, you will find the Reset and Auto configuration buttons.

Reset Button   There are two ways to reset the Range Expander's factory defaults. Either press the **Reset Button**, for approximately ten seconds, or restore the defaults from the Password tab in the Range Expander's Web-based Utility.

Auto configuration   The **Auto configuration** button can be used to easily connect the Range Expander to the nearest wireless network, via an access point or wireless router. Simply connect the power and press the **Auto configuration** button. Your wireless network must have security disabled for this feature to function.

⚠️ **IMPORTANT:** Resetting the Range Expander will erase all of your wireless settings, including security settings, and replace them with the factory defaults. Do not reset the Range Expander if you want to retain these settings.

The Recess for the Power Plate

The back of the Range Expander has a two-pronged recess where its power plates can be connected. Two power plates come with the Range Expander, one with two prongs for direct connection to a power outlet, and another with a cord to reach a power outlet.

Either of these power plate can be slid into the recess and is fully connected when the orange tab snaps into place. To remove the power plate, slide the tab to the right and slide out the power plate. Always unplug the Range Expander from the power outlet before removing the power plate.

Figure 3-2: Recess for the Power Plate

Chapter 4: Connecting the Wireless-G Range Expander

Overview

Linksys recommends that you connect the Range Expander to your wired network for setup. Proceed to the "Connection to a Wired Network for Setup" section.

If you want to configure the Range Expander using your wireless network, proceed to the "Connection to a Wireless Network for Setup" section if you have security enabled. Proceed to the "Connection for Auto Configuration" section if you have security disabled.

> **NOTE:** The Auto configuration button can be used to set up the Range Expander if you have security disabled on your wireless network. Proceed to the "Connection for Auto Configuration" section.

> **NOTE TO ADVANCED USERS:** If you want to use the Web-based Utility to configure the Range Expander, then connect the Range Expander to your network. Open the web browser of a networked computer, and enter the Range Expander's IP address, **192.168.1.240**. Configure your network's SSID, channel, and security settings on the *Basic Setup* screen. For more information, proceed to "Chapter 6: Configuring the Wireless-G Range Expander."

Connection to a Wired Network for Setup

1. Flip up the lid covering the Ethernet network port on the Range Expander's front panel.

2. Connect the included Ethernet network cable to the Ethernet network port of the Range Expander.

   Connect the other end of the network cable to an Ethernet network port on your network router.

3. Connect the appropriate power plate and connect it to a power outlet, preferably a surge protector.

   Proceed to "Chapter 5: Setting Up the Wireless-G Range Expander."


Figure 4-1: Connecting the Ethernet Network Cable

Figure 4-3: Using the Power Plate with Plug
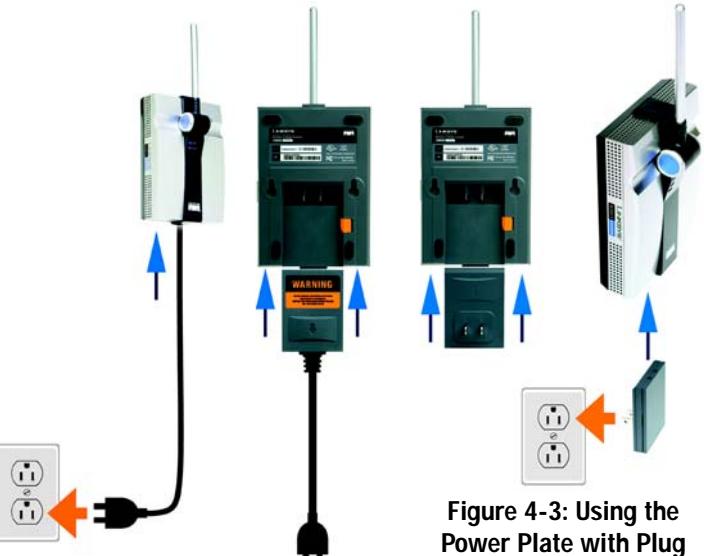
Figure 4-2: Using the Power Plate with Cord

Connection to a Wireless Network for Setup

Linksys recommends that you have the Range Expander in the same room as your access point or wireless router during setup.

Connect the appropriate power plate and connect it to a power outlet, preferably a surge protector.

Proceed to "Chapter 5: Setting Up the Wireless-G Range Expander."

Connection for Auto Configuration

Linksys recommends that you have the Range Expander in the same room as your access point or wireless router during setup.

1. Connect the appropriate power plate and connect it to a power outlet, preferably a surge protector.

2. Press the Range Expander's **Auto configuration** button for five seconds. The Range Expander will then automatically detect your wireless network and configure itself with those settings.

4. To move the Range Expander, unplug the power plate from the power outlet.

5. Locate an optimum location for the Range Expander. The best placement is usually at the edge of your wireless network.

6. Fix the direction of the antenna. Try to place it in a position that will best cover your wireless network. Normally, the higher you place the Range Expander's antenna, the better its performance will be. Its receiving sensitivity can be enhanced by proper Proper positioning of the antenna should enhance its receiving sensitivity.

