

LINKSYS®

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5GHz +
802.11a
2.4GHz
802.11g

Dual-Band
Wireless A+G

Notebook Adapter

User Guide



Model No. **WPC55AG**

CISCO SYSTEMS



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This User Guide

The User Guide to the Dual-Band Wireless A+G Notebook Adapter has been designed to make understanding networking easier than ever. Look for the following items when reading this 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”.

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Chapter 1: Introduction

Welcome

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

The Linksys Dual-Band Wireless A+G Notebook Adapter lets your notebook communicate with all three wireless network standards. With one PC Card, you can connect to Wireless-A (802.11a), Wireless-G (802.11g) and Wireless-B (802.11b) networks.

Wireless-B networks have a data rate of 11Mbps, and are commonly found in corporate environments and in homes for household Internet connectivity without the need for running cables. They're also popping up all over the country in coffee shops, airports, hotels, convention centers, and other public spaces offering "on the go" connectivity to mobile users.

In high speed or heavy usage environments, Wireless-B is quickly being replaced by a new standard, Wireless-G, which uses the same 2.4GHz radio band, but at 54Mbps, is almost five times faster. The third wireless network standard is Wireless-A, which also runs at 54Mbps, but operates in the less-crowded 5GHz radio band. Wireless-A is mostly used in corporate installations.

Whichever standard you encounter, the Dual-Band Wireless A+G Notebook Adapter is ready to connect. And it's simple to use. Just pop it into a PC Card slot and run the included Setup Wizard, which will walk you through the configuration. All wireless communications can be protected by up to 152-bit encryption, so your data stays secure.

Use the instructions in this Guide to help you set up and install the Adapter. These instructions should be all you need to get the most out of the Dual-Band Wireless A+G Notebook Adapter.

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

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 and an operating frequency of 2.4GHz.*

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

What's in this Guide?

This user guide covers the steps for setting up and using the Dual-Band Wireless A+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 Dual-Band Wireless A+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 use 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 WLAN Monitor**
This chapter show you how to use the Adapter's WLAN Monitor.
- **Appendix A: Troubleshooting**
This appendix describes some potential 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.

Dual-Band Wireless A+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 SSID.

Before enabling 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.

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

Dual-Band Wireless A+G products offer the most flexibility, because they can connect to 802.11a networks, or they can connect to networks with 802.11g and/or 802.11b devices—depending on the settings you configure on the dual-band products.

The Dual-Band Wireless A+G Notebook Adapter is compatible with all 802.11a, 802.11b, and 802.11g routers, as well as access points. It will also communicate with other wireless notebook adapters for your laptop computers, wireless PCI adapters for your desktop PCs, and wireless USB adapters when you want to enjoy USB connectivity. Wireless products will also communicate with wireless print servers.

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 wired 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 Dual-Band Wireless A+G Notebook Adapter

The LED Indicators

The Adapter's LEDs display information about network activity.

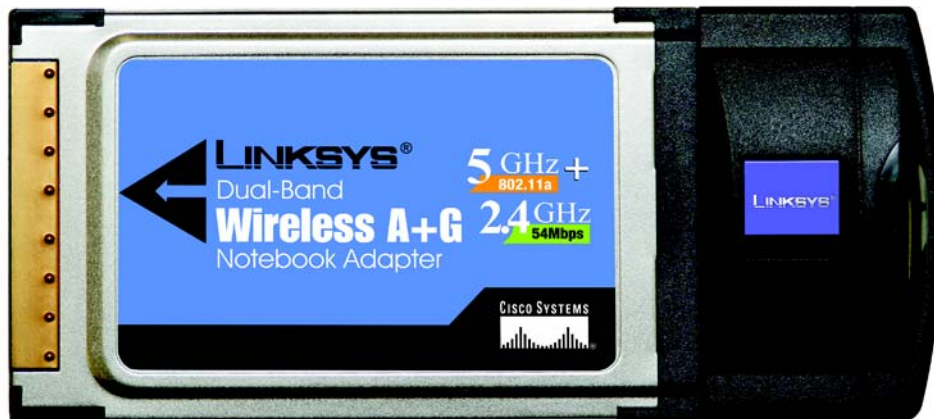


Figure 3-1: Front Panel

- | | |
|--------------|---|
| 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. It flashes when data is transmitted or received. |

Chapter 4: Software Installation and Configuration

The Dual-Band Wireless A+G Notebook Adapter Setup Wizard will guide you through the installation procedure. The Setup Wizard will install the driver and WLAN Monitor, 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.



