

LINKSYS®

A Division of Cisco Systems, Inc.



2.4GHz
802.11g

Wireless-G Notebook Adapter

User Guide

WIRELESS

Model No. **WPC54G**

CISCO SYSTEMS



Copyright and Trademarks

Specifications are subject to change without notice. Linksys is a registered trademark or trademark of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries. Copyright © 2004 Cisco Systems, Inc. All rights reserved. Other brands and product names are trademarks or registered trademarks of their respective holders.

This User Guide

The User Guide to the Wireless-G Notebook Adapter has been designed to make understanding networking 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 Adapter.



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



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

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 in the "Table of Contents".

Table of Contents

Chapter 1: Introduction	1
Welcome	1
What's in this Guide?	2
Chapter 2: Planning your Wireless Network	4
Network Topology	4
Roaming	4
Network Layout	5
Chapter 3: Getting to Know the Wireless-G Notebook Adapter	6
The LED Indicators	6
Chapter 4: Software Installation and Configuration	7
The Installation Procedure	8
Chapter 5: Hardware Installation	12
Connecting the Adapter	12
Chapter 6: Using the Wireless Network Monitor	13
Accessing the Wireless Network Monitor	13
Link Information	13
Site Survey	16
Profiles	17
Creating a New Profile	18
Appendix A: Troubleshooting	28
Common Problems and Solutions	28
Frequently Asked Questions	29
Appendix B: Wireless Security	32
Security Precautions	32
Security Threats Facing Wireless Networks	32
Appendix C: Windows Help	35
Appendix D: Glossary	36
Appendix E: Specifications	40
Appendix F: Warranty Information	41
Appendix G: Regulatory Information	42
Appendix H: Contact Information	45

List of Figures

Figure 3-1: Front Panel	6
Figure 4-1: The Setup Wizard's Welcome Screen	7
Figure 4-2: The Setup Wizard's License Agreement	8
Figure 4-3: The Setup Wizard's Wireless Mode Screen	8
Figure 4-4: The Setup Wizard's Ad-Hoc Mode Screen	9
Figure 4-5: The Setup Wizard's WEP Screen	9
Figure 4-6: The Setup Wizard's WPA-PSK Screen	10
Figure 4-7: The Setup Wizard's Check Settings Screen	10
Figure 4-8: The Setup Wizard's Congratulations Screen	11
Figure 5-1: Installing the Adapter into your notebook	12
Figure 6-1: Link Information	13
Figure 6-2: Wireless Network Status	14
Figure 6-3: Wireless Network Statistics	15
Figure 6-4: Site Survey	16
Figure 6-5: Profiles	17
Figure 6-6: Importing a Profile	17
Figure 6-7: Exporting a Profile	17
Figure 6-8: Creating a New Profile	18
Figure 6-9: Enter Profile Name	18
Figure 6-10: Wireless Mode for New Profile	19
Figure 6-11: Ad-Hoc Mode Settings	19
Figure 6-12: Network Settings	20
Figure 6-13: Wireless Security for New Profile	21
Figure 6-14: WEP Setting for New Profile	21
Figure 6-15: WPA-PSK Settings	22
Figure 6-16: TKIP Settings	22
Figure 6-17: WPA RADIUS Settings	23
Figure 6-18: Encryption Type	23
Figure 6-19: EAP-TLS Authentication	24
Figure 6-20: EAP-TTLS Authentication	24

Figure 6-21: EAP-MD5 Authentication	24
Figure 6-22: EAP-PEAP Authentication	24
Figure 6-23: EAP-LEAP Authentication	24
Figure 6-24: RADIUS Settings	25
Figure 6-25: EAP-TLS Authentication	25
Figure 6-26: EAP-TTLS Authentication	25
Figure 6-27: EAP-MD5 Authentication	26
Figure 6-28: EAP-PEAP Authentication	26
Figure 6-29: LEAP Authentication	26
Figure 6-30: Confirm New Settings	27
Figure 6-31: The Congratulations Screen	27

Chapter 1: Introduction

Welcome

Thank you for choosing the Wireless-G Notebook Adapter. With this Adapter, your wireless networking experience will be faster and easier than ever.

Like all wireless products, the Adapter allows for greater range and mobility within your wireless network. This adapter communicates over the 54Mbps 802.11g wireless standard, which is almost five times faster than 802.11b. But since they share the same 2.4GHz radio band, the Adapter can also communicate with the widely used 11Mbps 802.11b standard.

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. For more information about wireless networks, refer to Chapter 2: Planning Your Wireless Network.

The included Setup Wizard will walk you through configuring the adapter to your network's settings, step by step. Then just slide it into your computer's PC Card slot and enjoy your wireless network. Future changes to your network settings can be made with the Wireless Network Monitor, explained in Chapter 6.

Further information about the Adapter's functions can be found in Appendix A: Troubleshooting. If you're concerned about wireless security, Appendix B shows you how to keep your network secure. Further appendices provide more information about the Adapter and networking in general to help you get the most out of the Wireless-G Notebook Adapter.

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

802.11g a wireless networking standard that specifies a maximum data transfer rate of 54Mbps and an operating frequency of 2.4GHz.

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

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

What's in this Guide?

This user guide covers the steps for setting up and using the Wireless-G Notebook Adapter.

- **Chapter 1: Introduction**
This chapter describes the Adapter'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 Notebook Adapter**
This chapter describes the physical features of the Adapter.
- **Chapter 4: Software Installation and Configuration**
This chapter instructs you on how to install the Adapter's Setup Wizard and Configure the Adapter
- **Chapter 5: Hardware Installation**
This chapter shows you how to connect the Adapter to your PC.
- **Chapter 6: Using the Wireless Network Monitor**
This chapter show you how to use the Adapter's Wireless Network Monitor.
- **Appendix A: Troubleshooting**
This appendix describes some problems and solutions, as well as frequently asked questions, regarding installation and use of the Adapter.
- **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 Adapter's technical specifications.
- **Appendix F: Warranty Information**
This appendix supplies the Adapter's warranty information.

Wireless-G Notebook Adapter

- **Appendix G: Regulatory Information**
This appendix supplies the Adapter'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.

Before enabling 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.

topology: the physical layout of a network.

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

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.

router: a networking device that connects multiple networks together.

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 access points and wireless routers have been designed for use with 802.11a, 802.11b, and 802.11g products. With 802.11g products communicating with the 802.11b standard and some products incorporating both “a” and “g”, products using these standards can communicate with each other.

Access points and wireless routers are compatible with 802.11a, 802.11b and 802.11g adapters, such as the PC Cards for your laptop computers, PCI Card for your desktop PC, 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.

802.11a: a wireless networking standard that specifies a maximum data transfer rate of 54Mbps and an operating frequency of 5GHz.

switch: a data switch that connects computing devices to host computers, allowing a large number of devices to share a limited number of ports

Chapter 3: Getting to Know the Wireless-G Notebook Adapter

The LED Indicators

The Network Adapter's LEDs display information about network activity.