3. Connect the power plate to a power outlet, preferably a surge protector.

**Congratulations! The installation of the Wireless-G Range Expander is complete.**
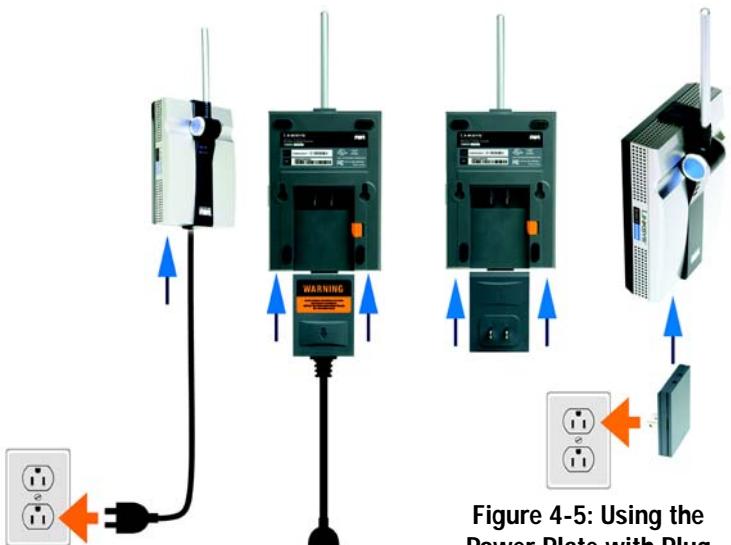
Figure 4-5: Using the Power Plate with Plug

Figure 4-4: Using the Power Plate with Cord

Chapter 5: Setting Up the Wireless-G Range Expander

Overview

The first part of this chapter explains how to configure the Range Expander. The remainder of the chapter describes how to move the Range Expander to its final location.

Running the Setup Wizard

Now that you've placed the Range Expander within your wireless network, you are ready to begin setting it up. This Setup Wizard will take you through all the steps necessary to configure the Range Expander.

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

2. Click the **Setup** button to continue this Setup Wizard. Clicking the **User Guide** button opened this Guide. To exit this Setup Wizard, click the **Exit** button.

3. Make sure your access point or wireless router is working properly before you continue with the Setup Wizard. Click **Next** to continue or **Exit** to exit the Setup Wizard.

NOTE: You won't need to use the Setup Wizard, if you set up the Range Expander using the Auto configuration button. The Auto configuration button can be used to quickly set up the Range Expander if you have security disabled on your wireless network.

Figure 5-1: Setup Wizard's Welcome Screen

Figure 5-2: Check Your Wireless Network

4. The Setup Wizard will run a search for your wireless network. If found, you will be asked to confirm the settings. If the settings are correct, click **Continue** and proceed to step 7. If you'd like to choose a different wireless network, proceed to step 5.

    If no wireless network is found, a screen will notify you when no access point is detected on your network. Click **Continue** to survey your network for any access points or wireless routers, and proceed to step 5. You can click **Cancel** to exit the Setup Wizard.

Figure 5-3: Confirm Wireless Network Settings

Figure 5-4: Wireless Network Not Found

5. The site survey results will display all available access points and wireless routers in your network. Select the one you want and then click **Yes** to continue. Then proceed to step 6.

    You can click **No** to return to the *Welcome* screen of the Setup Wizard.

    If you want to manually enter settings, click **Manual**. The *Configure Wireless Settings Manually* screen will appear. Enter the SSID of your network. Then select the channel setting of your network.

    If your network uses WEP encryption, select **WEP** from the *Encryption* drop-down menu. Click **Next** to continue and proceed to step 6. If your network uses WPA security, select **WPA**. Click **Next** to continue and proceed to step 6.

    If it does not use wireless security, select **Disabled**. Click **Next** to continue and proceed to step 7.
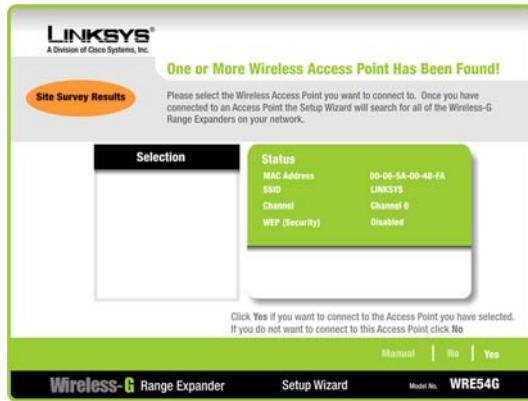


Figure 5-5: Choose the Access Point
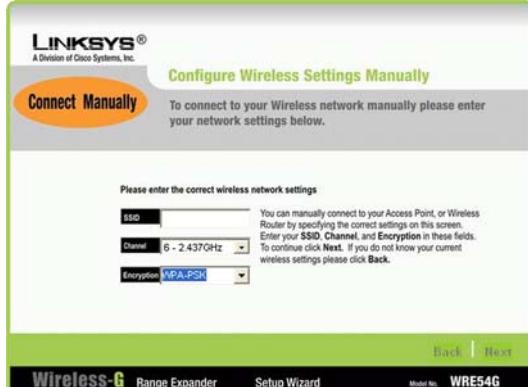
Figure 5-6: Configure Wireless Settings Manually

6. If security is disabled, then proceed to step 7. If security is enabled, the appropriate *Security Settings* screen will appear. Enter the WEP or WPA settings. Then click **Next** to continue or **Exit** to exit the Setup Wizard.