Figure 4-1: 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.
3. The Setup Wizard will ask you to choose a network mode. Click the **5GHz + 2.4GHz** radio button if you will connect to both 802.11a and 802.11g networks. Click the **5GHz** radio button if you will connect only to 802.11a networks. Click the **2.4GHz** radio button if you will connect only to 802.11g or 802.11b networks.

Click the **Next** button.

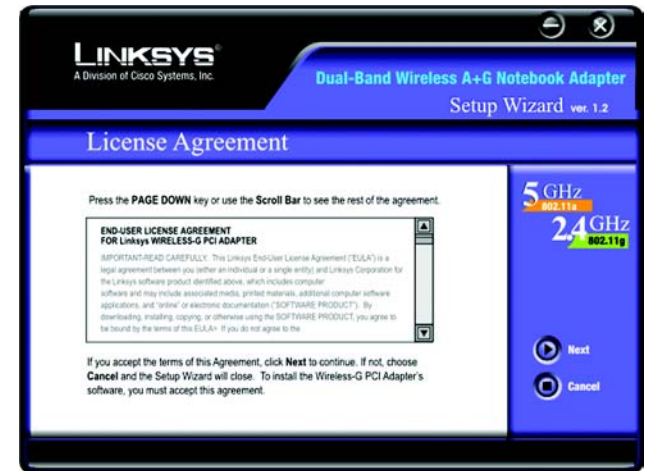


Figure 4-2: Setup Wizard's License Agreement

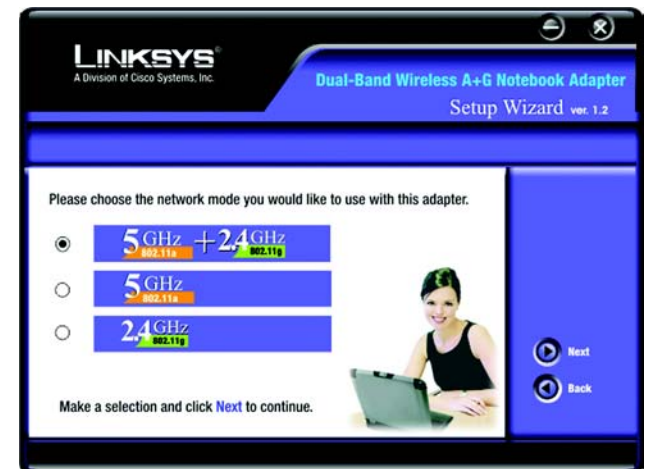


Figure 4-3: Setup Wizard's Network Mode Screen

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

The Setup Wizard provides three SSID fields. In the **SSID 1** field, enter the **SSID** of your wireless network. The SSID must be identical for all devices in the network. The default setting is **linksys** (all lowercase).

In the **SSID 2** and **SSID 3** fields, enter alternative SSIDs. When attempting to connect to the network, the Adapter will first try SSID 1. If the Adapter fails to connect, then it will try SSID 2 and SSID 3 until it establishes a connection. Click the **Next** button.



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

- If you chose **Infrastructure Mode**, go to Step 6 now. If you chose **Ad-Hoc Mode**, select the correct operating channel for your network. If you have an 802.11g network, then select the Network Mode from the drop-down menu. Click the **Next** button, and go to Step 6. 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 **Auto**, which enables the Adapter to match the channel setting of the strongest wireless signal it detects.

Network Mode - If you have 802.11b and 802.11g devices in your network, then select **Mixed Mode**. Both Wireless-G and Wireless-B computers will be allowed on the network, but transmission speeds will be reduced. If you have only 802.11g devices in your network, select **G-Only Mode** for maximum speed (no Wireless-B users will be allowed on the network).