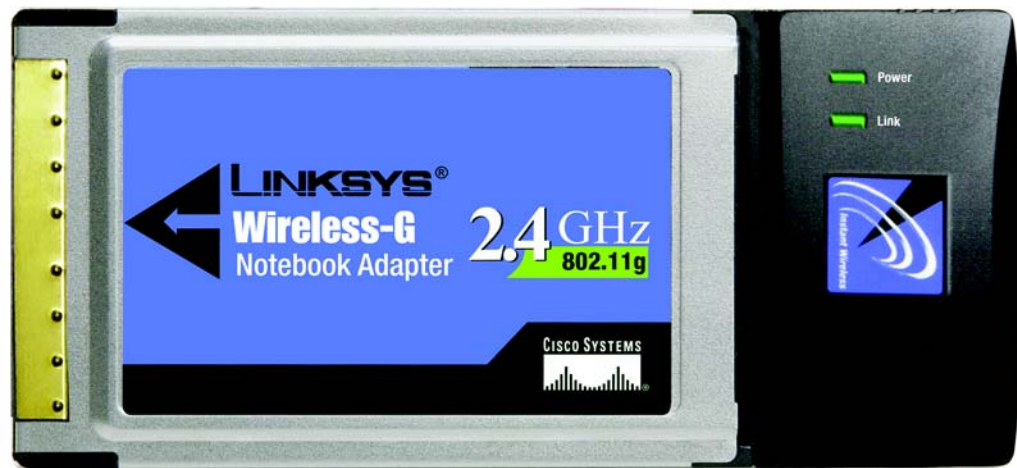


Figure 3-1: Front Panel

Power *Green.* The Power LED lights up when the Adapter is powered on.

Link *Green.* The Link LED lights up when the Adapter has an active connection.

Chapter 4: Software Installation and Configuration

The Wireless-G Notebook Adapter Setup Wizard will guide you through the installation procedure. The Setup Wizard will install the Wireless Network Monitor and driver, as well as configure the Adapter.



NOTE: You must run the Setup Wizard to install the software before installing the hardware.

Insert the **Setup Wizard CD-ROM** into your 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).

On the Welcome screen, you have the following choices:

Install - Click the **Install** button to begin the software installation process.

User Guide - Click the **User Guide** button to open the PDF file of this User Guide.

Exit - Click the **Exit** button to exit the Setup Wizard.

software: instructions for the computer

hardware: the physical aspect of computers, telecommunications, and other information technology devices



Figure 4-1: The Setup Wizard's Welcome Screen

The Installation Procedure

1. To install the Adapter, click the **Install** button on the *Welcome* screen.
2. After reading the License Agreement, click the **Next** button if you agree, or click the **Cancel** button to end the installation.



Figure 4-2: The Setup Wizard's License Agreement

3. The Setup Wizard will ask you to choose a network mode. Click the **Infrastructure Mode** radio button if you want your wireless computers to network with computers on your wired network using an access point or wireless router. Click the **Ad-Hoc Mode** radio button if you want multiple wireless computers to network directly with each other.

In the SSID field, enter your wireless network's **SSID**. The SSID must be identical for all devices in the network. The default setting is **linksys** (all lowercase). Click the **Next** button.



NOTE: Network SSIDs should be unique to your network and identical for all devices within the network.

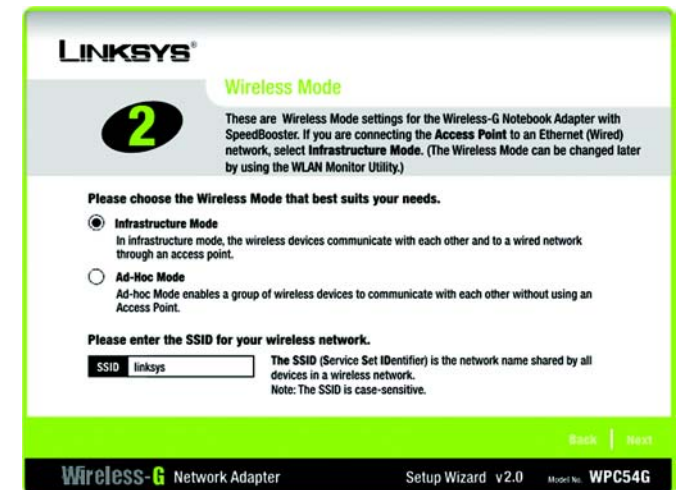


Figure 4-3: The Setup Wizard's Wireless Mode Screen

- If you chose **Infrastructure Mode**, go to Step 5 now. If you chose **Ad-Hoc Mode**, select the correct operating channel for your network. Then, select the Network Mode from the drop-down menu. Click the **Next** button, and go to Step 5. Click the **Back** button to change any settings.

Channel - The channel you choose should match the channel set on the other devices in your wireless network. If you are unsure about which channel to use, select the default channel (Channel 6).

Network Mode - Select the type of network you have, mixed (Wireless-G and Wireless-B) or G-Only (only Wireless-G). If you select Mixed Mode, both Wireless-G and Wireless-B computers will be allowed on the network, which may reduce your speed. Select G-Only Mode for maximum speed, but no Wireless-B users will be allowed on the network.

- Select the type of security you want to use: **64-bit WEP**, **128-bit WEP**, or **WPA-PSK**. All devices in a network must use the same type.

WEP

Security - To use WEP encryption, select 64-bits or 128-bit characters from the drop-down menu, and enter a passphrase or WEP key.

Passphrase - Instead of manually entering a WEP key, you can enter a passphrase in the Passphrase field, so a WEP key is automatically generated. It is case-sensitive and should not be longer than 16 alphanumeric characters. This passphrase must match the passphrase of your other wireless network devices and is compatible with Linksys wireless products only. (If you have any non-Linksys wireless products, enter the WEP key manually on those products.)

WEP Key - The WEP key you enter must match the WEP key of your wireless network. If you are using 64-bit WEP encryption, then the key must consist of exactly 10 hexadecimal characters. If you are using 128-bit WEP encryption, then the key must consist of exactly 26 hexadecimal characters. Valid hexadecimal characters are "0" to "9" and "A" to "F".

Transmit Key - The default transmit key number is 1. If your network's access point or wireless router uses transmit key number 2, 3, or 4, select the appropriate number from the *Transmit Key* drop-down box.

Authentication -The default is set to **Auto**, where it auto-detects for **Shared Key** or **Open** system. Shared Key is when both the sender and the recipient share a WEP key for authentication. Open key is when the sender and the recipient do not share a WEP key for authentication. All points on your network must use the same authentication type.

Click the **Next** button to continue.s. Click the **Back** button to return to the previous screen. Click the **Help** button for more information.