    WEP
    On the *WEP Security Settings* screen, select the level of WEP encryption, **WEP (64-bits)** or **WEP (128-Bits)**. Then enter the passphrase or the WEP key. The passphrase can consist of no more than 16 alphanumeric characters.

    If you enter the WEP key in the *Key 1* field, it must have 10 hexadecimal characters for 64-bit encryption or 26 hexadecimal characters for 128-bit encryption. Hexadecimal characters are the letters "A" through "F" and the numbers "0" through "9". All devices in your wireless network must use the same WEP key.

wep: a method of encrypting network data transmitted on a wireless network for greater security.

wpa: a wireless security protocol using TKIP (Temporal Key Integrity Protocol) encryption, which can be used in conjunction with a RADIUS server.
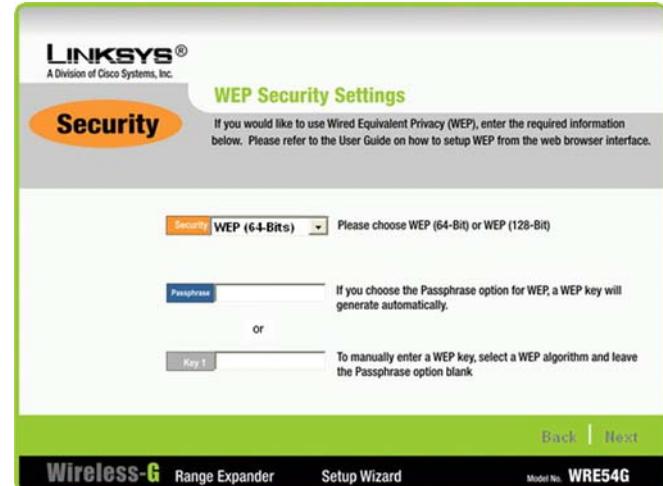
Figure 5-7: WEP Security Settings

WPA
On the *WPA Security Settings* screen, enter the passphrase or pre-shared key in the *Passphrase* field. The passphrase or pre-shared key must have between 8 to 63 characters in length.

Figure 5-8: WPA Security Settings

7. Now that the Setup Wizard has found an access point or wireless router with which to communicate, it will now search for the Range Expander. Select the one you want. Then, click **Yes** to continue, or click **No** to return to the *Welcome* screen of the Setup Wizard.

Figure 5-9: Choose the Range Expander

8. You will be asked to enter its password. Enter the default password, **admin**. Then, click **Enter** to continue. To exit this Setup Wizard, click **Exit**.

Figure 5-10: Enter the Password

9. The *Configure Network Address Settings* screen will appear. Enter an IP Address and appropriate Subnet Mask for the Range Expander. Then enter the IP Address of your network gateway, as well as a descriptive name for the Range Expander. Then, click **Next** to continue or **Back** to return to the previous screen.

- IP Address. This IP address must be unique to your network. (The default IP address is **192.168.1.240**.) If you are not sure about what to do, keep the default IP address.

- Subnet Mask. The Range Expander's Subnet Mask must be the same as your network's Subnet Mask.

- Gateway. This IP address should be the IP address of the gateway device that permits communication between the Internet and the local network (this is usually your network router). If you are not sure about what to enter, keep the default Gateway IP address.

- Expander Name. You can assign the Range Expander any name up to 32 characters in length, such as its location (garage, downstairs, living room).

Figure 5-11: Configure Network Address Settings

ip address: the address used to identify a computer or device on a network.

subnet mask: an address code that determines the size of the network.

gateway: a device that interconnects networks with different, incompatible communications protocols.

10. If you have the WRE54G v2, proceed to step 11.

If you have the WRE54G v1, enter the MAC address of your access point or wireless router. You can find the MAC address on a label located on the bottom panel of the access point or wireless router. Then, click **Next** to continue or **Back** to return to the previous screen.

Figure 5-12: MAC Address of Access Point or Wireless Router (WRE54G v1 Only)

mac address: the unique address that a manufacturer assigns to each networking device.

11. You should now review the settings you've chosen. If these settings are correct, click **Yes** to save these settings. If you wish to change any of the settings, click **No**. You will exit the Setup Wizard and can start it again to change your settings.
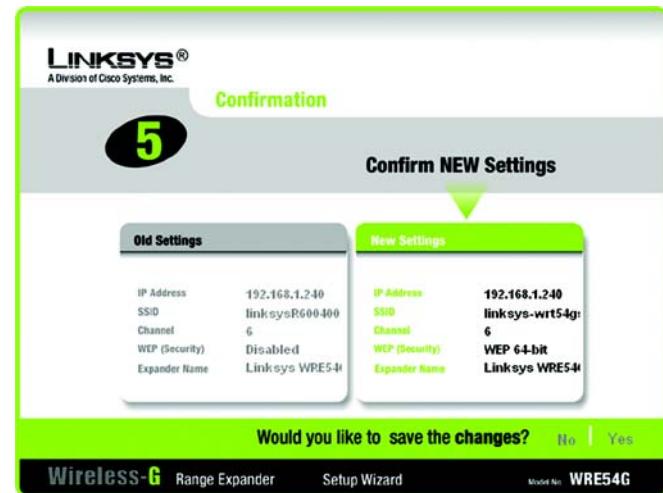
Figure 5-13: Confirmation Screen

12. The configuration performed with the Setup Wizard is complete. Click **Online Registration** to register the Range Expander, or click **Exit** to exit the Setup Wizard.