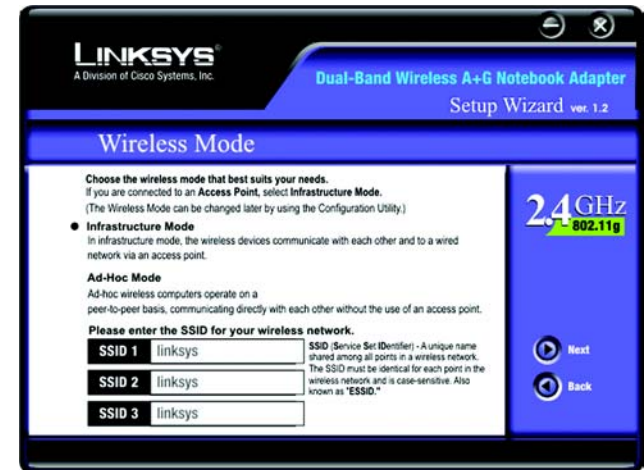


Figure 4-4: Setup Wizard's Wireless Mode Screen



Figure 4-5: Setup Wizard's Wireless Channel Screen

6. The Setup Wizard will ask you to review your settings before it starts to copy files. Click the **Next** button to save these settings, or click the **Back** button to change any settings.
7. After the software has been successfully installed, the *Congratulations* screen will appear. Click the **Exit** button.

Proceed to “Chapter 5: Hardware Installation.”



Figure 4-6: Setup Wizard's Finalize Settings Screen



Figure 4-7: 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, as shown in Figure 5-1, 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 Dual-Band Wireless A+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 WLAN Monitor."



Figure 5-1: Installing the Adapter

Chapter 6: Using the WLAN Monitor

Use the WLAN Monitor to check the link information, search for available wireless networks, or create profiles that hold different configuration settings.

Accessing the WLAN Monitor

After installing the Adapter, the Dual-Band Wireless A+G Notebook Adapter WLAN Monitor icon will appear in your system tray. Double-click the icon.

The *Link Information* screen will appear. From this screen, you can find out how strong the current wireless signal is and how good the connection's quality is. 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 perform configuration changes, 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 status information.

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

Signal Strength - The Signal Strength bar indicates signal strength, from 0 to 100%.

Link Quality - The Link Quality bar indicates the quality of the wireless network connection, from 0 to 100%.

Click the **More Information** button to view additional information about the wireless network connection. (See Figure 6-3.)

Click the X (Close) button in the upper right corner to exit the WLAN Monitor.



Figure 6-1: The WLAN Monitor Icon



Figure 6-2: Link Information

Network Settings

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

Status - The status of the wireless network connection.

SSID - The SSID of the wireless network.

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

Security - The status of the security feature.

Network Type - The wireless mode currently in use, Infrastructure or Ad-Hoc.

IP Address - The IP Address of the Adapter.

Subnet Mask - The Subnet Mask of the Adapter.

Default Gateway - The Default Gateway address of the Adapter.

DNS - The DNS address of the Adapter.

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

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 **X** (Close) button in the upper right corner to exit the WLAN Monitor.



Figure 6-3: More Information - Network Settings

Network Statistics

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

Transmit Rate - The data transfer rate of the current connection. (In Auto mode, the Adapter dynamically shifts to the fastest data transfer rate possible at any given time.)

Receive Rate - The rate that data is received.

Authentication - The current security authentication mode.

Network Mode - The mode of the wireless network currently in use, 802.11a or 802.11g.

Transmit Total - The total number of packets being transmitted.

Receive Total - The total number of packets being received.

Signal to Noise - This tells you the quality of your signal. The higher the number, the better your signal.



Figure 6-4: More Information - Network Statistics

Click the **Settings** button to go to the *Settings* screen.

Click the **Back** button to return to the initial *Link Information* screen.

Click the X (Close) button in the upper right corner to exit the WLAN Monitor.

Site Survey

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

Site Information

For each network selected, the following settings are listed:

Network Type - The wireless mode currently in use, Infrastructure or Ad-Hoc.

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

WEP - The status of the encryption security feature.

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

Surveyed at - The time at which the wireless network was scanned.

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.

Click the **X** (Close) button in the upper right corner to exit the WLAN Monitor.



Figure 6-5: Site Survey

Profiles

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

Profile Information

For each profile selected, the following are listed:

Network Type - The mode of the wireless network currently in use, Infrastructure or Ad-Hoc.

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. (Auto indicates that the Adapter will use the channel setting of the network's access point.)

WEP - The status of the encryption security feature.

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

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

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

Import - Click the **Import** button 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 the **Export** button. Direct Windows to the appropriate folder, and click the **OK** button.