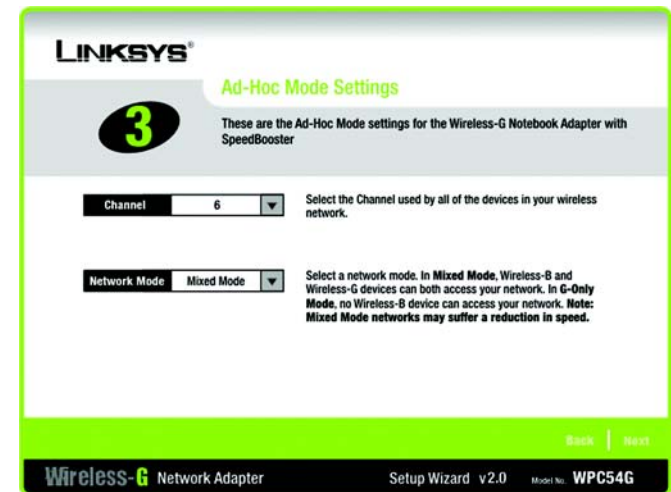


Figure 4-4: The Setup Wizard's Ad-Hoc Mode Screen

bit: a binary digit

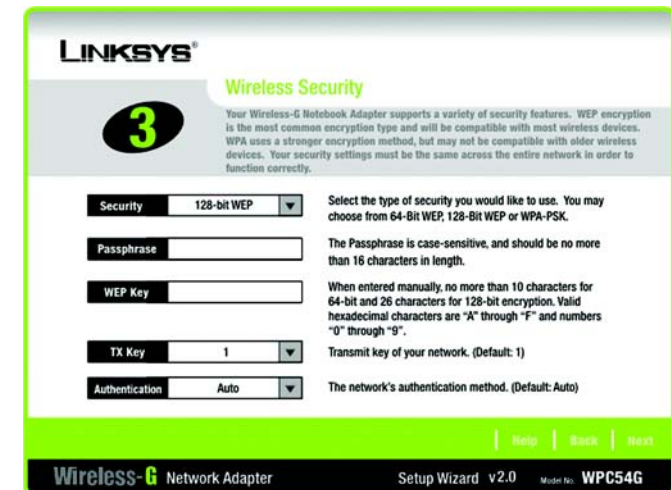


Figure 4-5: The Setup Wizard's WEP Screen

WPA-PSK

WPA-PSK offers the TKIP encryption method with dynamic encryption keys.

Select the type of algorithm, **TKIP**, from the *Security* drop-down menu. Enter a WPA Shared Key of 8-63 characters in the *Passphrase* field.

Click the **Next** button to continue. Click the **Back** button to return to the previous screen. Click the **Help** button for more information.

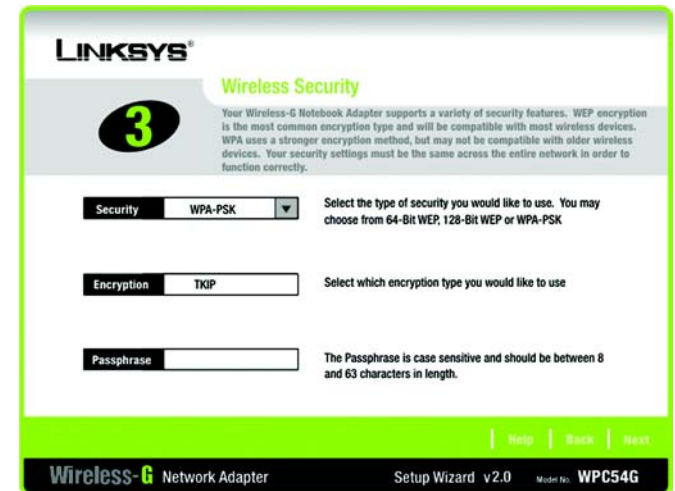


Figure 4-6: The Setup Wizard's WPA-PSK Screen

6. The Setup Wizard will ask you to review and finalize your settings before it starts to install files. Click **Next** if you are satisfied with your settings, or click **Back** to change any settings.

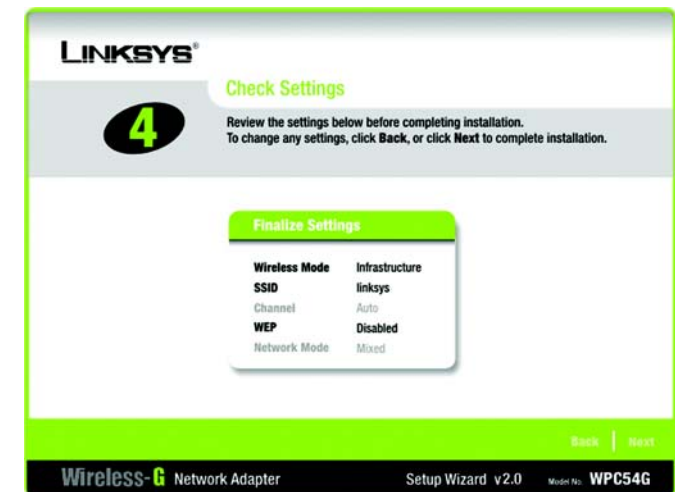


Figure 4-7: The Setup Wizard's Check Settings Screen

Wireless-G Notebook Adapter

7. After the software has been successfully installed, the *Congratulations* screen will appear. Click the **Exit** button.

Proceed to “Chapter 5: Hardware Installation.”



Figure 4-8: The Setup Wizard's Congratulations Screen

Chapter 5: Hardware Installation



NOTE: You must run the Setup Wizard to install the software before installing the hardware.

Connecting the Adapter

1. Turn off your notebook PC.
2. Locate an available CardBus slot on your notebook PC.
3. With the connector pin end facing the CardBus slot and the label facing up, slide the Adapter into the CardBus slot until it locks in place.
4. Restart your notebook PC. The Power LED should light up when the Adapter is installed correctly.
5. Windows will begin copying the driver files to your computer. If Windows asks you for the original Windows CD-ROM, insert the CD-ROM, and direct Windows to its correct location (e.g., D:\).

The installation of the Wireless-G Notebook Adapter is complete.

If you want to check the link information, search for available wireless networks, or make additional configuration changes, go to “Chapter 6: Using the Wireless Network Monitor.”



Figure 5-1: Installing the Adapter into your notebook

Chapter 6: Using the Wireless Network Monitor

Use the Wireless Network Monitor to check the status of your wireless connection, search for available wireless networks, or create profiles that hold different configuration settings.

Accessing the Wireless Network Monitor

After installing the Adapter, the Adapter's Wireless Network Monitor icon will appear in your System tray. Double-click the icon and the *Link Information* screen will appear. From this screen, you can view the strength of the Adapter's signal is and the quality of its connection. You can also click the **More Information** button to view additional status information about the current wireless connection. To search for available wireless networks, click the **Site Survey** tab. To create new profiles for different network configurations, click the **Profiles** tab.

Link Information

The *Link Information* screen displays network mode, signal strength, and link quality information about the current connection. It also provides a button to click for additional information.

Ad-Hoc Mode or Infrastructure Mode - The screen indicates whether the Adapter is currently working in Ad-Hoc or Infrastructure mode.

Signal Strength - This bar indicates strength of the signal transmitted by the Adapter.

Link Quality - The Link Quality bar indicates the quality of the wireless network connection.

Click the **More Information** button to view additional information about the wireless network connection.



Figure 6-1: Link Information

Clicking the **More Information** button displays more information about the Adapter's connection, as shown below:

Wireless Network Status

The Networks Settings screen provides information on your current network settings.