To configure another Range Expander in your network, run this Setup Wizard again.

Proceed to the next section, "Moving the Range Expander."

Figure 5-14: Congratulations Screen

Moving the Range Expander

1. If necessary, disconnect the Ethernet network cable from your network router and the Range Expander.

2. Unplug the power plate from the power outlet.

3. Locate an optimum location for the Range Expander. The best placement is usually at the edge of your wireless network.

4. Fix the direction of the antenna. Try to place it in a position that will best cover your wireless network. Normally, the higher you place the Range Expander's antenna, the better the performance will be. Proper positioning of the antenna can enhance its receiving sensitivity.

5. Connect the power plate to a power outlet, preferably a surge protector.

Congratulations! The installation of the Wireless-G Range Expander is complete.

If you want to make any advanced configuration changes, proceed to "Chapter 6: Configuring the Wireless-G Range Expander."

Figure 5-16: Using the Power Plate with Plug

Figure 5-15: Using the Power Plate with Cord

Chapter 6: Configuring the Wireless-G Range Expander

Overview

The Range Expander has been designed to be functional right out of the box, setting it up with the Auto configuration button or the Setup Wizard. However, if you'd like to change these settings, the Range Expander can be configured through your web browser and Web-based Utility. This chapter describes the Web-based Utility and its different features.

Accessing the Web-based Utility

Open your web browser and enter the IP address you entered in the Setup Wizard. (If you kept the Range Expander's default IP address or used the Auto configuration button, the default IP address is **192.168.1.240**.) Press the **Enter** key and the login screen will appear. Leave the *User Name* field blank. The first time you open the Web-based Utility, enter the default password **admin**. You can set a new password from the Password tab.

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

browser: an application program that provides a way to look at and interact with all the information on the World Wide Web.

Figure 6-1: Login Screen

The Setup Tab

Basic Setup

The first screen that appears displays the *Basic Setup* screen. This allows you to change the Range Expander's general settings. Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. If you require more information, click **Help**.

- **Firmware**. This will display the Range Expander's current firmware version. Firmware can be upgraded from the Help tab.

- **Name**. You may assign any name to the Range Expander. Unique, memorable names are helpful, especially if you are employing multiple Range Expanders on the same network. Verify this is the name you wish to use and click **Save Settings** to set it.

Wireless

The selections under this heading allow you to configure the Range Expander's connection to your wireless network.

- **IP Address**. The IP address must be unique to your network. We suggest you use the default IP address of **192.168.1.240**.

- **Subnet Mask**. The Subnet Mask must be the same as that set on your wireless network.

- **Gateway**. If you have assigned a static IP address to the access point, then enter the IP address of your network's Gateway (usually your network router) in the *Gateway* field.

- **Mode**. Select **Mixed** and both Wireless-G and Wireless-B computers will be allowed on the network, but the speed will be reduced. Select **G-Only** for maximum speed if your network only has Wireless-G products. The final selection, **B-Only**, allows only Wireless-B products on the network.

- **SSID**. The SSID is the name shared among all devices in a 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 devices in your wireless network. For added security, you should change the SSID from the default name, **linksys**, to a unique name.

- **SSID Broadcast**. This allows the SSID to be broadcast on your network. You may want to enable this function while configuring your network, but make sure that you disable it when you are finished. With this enabled, someone could easily obtain the SSID information with site survey software and gain unauthorized access to
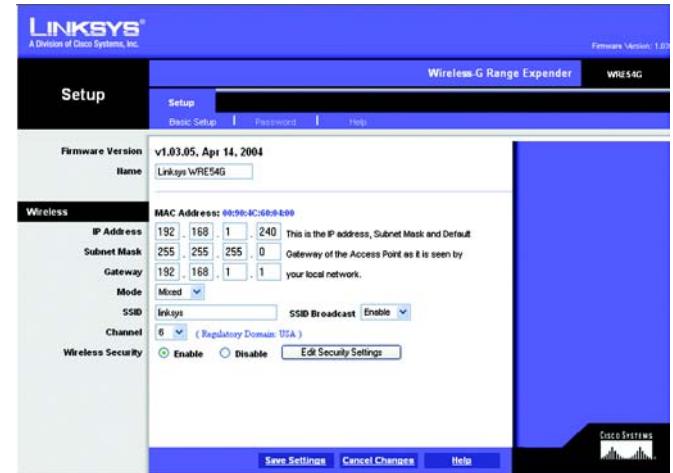
Figure 6-2: Setup Tab - Basic Setup

firmware: *the programming code that runs a networking device*

your network. Click **Enable** to broadcast the SSID to all wireless devices in range. Click **Disable** to increase network security and prevent the SSID from being seen during a site survey.

- **Channel**. Select the appropriate channel from the list provided to correspond with your network settings. All devices in your wireless network must use the same channel to function correctly.