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



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

Click the **X** (Close) button in the upper right corner to exit the WLAN Monitor.



Figure 6-6: Profiles

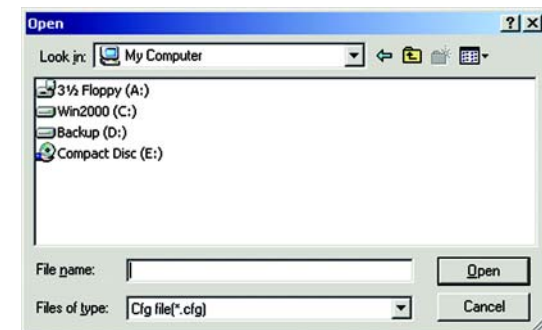


Figure 6-7: Importing a Profile

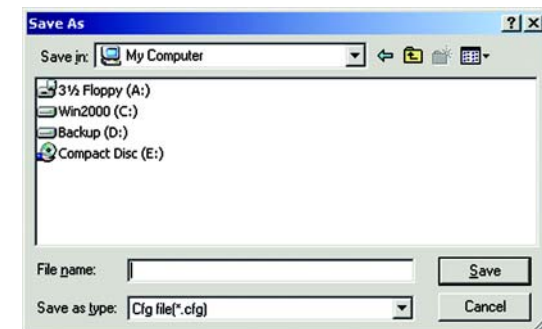


Figure 6-8: Exporting a Profile

Creating a New Profile

1. On the *Profiles* screen, click the **New** button to create 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.
3. The *Profile Wizard* screen will appear. Select **2.4GHz + 5GHz** if you will connect to 802.11a or 802.11g networks. Select **5GHz** if you will only connect to 802.11a networks. Select **2.4GHz** if you will only connect to 802.11g networks. Click the **Next** button.



Figure 6-9: Creating a New Profile



Figure 6-10: Enter Profile Name



Figure 6-11: Profile Wizard

- The *Network Setting* screen will appear next. If your network has a DHCP server, click the radio button next to **Obtain an IP address automatically (DHCP)**. Click the **Next** button to continue, or click the **Cancel** button to return to the *Profiles* screen.

If your network does not have a DHCP server, click the radio button next to **Specify the IP address**. 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. Click the **Next** button to continue, or click the **Cancel** button to return to the *Profiles* screen.

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 and DNS 2 - Enter the DNS address of your wired Ethernet network here.

- The *Choose a network type* 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 in the *SSID 1* field. Enter alternative SSIDs in the *SSID 2* and *SSID 3* fields.

Click the **Next** button to continue or the **Back** button 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 1-3 - 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.

When attempting a connection, the Adapter will first try SSID 1. If unsuccessful, the Adapter will then try SSID 2 and SSID 3 until it establishes a connection.