Status - This shows the status, connected or not, of the wireless network connection.

SSID - This is the wireless network's name.

Wireless Mode - The current networking mode, Ad-Hoc or Infrastructure, is displayed here.

Transmit Rate - The rate at which data is transmitted by the Adapter is shown here.

Channel - This shows the channel to which the wireless network devices are set.

Encryption- This shows if encryption has been enabled.

Authentication - This is your wireless network's authentication method.

IP Address - This is the Adapter's IP Address.

Subnet Mask - This is the Adapter's Subnet Mask.

Default Gateway - This shows the address of the Adapter's Default Gateway.

DNS - This is the DNS address for the Adapter.

DHCP Client- This displays the status of the network's DHCP client.

MAC - The MAC address of the wireless network's access point or wireless router.

Signal Strength - This bar indicates strength of the signal transmitted by the Adapter.

Link Quality - The Link Quality bar indicates the quality of the wireless network connection.

Click the **Statistics** button to go to the *Network Statistics* screen. Click the **Back** button to return to the initial *Link Information* screen. Click the **Save to Profile** button to save the currently active connection to a profile.



Figure 6-2: Wireless Network Status

encryption: encoding data transmitted in a network

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

default gateway: a device that forwards Internet traffic from your local area network.

dns: the IP address of your ISP's server, which translates the names of websites into IP addresses.

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

Wireless Network Statistics

The Wireless Networks Statistics screen provides statistics on your current network settings.

Transmit Rate - This is the data transfer rate of the current wireless connection.

Receive Rate - This shows how fast data is received.

Packets Received - This shows the packets received by the Adapter, in real time, since connecting to the wireless network or since the *Refresh* button was last pressed.

Packets Transmitted - This shows the packets transmitted from the Adapter, in real time, since connecting to the wireless network or since the *Refresh* button was last pressed.

Bytes Received - This shows the bytes received by the Adapter, in real time, since connecting to the wireless network or since the *Refresh* button was last pressed.

Bytes Transmitted - This shows the bytes transmitted from the Adapter, in real time, since connecting to the wireless network or since the *Refresh* button was last pressed.

Noise Level - This shows the level of background noise affecting the wireless signal. A lower reading translates into a higher quality signal.

Signal Strength - This is the intensity of the wireless signal received by the card.

Driver Version - This shows the version of the Adapter's driver.

Signal Strength - This bar indicates strength of the signal transmitted by the Adapter.

Link Quality - The Link Quality bar indicates the quality of the wireless network connection.

Click the **Back** button to return to the initial *Link Information* screen. Click the **Status** button to go to the *Network Status* screen. Click the **Save to Profile** button to save the currently active connection to a profile. Click the **Refresh Stats** button to refresh the screen.

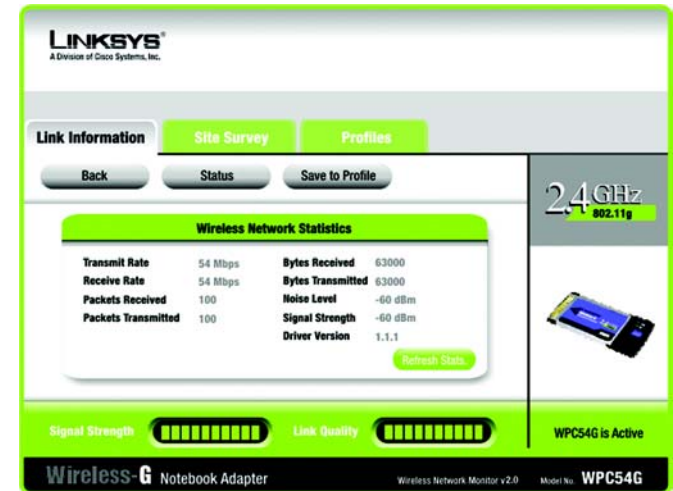


Figure 6-3: Wireless Network Statistics

byte: a unit of data that is usually eight bits long

Site Survey

The *Site Survey* screen displays a list of infrastructure and ad-hoc networks available for connection in the table on the right. This table shows the network's SSID, Channel, and the quality of the wireless signal the Adapter is receiving. You may click **SSID**, **CH (Channel)**, or **Signal**, to sort by that field.

SSID - The SSID or unique name of the wireless network.

CH - The channel upon which the network broadcasts.

Signal - The percentage of signal strength, from 0 to 100%.

Site Information

For each network selected, the following settings are listed:

SSID - The wireless network's name.

Wireless Mode - The mode of the wireless network currently in use.

Channel - The channel to which the wireless network devices are set.

Encryption - The status of the encryption security feature.

MAC - The MAC address of the wireless network's access point.

Refresh - Click the Refresh button to perform a new search for wireless devices.

Connect - To connect to one of the networks on the list, select the wireless network, and click the **Connect** button.

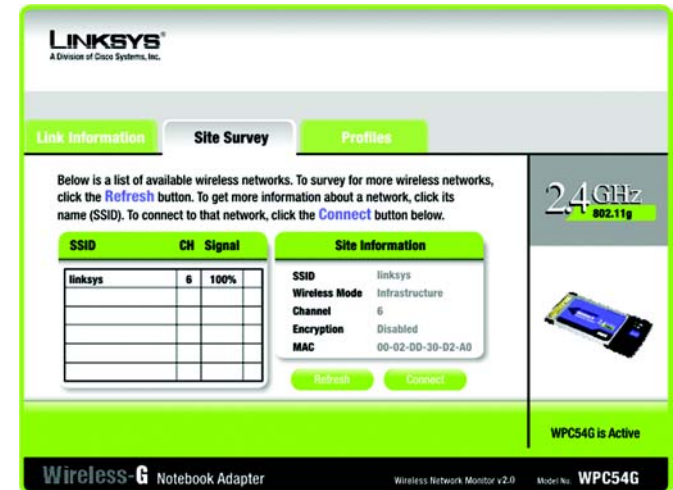


Figure 6-4: Site Survey

Profiles

The *Profiles* screen lets you save different configuration profiles for different network setups. The table on the right displays a list of infrastructure and ad-hoc networks available for connection. This table shows the network's profile name and the wireless network's SSID, as set in the connection profile.

Profile Information

For each profile selected, the following are listed:

Wireless Mode - The mode of the wireless network currently in use.

Transfer Rate - The Adapter is set to Auto mode, so it will dynamically shift to the fastest data transfer rate possible at any given time.

Channel - The channel to which the wireless network devices are set.

Encryption- The status of the encryption security feature.

Authentication - The authentication setting for the network.

Connect - To connect to a wireless network using a specific profile, select the profile, and click the **Connect** button.

New - Click **New** to create a new profile. See the next section, "Creating a New Profile," for detailed instructions.

Edit - Select a profile, and click **Edit** to change an existing profile.

Import - Click **Import** to import a profile that has been saved in another location. Select the appropriate file, and click the **Open** button.

Export - Select the profile you want to save in a different location, and click **Export**. Direct Windows to the appropriate folder, and click the **OK** button.