- **Wireless Security**. To disable wireless security, select the **Disable** radio button. To enable wireless security, select the **Enable** radio button. Then to change the security settings to match your network, click the **Edit Security Settings** button. A new window will appear. Configure the appropriate WEP or WPA settings.

WPA

Security Mode. If your network uses WPA security, then select **WPA Pre-Shared Key**.

WPA Algorithm. TKIP is automatically selected.

WPA Shared Key. Enter the pre-shared key (also called passphrase) for your network. It must have between 8 to 63 characters in length.

Group Key Renewal. You can specify how often you want the dynamic encryption keys to change. Enter the number of seconds in the field provided.

Click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. If you require more information, click **Help**.

WEP

Security Mode. If your network uses WPA security, then select **WEP**.

Default Transmit Key. Select the key you want to use as the Range Expander's default WEP key.

WEP Encryption. Select the level of WEP encryption you wish to use, **64-bit 10 hex digits** or **128-bit 26 hex digits**. Higher encryption levels offer higher levels of security, but due to the complexity of the encryption, they may decrease network performance.

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 have more than 16 alphanumeric characters. (This Passphrase function is compatible with Linksys wireless products only. If you want to communicate with non-Linksys wireless products, enter the WEP key manually on the non-Linksys wireless products.) After you enter the Passphrase, click the **Generate** button to create WEP keys.

Figure 6-3: WPA Security
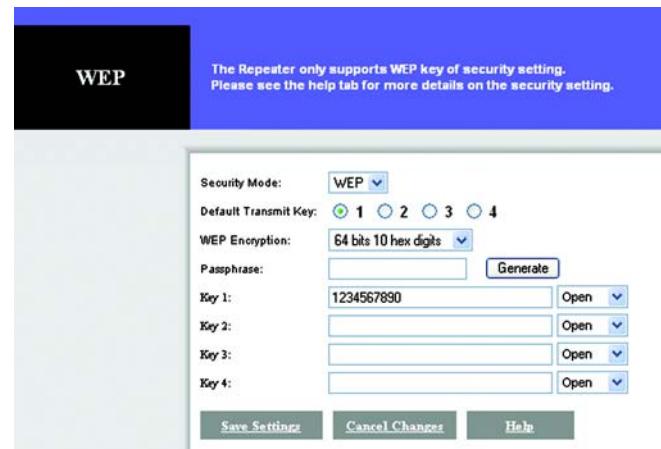
Figure 6-4: WEP Security

encryption: encoding data transmitted 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.

Keys 1-4. WEP keys enable you to create an encryption scheme for wireless transmissions. If you are not using a Passphrase, then manually enter a set of values. (Do not leave a key field blank, and do not enter all zeroes. These are not valid key values.)

If you are using 64-bit WEP encryption, then the key must be exactly 10 hexadecimal characters in length. If you are using 128-bit WEP encryption, then the key must be exactly 26 hexadecimal characters in length. Valid hexadecimal characters are "0"-"9" and "A"-"F".

For each WEP key, select the authentication method you want to use, **Open** key or **Shared** key. For Open key authentication, the sender and recipient do not share a WEP key for authentication. For Shared key authentication, both the sender and recipient share a WEP key for authentication.

Click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. If you require more information, click **Help**.

When you have finished making your changes on the *Basic Setup* screen, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes. If you require additional information, click the **Help** button.

Password

The *Password* screen allows you to change the Range Expander's password or restore factory defaults. You can also back up or restore the Range Expander's configuration file.

- **Password**. This password protects access to the Web-based Utility. Enter the new password in the *Password* field. Then enter it again in the next field to confirm it.

- **Restore Factory Defaults**. To restore the Range Expander's factory default settings, click the **Yes** radio button. Then, click the **Save Settings** button. Otherwise, keep the default, **No**.

- **Backup/Restore Setting**. To back up the configuration file of the Range Expander, click the **Backup** button. The *File Download* screen will appear. Click the **Save** button and follow the on-screen instructions to back up the file on your PC.

  To restore the back-up configuration file, click the **Restore** button and follow the on-screen instructions.

Click the **Save Settings** button to apply your changes, or click the **Cancel Changes** button to cancel your changes. If you require additional information, click the **Help** button.

Figure 6-5: Setup Tab - Password

IMPORTANT: Restoring the Range Expander's factory default settings will erase all of your Wireless and WEP settings, and replace them with the factory defaults. Do not reset the Range Expander if you want to retain these settings.

download: to receive a file transmitted over a network

Figure 6-6: File Download

Help

The Help screen offers a variety of resources. If you want help information about the Setup and Password tabs in this Web-based Utility, click the **Help** tab. You can also access the Linksys website, online User Guide for the Range Expander, or the Adobe website (to download the free Adobe Reader program). You can also upgrade the Range Expander's firmware using this screen.

The links to the help information for the Setup and Password tabs are listed on the left-hand side of the screen.

Linksys Website. Click the **Linksys Website** link to connect to the Linksys homepage for extensive help and product information. (This is available only if you have an active Internet connection.)

Online User Guide in PDF Format. For an online user guide in PDF format, click this link. If you do not have the Adobe 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).