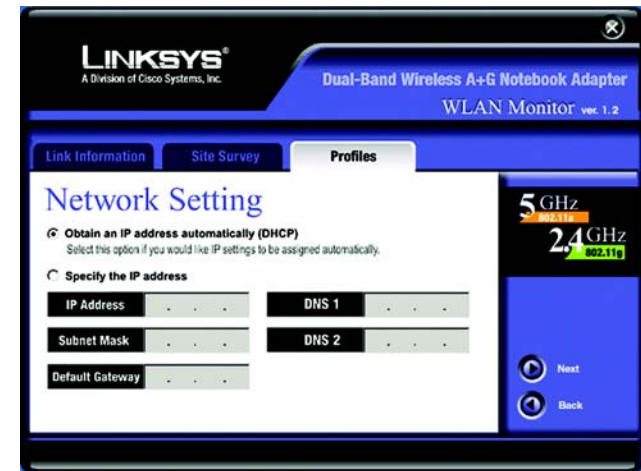


Figure 6-12: Network Setting for New Profile

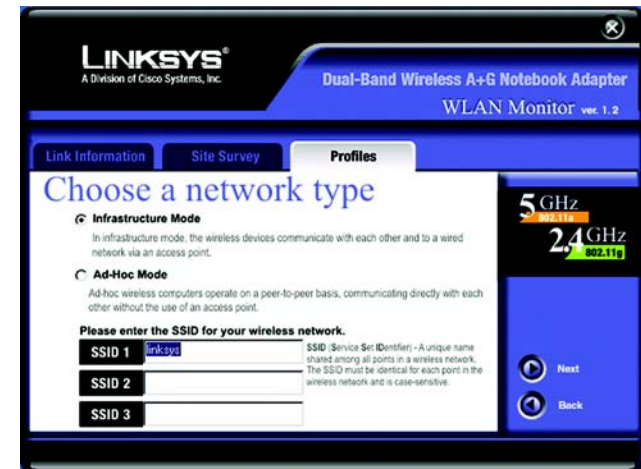


Figure 6-13: Choose a network type

6. The *Wireless Settings* screen will appear. If you chose Infrastructure Mode, go to Step 7 now. If you chose Ad-Hoc Mode, select the correct operating channel for your network from the *Channel* drop-down menu. If you are setting up an 802.11g profile, then select the Network Mode from the drop-down menu. Click the **Next** button, and go to Step 7. 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 **Auto**, which enables the Adapter to match the channel setting of the strongest wireless signal it detects.

Network Mode (available for 802.11g only) - To allow both Wireless-G and Wireless-B computers on the network, even though transmission speeds may be reduced, select **Mixed Mode**. If you have only Wireless-G computers on your network, select **G-Only Mode** for maximum speed (no Wireless-B computers will be allowed on this network).

7. The *Security Setting* screen will appear. Select **WEP**, **WPA-PSK**, **WPA-RADIUS**, **RADIUS**, or **LEAP** for the Encryption Type. WEP stands for Wired Equivalent Privacy, while WPA-PSK stands for Wi-Fi Protected Access - Pre-Shared Key. WPA is a security standard stronger than WEP encryption. RADIUS stands for Remote Authentication Dial-In User Service, while LEAP stands for Lightweight Extensible Authentication Protocol. If you don't want to use encryption, select **Disabled**.

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

Proceed to the appropriate section for your Encryption Type: WEP, WPA-PSK, WPA-RADIUS, RADIUS, or LEAP. If you do not want to use encryption, proceed to Step 8.



Figure 6-14: Wireless Settings for New Profile



Figure 6-15: Security Setting for New Profile

WEP

WEP - After you select WEP and click the Next button, then the screen in Figure 6-16 will appear. Select **64-Bit**, **128-Bit**, or **152-Bit** from the drop-down menu (152-bit WEP encryption is available only for 802.11a networking). Then enter a passphrase or WEP key.

Authentication - You have two choices, Open or Shared Key. The default is set to **Open**. Open key is when the sender and the recipient do not share a WEP key for authentication. Shared Key is when both the sender and the recipient share a WEP key for authentication. All devices on your network must use the same authentication type.

Passphrase (not available for 152-bit encryption) - Instead of manually entering a WEP key, you can enter a passphrase in the *Passphrase* field, so WEP keys are 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 1-4 - If you are not using a Passphrase, then manually enter your WEP key(s). The WEP keys you enter must match the WEP keys of your wireless network. If you are using 64-bit WEP encryption, then each key must consist of exactly 10 hexadecimal characters. If you are using 128-bit WEP encryption, then each key must consist of exactly 26 hexadecimal characters. If you are using 152-bit WEP encryption, then each key must consist of exactly 32 hexadecimal characters. Valid hexadecimal characters are "0" to "9" and "A" to "F".

Click the **Next** button to continue, and then go to Step 8. Click the **Back** button to return to the previous screen.



Figure 6-16: WEP Settings

WPA-PSK

After you select WPA-PSK (Wi-Fi Protected Access - Pre-Shared Key) and click the Next button, then the screen in Figure 6-18 will appear.

WPA-PSK offers two encryption types, TKIP and AES, with dynamic encryption keys.

Encryption Type - Select the type of algorithm you want to use, **TKIP** or **AES**, for the *Encryption Type*.

Pre-Shared Key - Enter a WPA Pre-Shared Key of 8-63 characters in the *Pre-Shared Key* field. The longer and more complex your pre-shared key is, the more secure your network will be.

Click the **Next** button to continue, and then go to Step 8. Click the **Back** button to return to the previous screen.



Figure 6-17: WPA-PSK Setting



Figure 6-18: 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 two encryption types, TKIP and AES, with dynamic encryption keys, as well as two authentication methods, EAP-TLS and EAP-PEAP.