Delete - Click **Delete** to delete a profile.



NOTE: If you want to export more than one profile, you have to export them one at a time.

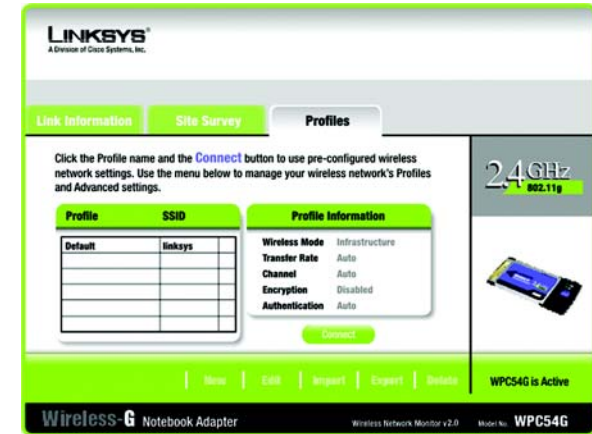


Figure 6-5: Profiles

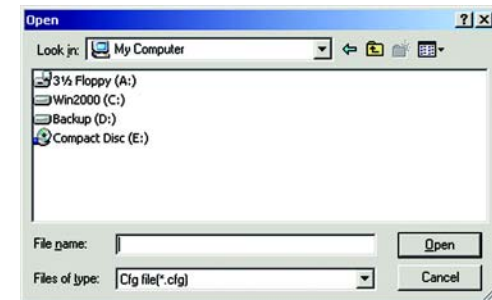


Figure 6-6: Importing a Profile

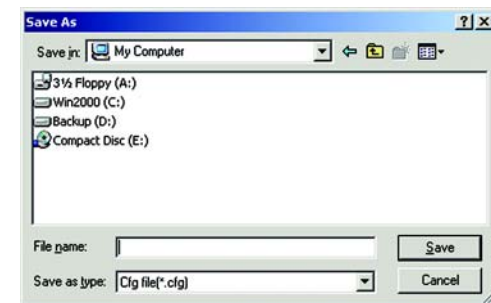


Figure 6-7: Exporting a Profile

Creating a New Profile

1. On the *Profiles* screen, click **New** to create a new profile.

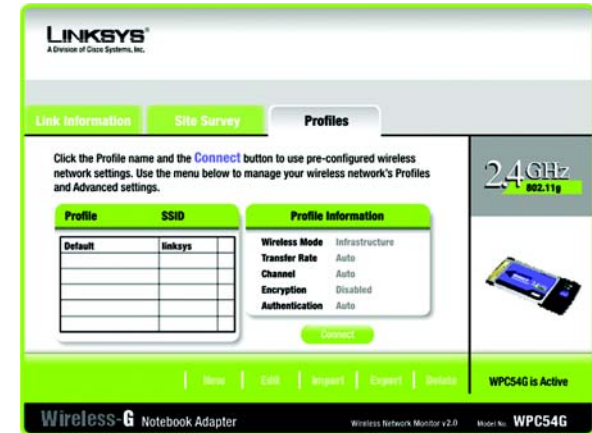


Figure 6-8: Creating a New Profile

2. Enter a name for the new profile, and click the **OK** button. Click the **Cancel** button to return to the Profiles screen without entering a name.



Figure 6-9: Enter Profile Name

- The *Wireless Mode* screen shows a choice of two wireless modes. Click the **Infrastructure Mode** radio button if you want your wireless computers to communicate with computers on your wired network via a wireless access point. Click the **Ad-Hoc Mode** radio button if you want multiple wireless computers to communicate directly with each other. Enter the SSID for your network.

Click **Next** to continue or **Back** to return to the previous screen.

Infrastructure Mode - This mode allows wireless and wired networks to communicate through an access point.

Ad-Hoc Mode - This mode allows wireless-equipped computers to communicate directly with each other. No access point is used.

SSID - The network name. It must be used for all the devices in your wireless network. It is case sensitive. It should be a unique name to help prevent others from entering your network.

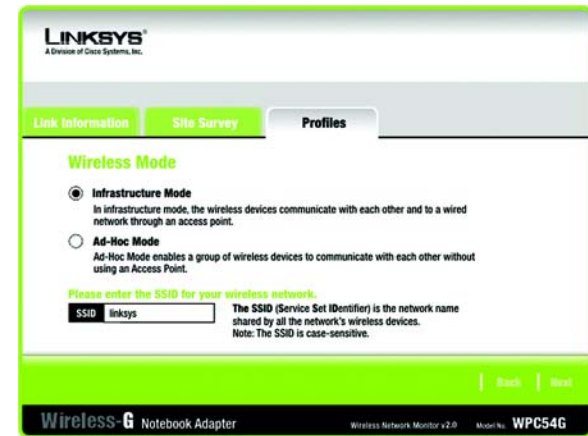


Figure 6-10: Wireless Mode for New Profile

- The *Ad-Hoc Mode Settings* screen will appear. If you chose Infrastructure Mode, go to Step 5 now. If you chose Ad-Hoc Mode, select the correct operating channel for your network from the Channel drop-down menu. Then, select the Network Mode from the drop-down menu. Click **Next** to go to Step 5 or **Back** to change any settings.

Channel - The channel you choose should match the channel set on the other devices in your wireless network. If you are unsure about which channel to use, select the default channel (Channel 6).

Network Mode - Select Mixed Mode, and both Wireless-G and Wireless-B computers will be allowed on the network, but the speed may be reduced. Select G-Only Mode for maximum speed, but no Wireless-B users will be allowed on the network. Select B-Only Mode for Wireless-B users only.

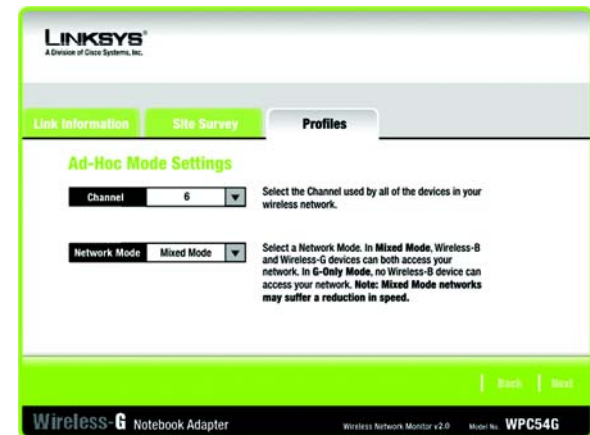


Figure 6-11: Ad-Hoc Mode Settings

- The *Network Settings* screen will appear next. If your network has a DHCP server, click the radio button next to **Obtain an IP address automatically (DHCP)**.

If your network does not have a DHCP server, click the radio button next to **Specify the IP Setting**. Enter an IP Address, Subnet Mask, Default Gateway, and DNS appropriate for your network. You must specify the IP Address and Subnet Mask on this screen. If you are unsure about the Default Gateway and DNS address, leave these fields empty.

IP Address - This IP Address must be unique to your network.