Adobe Website. 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.)

Firmware Upgrade. The version number and date of the Range Expander's current firmware is displayed here. New firmware versions are posted at *www.linksys.com* and can be downloaded for free. If the Range Expander 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.

To upgrade the Range Expander's firmware:

1. Go to the Linksys website, *www.linksys.com* and proceed to the product page for the Range Expander.

2. Download the firmware upgrade file, and extract it on your computer.

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 extracted firmware upgrade file.

5. Click the **Upgrade** button, and follow the on-screen instructions. If you want to cancel the firmware upgrade, click the **Cancel** button. If you need more information, click the **Help** button.

Figure 6-7: Setup Tab - Help

upgrade: to replace existing software or firmware with a newer version.

Figure 6-8: Firmware Upgrade

Appendix A: Troubleshooting

This appendix consists of two parts: "Common Problems and Solutions" and "Frequently Asked Questions." This appendix provides solutions to problems that may occur during the installation and operation of the Wireless-G Range Expander. Read the description below to solve your problems. If you can't find an answer here, check the Linksys website at *www.linksys.com*.

Common Problems and Solutions

1. ***The Wireless-G Range Expander will not connect to my Wireless-G network.***
    Go through this checklist:
    *   Verify that your PC can communicate with your wireless network.
    *   Press the Range Expander's reset button (with a pin or a pen) for five seconds. This should reset the Range Expander's settings back to their defaults.
    *   Disconnect the Range Expander's power for 30 seconds. Then, connect the power again.
    *   Press the Auto configuration button on the side of the Range Expander. As long as it is within range of an access point or wireless router that has WEP encryption disabled, it should communicate with that access point or wireless router.

2. ***The Setup Wizard does not detect the Range Expander.***
    Go through this checklist:
    *   Press the Range Expander's reset button (with a pin or a pen) for five seconds. This should reset the Range Expander's settings back to their defaults.
    *   Disconnect the Range Expander's power for 30 seconds. Then, connect the power again.

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 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 is the IEEE 802.11g standard?
It is one of the IEEE standards for wireless networks. The 802.11g standard allows wireless networking hardware from different manufacturers to communicate, provided that the hardware complies with the 802.11g standard. The 802.11g standard states a maximum data transfer rate of 54Mbps 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 IEEE 802.11g features are supported?
The product supports the following IEEE 802.11g functions:
- CSMA/CA plus Acknowledge protocol
- OFDM protocol
- Multi-Channel Roaming
- Automatic Rate Selection
- RTS/CTS feature
- Fragmentation
- Power Management

What is Ad-hoc?
An Ad-hoc wireless network is a group of computers, each with a wireless adapter, connected as an independent wireless network. An Ad-hoc wireless network is applicable at a departmental scale for a branch or SOHO operation.

What is Infrastructure?
An integrated wireless and wired network is called an Infrastructure configuration. Infrastructure is applicable to enterprise scale for wireless access to a central database, or wireless application for mobile workers.

What is Roaming?

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

To achieve true seamless connectivity, the wireless network must incorporate a number of different functions. Each node, 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 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 in the network. Based on that information, the node next selects the right 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 access point or whether it should seek a new one. When a node no longer receives acknowledgment from its original access point, it undertakes a new search. Upon finding a new 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?

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

Can Linksys Wireless products support file and printer sharing?

Linksys Wireless products can work with Netware, Windows NT/2000, or other operating systems to support printer or file sharing.

What is WEP?

WEP is Wired Equivalent Privacy, a data privacy mechanism based on a 40-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 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.

How do I avoid interference?

Using multiple access points on the same channel and in close proximity to one another will generate interference. When employing multiple access points, be sure to operate each one on a different channel (frequency).

How do I reset the Range Expander?

Press the Reset button on the back of the Range Expander for about ten seconds. This will reset the unit to its default settings.

How do I resolve issues with signal loss?

There is no way to know the exact range of your wireless network without testing. Every obstacle placed between points in a network will create signal loss. Leaded glass, metal, concrete floors, water and walls will inhibit the signal and reduce range. Start with your access point and your wireless PC in the same room and move it away in small increments to determine the maximum range in your environment. You may also try using different channels, as this may eliminate interference affecting only one channel.

Appendix B: Wireless Security

Linksys wants to make wireless networking as safe and easy for you as possible. The current generation of Linksys products provide several network security features, but they require specific action on your part for implementation. So, keep the following in mind whenever you are setting up or using your wireless network.

Security Precautions

The following is a complete list of security precautions to take (as shown in this User Guide) (at least steps 1 through 5 should be followed):

1. Change the default SSID.

2. Disable SSID Broadcast.

3. Change the default password for the Administrator account.

4. Enable MAC Address Filtering.

5. Change the SSID periodically.

6. Use the highest encryption algorithm possible. Use WPA if it is available. Please note that this may reduce your network performance.

7. Change the WEP encryption keys periodically.

To ensure network security, steps one through five should be followed, at least.