Subnet Mask - The Adapter's Subnet Mask must be the same as your wired network's Subnet Mask.

Default Gateway - Enter the IP address of your network's Gateway here.

DNS 1 & 2 - Enter the DNS address of any (wired) Ethernet network here

Click **Next** to continue, or **Cancel** to return to the *Profiles* screen.

The screenshot shows the 'Network Settings' page in the Linksys Wireless Network Monitor. At the top, there are three tabs: 'Link Information', 'Site Survey', and 'Profiles'. The 'Profiles' tab is active. The main content area is titled 'Network Settings' and contains two radio button options. The first option, 'Obtain an network settings automatically (DHCP)', is selected. Below it is the text 'Select this option to have your network settings assigned automatically.' The second option, 'Specify network settings', is unselected. Below it is the text 'Select this option to specify the network settings for your network.' Underneath the second option are five input fields: 'IP Address', 'Subnet Mask', 'Default Gateway', 'DNS 1', and 'DNS 2'. At the bottom right of the main content area are 'Cancel' and 'Next' buttons. The footer of the screen displays 'Wireless-G Notebook Adapter', 'Wireless Network Monitor v2.0', and 'Model No. WPC54G'.

Figure 6-12: Network Settings

DHCP: a networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time, instead of assigning permanent IP addresses

ethernet: a standard network protocol that specifies how data is placed on and retrieved from a common transmission medium

- The *Wireless Security* screen will appear. Select WEP, WPA-PSK, WPA Radius, or Radius for the Encryption Method. WEP stands for Wired Equivalent Privacy, WPA-PSK stands for Wi-Fi Protected Access Pre-Shared Key, which is a security standard stronger than WEP encryption, and RADIUS stands for Remote Authentication Dial-In User Service. If you don't want to use encryption, select **Disabled**. Then, click **Next** to continue or **Back** to return to the previous screen.

WEP

Security - To use WEP encryption, select 64-bits or 128-bit characters from the drop-down menu, and enter a passphrase or key.

Passphrase - Instead of manually entering a WEP key, you can enter a passphrase in the Passphrase field, so a WEP key is automatically generated. It is case-sensitive and should not be longer than 16 alphanumeric characters. This passphrase must match the passphrase of your other wireless network devices and is compatible with Linksys wireless products only. (If you have any non-Linksys wireless products, enter the WEP key manually on those products.)

Transmit Key - The default transmit key number is 1. If your network's access point or wireless router uses transmit key number 2, 3, or 4, select the appropriate number from the *Transmit Key* drop-down box.

Key 1 - The WEP key you enter must match the WEP key of your wireless network. If you are using 64-bit WEP encryption, then the key must consist of exactly 10 hexadecimal characters. If you are using 128-bit WEP encryption, then the key must consist of exactly 26 hexadecimal characters. Valid hexadecimal characters are "0" to "9" and "A" to "F".

Authentication -The default is set to **Auto**, where it auto-detects for **Shared Key** or **Open** system. Shared Key is when both the sender and the recipient share a WEP key for authentication. Open key is when the sender and the recipient do not share a WEP key for authentication. All points on your network must use the same authentication type.

Click **Help** for more information about this screen and these settings. Click **Next** to continue, or **Cancel** to return to the *Profiles* screen.

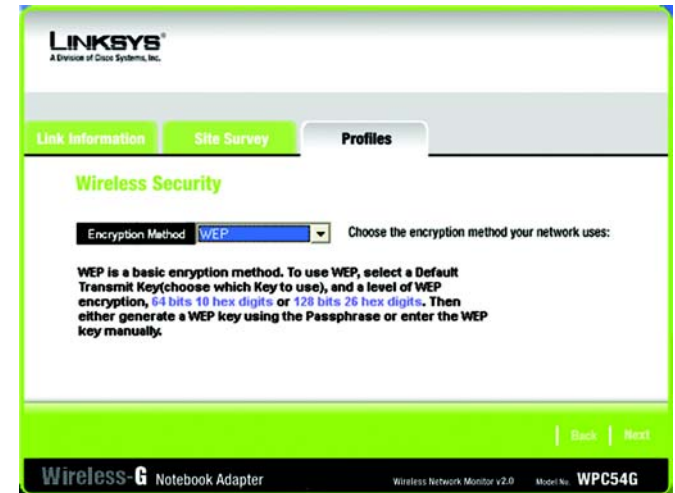


Figure 6-13: Wireless Security for New Profile

passphrase: used much like a password, a passphrase simplifies the WEP encryption process by automatically generating the WEP encryption keys for Linksys products

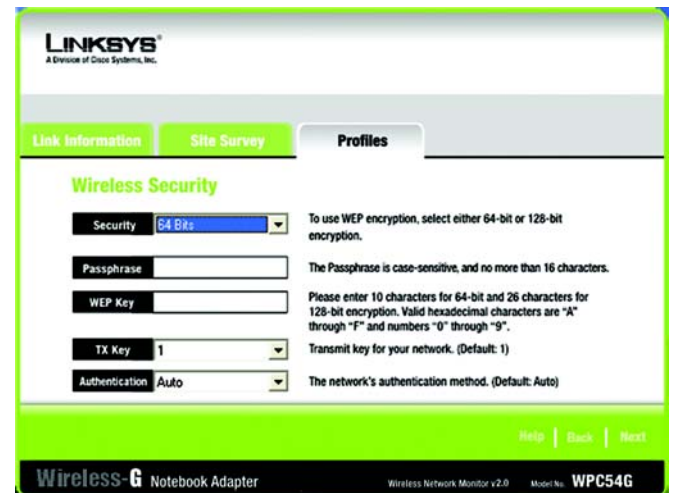


Figure 6-14: WEP Setting for New Profile

WPA-PSK

WPA-PSK offers the TKIP encryption method with dynamic encryption keys. Click **Next** to continue or **Back** to return to the previous screen.

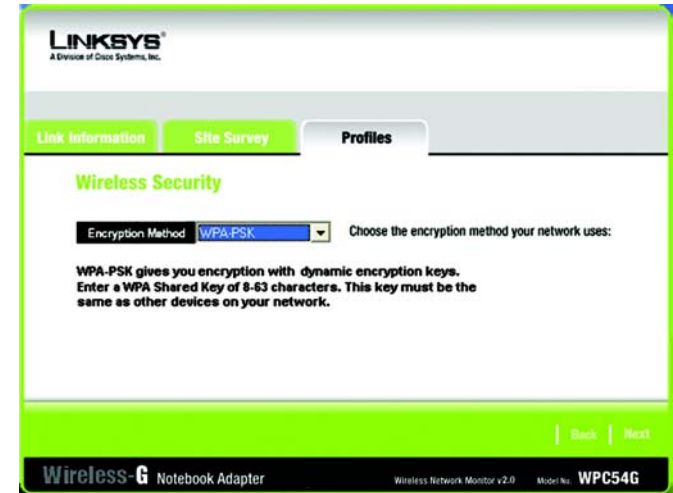


Figure 6-15: WPA-PSK Settings

Select **TKIP** for the *Encryption Type*. Enter a WPA Shared Key of 8-63 characters in the *Passphrase* field.