Security Threats Facing Wireless Networks

Wireless networks are easy to find. Hackers know that in order to join a wireless network, wireless networking products first listen for "beacon messages". These messages can be easily decrypted and contain much of the network's information, such as the network's SSID (Service Set Identifier). Here are the steps you can take:

Change the administrator's password regularly. With every wireless networking device you use, keep in mind that network settings (SSID, WEP keys, etc.) are stored in its firmware. Your network administrator is the only person who can change network settings. If a hacker gets a hold of the administrator's password, he, too, can change those settings. So, make it harder for a hacker to get that information. Change the administrator's password regularly.

NOTE: Some of these security features are available only through the network router or access point. Refer to the router or access point's documentation for more information.

SSID. There are several things to keep in mind about the SSID:

1. Disable Broadcast

2. Make it unique

3. Change it often

Most wireless networking devices will give you the option of broadcasting the SSID. While this option may be more convenient, it allows anyone to log into your wireless network. This includes hackers. So, don't broadcast the SSID.

Wireless networking products come with a default SSID set by the factory. (The Linksys default SSID is "linksys".) Hackers know these defaults and can check these against your network. Change your SSID to something unique and not something related to your company or the networking products you use.

Change your SSID regularly so that any hackers who have gained access to your wireless network will have to start from the beginning in trying to break in.

MAC Addresses. Enable MAC Address filtering. MAC Address filtering will allow you to provide access to only those wireless nodes with certain MAC Addresses. This makes it harder for a hacker to access your network with a random MAC Address.

WEP Encryption. Wired Equivalent Privacy (WEP) is often looked upon as a cure-all for wireless security concerns. This is overstating WEP's ability. Again, this can only provide enough security to make a hacker's job more difficult.

There are several ways that WEP can be maximized:

1. Use the highest level of encryption possible

2. Use "Shared Key" authentication

3. Change your WEP key regularly

WPA. Wi-Fi Protected Access (WPA) is the newest and best available standard in Wi-Fi security. Two modes are available: Pre-Shared Key and RADIUS. Pre-Shared Key gives you a choice of two encryption methods: TKIP (Temporal Key Integrity Protocol), which utilizes a stronger encryption method and incorporates Message Integrity Code (MIC) to provide protection against hackers, and AES (Advanced Encryption System), which utilizes a symmetric 128-Bit block data encryption. RADIUS (Remote Authentication Dial-In User Service) utilizes a RADIUS server for authentication and the use of dynamic TKIP, AES, or WEP.

IMPORTANT: Always remember that each device in your wireless network MUST use the same encryption method and encryption key or your wireless network will not function properly.

WPA Pre-Shared Key. If you do not have a RADIUS server, select the type of algorithm, TKIP or AES, enter a password in the Pre-Shared key field of 8-64 characters, and enter a Group Key Renewal period time between 0 and 99,999 seconds, which instructs the Router or other device how often it should change the encryption keys.

WPA RADIUS. WPA used in coordination with a RADIUS server. (This should only be used when a RADIUS server is connected to the Router or other device.) First, select the type of WPA algorithm, **TKIP** or **AES**. Enter the RADIUS server's IP Address and port number, along with a key shared between the device and the server. Last, enter a Group Key Renewal period, which instructs the device how often it should change the encryption keys.

RADIUS. WEP used in coordination with a RADIUS server. (This should only be used when a RADIUS server is connected to the Router or other device.) First, enter the RADIUS server's IP Address and port number, along with a key shared between the device and the server. Then, select a WEP key and a level of WEP encryption, and either generate a WEP key through the Passphrase or enter the WEP key manually.

Implementing encryption may have a negative impact on your network's performance, but if you are transmitting sensitive data over your network, encryption should be used.

These security recommendations should help keep your mind at ease while you are enjoying the most flexible and convenient technology Linksys has to offer.

Appendix C: Upgrading Firmware

The Range Expander's firmware is upgraded through the Web-Utility's Help tab. Follow these instructions:

1. Go to the Linksys website, *www.linksys.com* and proceed to the product page for the Range Expander.

2. Download the firmware upgrade file, and extract it on your computer.

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 extracted firmware upgrade file.

5. Click the **Upgrade** button, and follow the on-screen instructions. If you want to cancel the firmware upgrade, click the **Cancel** button. If you need more information, click the **Help** button.

Figure C-1: Upgrade Firmware

Appendix D: Windows Help

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

TCP/IP

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

Shared Resources

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

Network Neighborhood/My Network Places

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

Appendix E: Glossary

802.11b - A wireless networking standard that specifies a maximum data transfer rate of 11Mbps and an operating frequency of 2.4GHz.

802.11g - A wireless networking standard that specifies a maximum data transfer rate of 54Mbps, an operating frequency of 2.4GHz, and backward compatibility with 802.11b devices.

Access Point - A device that allows wireless-equipped computers and other devices to communicate with a wired network. Also used to expand the range of a wireless network.

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

Ad-hoc - A group of wireless devices communicating directly with each other (peer-to-peer) without the use of an access point.

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

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

Bandwidth - The transmission capacity of a given device or network.

Bit - A binary digit.

Bridge - A device that connects different networks.

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

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

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

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

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

Download - To receive a file transmitted over a network.

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

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

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

Encryption - Encoding data transmitted in a network.

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

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

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

Firmware - The programming code that runs a networking device.

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

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

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

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

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

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

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

ISM band - Radio bandwidth utilized in wireless transmissions.