Figure 6-16: TKIP Settings

WPA RADIUS.

WPA RADIUS features WPA used in coordination with a RADIUS server. (This should only be used when a RADIUS server is connected to the Router.) WPA Radius offers the TKIP encryption method with dynamic encryption keys. It offers five authentication methods: EAP-TLS, EAP-TTLS, EAP-MD5, EAP-PEAP, and LEAP.

Click **Next** to continue or **Back** to return to the previous screen.

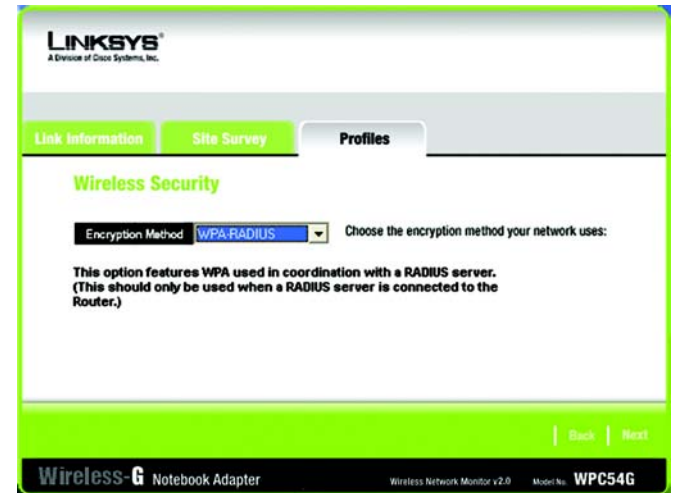


Figure 6-17: WPA RADIUS Settings

Select **TKIP** for the *Encryption Type*.

Click **Next** to continue or **Back** to return to the previous screen.



Figure 6-18: Encryption Type

Now, you will need to select the *Authentication Method* from the drop-down menu. The options are described below.

EAP-TLS

Enter the Login name of your wireless network in the *Login Name* field. From the *Certificate* drop-down menu, select the certificate you have installed to authenticate you on your wireless network. Select **Validate server certificate** to make sure that the certificate for the server is valid.

Click **Next** to continue or **Back** to return to the previous screen.

EAP-TTLS

Enter the Login name of your wireless network in the *Login Name* field. Enter the password of your wireless network in the *Password* field. Select **Validate server certificate** to make sure that the certificate for the server is valid. Select the *TTLS Protocol* from the drop-down menu.

Click **Next** to continue or **Back** to return to the previous screen.

EAP-MD5

Enter the Login name of your wireless network in the *Login Name* field. Enter the password of your wireless network in the *Password* field.

Click **Next** to continue or **Back** to return to the previous screen.

EAP-PEAP

Enter the Login name of your wireless network in the *Login Name* field. Enter the password of your wireless network in the *Password* field. Select **Validate server certificate** to make sure that the certificate for the server is valid. Then, select the *Peap Inner EAP* from the drop-down menu.

Click **Next** to continue or **Back** to return to the previous screen.

LEAP

Enter the Login name of your wireless network in the *Login Name* field. Enter the password of your wireless network in the *Password* field.

Click **Next** to continue or **Back** to return to the previous screen.



Figure 6-19: EAP-TLS Authentication



Figure 6-20: EAP-TTLS Authentication

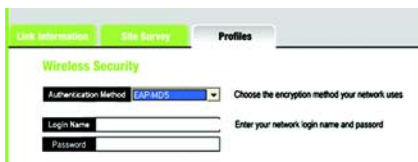


Figure 6-21: EAP-MD5 Authentication



Figure 6-22: EAP-PEAP Authentication



Figure 6-23: EAP-LEAP Authentication

RADIUS

RADIUS features WPA used in coordination with a RADIUS server. (This should only be used when a RADIUS server is connected to the Router.) It offers five authentication methods: EAP-TLS, EAP-TTLS, EAP-MD5, EAP-PEAP, and LEAP.

Click **Next** to continue or **Back** to return to the previous screen.



Figure 6-24: RADIUS Settings

Now, you will need to select the *Authentication Method* from the drop-down menu options described here:

EAP-TLS

Enter the Login name of your wireless network in the *Login Name* field. From the *Certificate* drop-down menu, select the certificate you have installed to authenticate you on your wireless network. Select **Validate server certificate** to make sure that the certificate for the server is valid.

Click **Next** to continue or **Back** to return to the previous screen.



Figure 6-25: EAP-TLS Authentication

EAP-TTLS

Enter the Login name of your wireless network in the *Login Name* field. Enter the password of your wireless network in the *Password* field. Select **Validate server certificate** to make sure that the certificate for the server is valid. Select the *TLS Protocol* from the drop-down menu.

Click **Next** to continue or **Back** to return to the previous screen.



Figure 6-26: EAP-TTLS Authentication

EAP-MD5

Enter the Login name of your wireless network in the *Login Name* field. Enter the password of your wireless network in the *Password* field.

Click **Next** to continue or **Back** to return to the previous screen.

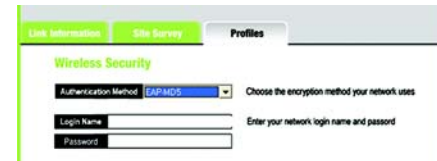


Figure 6-27: EAP-MD5 Authentication

EAP-PEAP

Enter the Login name of your wireless network in the *Login Name* field. Enter the password of your wireless network in the *Password* field. Select **Validate server certificate** to make sure that the certificate for the server is valid. Then, select the *Peap Inner EAP* from the drop-down menu.

Click **Next** to continue or **Back** to return to the previous screen.



Figure 6-28: EAP-PEAP Authentication

LEAP

Enter the Login name of your wireless network in the *Login Name* field. Enter the password of your wireless network in the *Password* field.

Click **Next** to continue or **Back** to return to the previous screen.

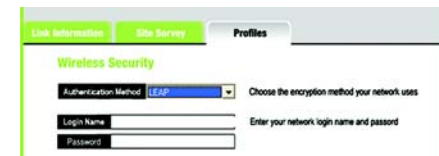


Figure 6-29: LEAP Authentication

- The *Confirm New Settings* screen will appear next showing the new settings. To save the new settings, click **Save**. To edit the new settings, click **Back**. To exit the Wireless Network Monitor, **Exit**.



Figure 6-30: Confirm New Settings

- The *Congratulations* screen will appear next. Click **Activate new settings now** to implement the new settings immediately and return to the *Link Information* screen. Click **Activate new settings later** to keep the current settings active and return to the *Profiles* screen.

You have successfully created a connection profile.



Figure 6-31: The Congratulations Screen

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 Notebook Adapter. 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. *My computer does not recognize the Wireless-G Notebook Adapter.*

Make sure that the Wireless-G Notebook Adapter is properly inserted into the PC Card slot.

2. *The Wireless-G Notebook Adapter does not work properly.*

Reinsert the Wireless-G Notebook Adapter into the notebook's PC Card slot.

For Windows 98SE or Me, right-click on **My Computer**, and select **Properties**. Select the **Device Manager** tab, and click on the **Network Adapter**. You will find the Wireless-G Notebook Adapter if it is installed successfully. If you see a yellow exclamation mark, the resources may be conflicting and you must follow the steps below:

- Uninstall the driver software from your PC.
- Restart your PC and repeat the hardware and software installation as specified in this User Guide.

3. *I cannot communicate with the other computers linked via Ethernet in the Infrastructure configuration.*

Make sure that the notebook or desktop is powered on.

Make sure that the Wireless-G Notebook Adapter is configured with the same SSID and WEP settings as the other computers in the Infrastructure configuration.

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 computer games with other members 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 802.11b standard?

One of the standards for wireless networks that 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 802.11g standard?

One of the standards for wireless networks that 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 802.11b features are supported?

The product supports the following 802.11b functions:

- CSMA/CA plus Acknowledge protocol
- Multi-Channel Roaming
- Automatic Rate Selection
- RTS/CTS feature
- Fragmentation
- Power Management

What 802.11g features are supported?

The product supports the following 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 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 access point. Before using the roaming function, the workstation must make sure that it is the same channel number with the access point of dedicated coverage area.

To achieve true seamless connectivity, the wireless LAN must incorporate a number of different functions. Each node and 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 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 access point and the distance of each access point to the wired backbone. 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?

WLAN features 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, WLAN offers the encryption function (WEP) to enhance security and access control.

What is WEP?

WEP is Wired Equivalent Privacy, a data privacy mechanism based on a shared key algorithm, as described in the 802.11 standard.

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 (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.



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.

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.

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

Wireless-G Notebook Adapter

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. Three modes are available: WPA-PSK, WPA Radius, and Radius. WPA-PSK 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. WPA RADIUS offers two encryption methods, TKIP and AES, with dynamic encryption keys. RADIUS (Remote Authentication Dial-In User Service) utilizes a RADIUS server for authentication.



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.

Wireless-G Notebook Adapter

WPA-PSK. If you do not have a RADIUS server, Select the type of algorithm, TKIP or AES, and enter a password in the Passphrase field of 8-63 characters.

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.) WPA Radius offers two encryption methods, TKIP and AES, with dynamic 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.)

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: Windows Help

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

TCP/IP

Before a computer can communicate with an access point or wireless router, 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 D: Glossary

802.11a - A wireless networking standard that specifies a maximum data transfer rate of 54Mbps and an operating frequency of 5GHz.

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 (Advanced Encryption Standard) - 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.

Beacon Interval - Data transmitted on your wireless network that keeps the network synchronized.

Bit - A binary digit.

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

CSMA/CA (Carrier Sense Multiple Access/Collision Avoidance) - A method of data transfer that is used to prevent data collisions.

CTS (Clear To Send) - A signal sent by a wireless device, signifying that it is ready to receive data.

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

Wireless-G Notebook Adapter

DHCP (Dynamic Host Configuration Protocol) - A networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time, instead of assigning permanent IP addresses.

DNS (Domain Name Server) - The IP address of your ISP's server, which translates the names of websites into IP addresses.

Domain - A specific name for a network of computers.

DSSS (Direct-Sequence Spread-Spectrum) - Frequency transmission with a redundant bit pattern resulting in a lower probability of information being lost in transit.

EAP (Extensible Authentication Protocol) - A general authentication protocol used to control network access. Many specific authentication methods work within this framework.

EAP-PEAP (Extensible Authentication Protocol-Protected Extensible Authentication Protocol) - A mutual authentication method that uses a combination of digital certificates and another system, such as passwords.

EAP-TLS (Extensible Authentication Protocol-Transport Layer Security) - A mutual authentication method that uses digital certificates.

Encryption - Encoding data transmitted in a network.

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

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.

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

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

IP (Internet Protocol) - 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 (Internet Service Provider) - A company that provides access to the Internet.

Wireless-G Notebook Adapter

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

LEAP (Lightweight Extensible Authentication Protocol) - A mutual authentication method that uses a username and password system.

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

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.

OFDM (Orthogonal Frequency Division Multiplexing) - Frequency transmission that separates the data stream into a number of lower-speed data streams, which are then transmitted in parallel to prevent information from being lost in transit.

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.

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

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".

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

SSID (Service Set Identifier) - Your wireless network's name.

Wireless-G Notebook Adapter

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

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 (Transmission Control Protocol) - A network protocol for transmitting data that requires acknowledgement from the recipient of data sent.

TCP/IP (Transmission Control Protocol/Internet Protocol) - A set of instructions PCs use to communicate over a network.

TKIP (Temporal Key Integrity Protocol) - a wireless encryption protocol that provides dynamic encryption keys for each packet transmitted.

Topology - The physical layout of a network.

WEP (Wired Equivalent Privacy) - A method of encrypting network data transmitted on a wireless network for greater security.

WLAN (Wireless Local Area Network) - A group of computers and associated devices that communicate with each other wirelessly.

WPA (Wi-Fi Protected Access) - a wireless security protocol using TKIP (Temporal Key Integrity Protocol) encryption, which can be used in conjunction with a RADIUS server.

Appendix E: Specifications

Standards	802.11g, 802.11b
Channels	11 Channels (USA, Canada) 13 Channels (Europe, Japan)
LEDs	Power, Link
Transmit Power	18 dBm
Protocols	802.11b: CCK (11 Mbps), DQPSK (2 Mbps), DBPSK (1 Mbps); 802.11g: OFDM
Network Protocols	TCP/IP, IPX/SPX, NetBEUI
Security Features	WEP, TKIP, 802.1x
WEP Key Bits	64, 128 Bit
Dimensions	4.53" x 2.13" x 0.30" (115 mm x 54 mm x 7.5 mm)
Unit Weight	1.66 oz. (0.047 kg.)
Certifications	FCC, IC-03, CE
Operating Temp.	32°F to 131°F (0°C to 55°C)
Storage Temp.	-13°F to 158°F (-25°C to 70°C)
Operating Humidity	5% to 95%, Non-Condensing
Storage Humidity	5% to 95%, Non-Condensing

Appendix F: 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.

Appendix G: Regulatory Information

FCC STATEMENT

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

Reorient or relocate the receiving antenna

Increase the separation between the equipment or devices

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

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

FCC Radiation Exposure Statement

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

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment has been evaluated for use in laptops (notebooks) with a side slot configuration.

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 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 tyypinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien näiden direktiivien muiden ehtojen mukainen.

Linksys Group 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 complètement libres d'utilisation en France (en utilisation intérieur). Pour ce qui est des autres canaux, ils peuvent être soumis à autorisation selon le département. 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.

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 H: Contact Information

Need to contact Linksys?

Visit us online for information on the latest products and updates to your existing products at:

<http://www.linksys.com> or
[ftp.linksys.com](ftp://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:
Or fax your request in to:

800-546-5797 (LINKSYS)
949-261-8868

If you experience problems with any Linksys product, you can call us at:

800-326-7114
support@linksys.com

Don't wish to call? You can e-mail us at:

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

949-261-1288