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

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

MAC (Media Access Control) Address - The unique address that a manufacturer assigns to each networking device.

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

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

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

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

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

Packet - A unit of data sent over a network.

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

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

RADIUS (Remote Authentication Dial-In User Service) - A protocol that uses an authentication server to control network access.

RJ-45 (Registered Jack-45) - An Ethernet connector that holds up to eight wires.

Roaming - The ability to take a wireless device from one access point's range to another without losing the connection.

Router - A networking device that connects multiple networks together.

RTS (Request To Send) - A networking method of coordinating large packets through the RTS Threshold setting.

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

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

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

Spread Spectrum - Wideband radio frequency technique used for more reliable and secure data transmission.

SSID (**S**ervice **S**et **ID**entifier) - Your wireless network's name.

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

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

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

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

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

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

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

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

Topology - The physical layout of a network.

TX Rate - Transmission Rate.

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

Upload - To transmit a file over a network.

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

WEP (**W**ired **E**quivalent **P**rivacy) - A method of encrypting network data transmitted on a wireless network for greater security.

WLAN (**W**ireless **L**ocal **A**rea **N**etwork) - A group of computers and associated devices that communicate with each other wirelessly.

WPA (**W**i-Fi **P**rotected **A**ccess) - a wireless security protocol using TKIP (Temporal Key Integrity Protocol) encryption, which can be used in conjunction with a RADIUS server.

Appendix F: Specifications

Standards	IEEE 802.11g, IEEE 802.11b
Port	Ethernet
Buttons	Auto configuration/Mode, Reset
LEDs	Blue/Red-LINK, Blue-ACTIVITY
Transmit Power	802.11g: Typ. 13±1 1dBm @ Normal Temp Range
	802.11b: Typ: 15±1 1dBm @ Normal Temp Range
Security features	WEP
WEP key bits	64/128
Dimensions (W x H x D)	3.18" x 8.27" x 1.77" (80.7 mm x 210 mm x 45 mm)
Power	Input: 115-230V AC 0.2A, Output: 3.3V DC 1.5A
Certification	FCC, CE, UL
Operating Temp.	0ºC to 40ºC (32ºF to 150ºF)
Storage Temp.	0ºC to 70ºC (-40ºF to 185ºF)
Operating Humidity	10% to 85%, Non-Condensing
Storage Humidity	5% to 90% Non-Condensing

Appendix G: Warranty Information

LIMITED WARRANTY

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

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

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

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

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

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

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Appendix H: Regulatory Information

FCC STATEMENT

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

Reorient or relocate the receiving antenna

Increase the separation between the equipment or devices

Connect the equipment to an outlet other than the receiver's

Consult a dealer or an experienced radio/TV technician for assistance

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

INDUSTRY CANADA (CANADA)

This Class B digital apparatus complies with Canadian ICES-003, RSS210.
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 declares that this product conforms to the specifications listed below, following the provisions of the European R&TTE directive 1999/5/EC:

EN 301 489-1, 301 489-17 General EMC requirements for Radio equipment.

EN 609 50 Safety

EN 300-328-1, EN 300-328-2 Technical requirements for Radio equipment.

Caution: 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. Contact local Authority for procedure to follow.

Note: Combinations of power levels and antennas resulting in a radiated power level of above 100 mW equivalent isotropic radiated power (EIRP) 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.

For more details on legal combinations of power levels and antennas, contact Linksys Corporate Compliance.

Linksys vakuuttaa täten että dieses produkt tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien näiden direktiivien muiden ehtojen mukainen.

Linksys déclare que le produit est conforme aux conditions essentielles et aux dispositions relatives à la directive 1999/5/EC.

Belgique:

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:

2.4 GHz Bande : les canaux 10, 11, 12, 13 (2457, 2462, 2467, et 2472 MHz respectivement) sont complétement libres d'utilisation en France (en utilisation intérieur). Pour ce qui est des autres canaux, ils peuvent être soumis à autorisation selon le départment. L'utilisation en extérieur est soumis à autorisation préalable et très restreint.

Vous pouvez contacter l'Autorité de Régulation des Télécommunications (http://www.art-telecom.fr) pour de plus amples renseignements.

SAFETY NOTICES

Caution: To reduce the risk of fire, use only No.26 AWG or larger telecommunication line cord.

Do not use this product near water, for example, in a wet basement or near a swimming pool.

Avoid using this product during an electrical storm. There may be a remote risk of electric shock from lightning.

Appendix I: Contact Information

Need to contact Linksys?
Visit us online for information on the latest products and updates
to your existing products at: http://www.linksys.com or
                                                                           ftp.linksys.com

Can't find information about a product you want to buy
on the web? Do you want to know more about networking
with Linksys products? Give our advice line a call at: 800-546-5797 (LINKSYS)
Or fax your request in to: 949-823-3002

If you experience problems with any Linksys product,
you can call us at: 800-326-7114
Don't wish to call? You can e-mail us at: support@linksys.com

If any Linksys product proves defective during its warranty period,
you can call the Linksys Return Merchandise Authorization
department for obtaining a Return Authorization Number at: 949-823-3000
(Details on Warranty and RMA issues can be found in the Warranty
Information section in this Guide.)