After you select WPA-RADIUS and click the Next button, then the screen in Figure 6-20 will appear.

Encryption Type - Select the type of algorithm your network is using, **TKIP** or **AES**.

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



Figure 6-19: WPA-RADIUS Setting



Figure 6-20: TKIP Setting

The screen in Figure 6-21 will appear next. Select **EAP-TLS** or **EAP-PEAP** from the *Authentication Method* drop-down menu. The options are described on the next page.

EAP-TLS

If you selected EAP-TLS, enter the login name of your wireless network in the *Login Name* field. Enter the name of the server in the *Server Name* field. From the *Certificate* drop-down menu, select the certificate you have installed to authenticate you on your wireless network.

Click the **Next** button to continue, and then go to Step 8. Click the **Back** button to return to the previous screen.

EAP-PEAP

If you selected EAP-PEAP, enter the login name of your wireless network in the *Login Name* field. Enter the name of the server in the *Server Name* field. Enter the password of your wireless network in the *Password* field.

Click the **Next** button to continue, and then go to Step 8. Click the **Back** button to return to the previous screen.



Figure 6-21: EAP-TLS Settings



Figure 6-22: EAP-PEAP Settings

RADIUS

RADIUS features WEP used in coordination with a RADIUS server. (This should only be used when a RADIUS server is connected to the Router.) If you selected RADIUS, then the screen in Figure 6-24 will appear. RADIUS offers two authentication types: EAP-TLS and EAP-PEAP.

Authentication Type - Select the authentication method your network is using, **EAP-TLS** or **EAP-PEAP**. These options are described below.

EAP-TLS

If you selected EAP-TLS, enter the login name of your wireless network in the *Login Name* field. Enter the name of the server in the *Server Name* field. From the *Certificate* drop-down menu, select the certificate you have installed to authenticate you on your wireless network.

Click the **Next** button to continue, and then go to Step 8. Click the **Back** button to return to the previous screen.



Figure 6-23: RADIUS Setting



Figure 6-24: EAP-TLS Settings

EAP-PEAP

If you selected EAP-PEAP, enter the login name of your wireless network in the *Login Name* field. Enter the name of the server in the *Server Name* field. Enter the password of your wireless network in the *Password* field.

Click the **Next** button to continue, and then go to Step 8. Click the **Back** button to return to the previous screen.

LEAP

If you selected LEAP, then the screen in Figure 6-26 will appear.

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

Password - Enter the password of your wireless network in the *Password* field.

Click the **Next** button to continue, and then go to Step 8. Click the **Back** button to return to the previous screen.



Figure 6-25: EAP-PEAP Settings



Figure 6-26: LEAP Settings

8. The *Confirm New Settings* screen will appear next, showing the new settings. To save the new settings, click the **Yes** button. To edit the new settings, click the **Back** button. To cancel these new settings, click the **Cancel** button.
9. 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.

Click the X (Close) button in the upper right corner to exit the WLAN Monitor.



Figure 6-27: Confirm New Settings for New Profile



Figure 6-28: Congratulations for New Profile

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 Dual-Band Wireless A+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 Dual-Band Wireless A+G Notebook Adapter.*

Make sure that the Dual-Band Wireless A+G Notebook Adapter is properly inserted into the CardBus slot.

2. *The Dual-Band Wireless A+G Notebook Adapter does not work properly.*

Reinsert the Dual-Band Wireless A+G Notebook Adapter into the notebook or desktop's USB port.

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 Dual-Band Wireless A+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 Dual-Band Wireless A+G Notebook Adapter is configured with the same SSID and security 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 IEEE 802.11a standard?

It is one of the IEEE standards for wireless networks. The 802.11a standard allows wireless networking hardware from different manufacturers to communicate, provided that the hardware complies with the 802.11a standard. The 802.11a standard states a maximum data transfer rate of 54Mbps and an operating frequency of 5GHz.

mbps: one million bits per second; a unit of measurement for data transmission.

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 802.11a features are supported?

The product supports the following IEEE 802.11a functions:

- OFDM protocol
- Multi-Channel Roaming
- Automatic Rate Selection
- RTS/CTS feature
- Fragmentation

fragmentation: breaking a packet into smaller units when transmitting over a network medium that cannot support the original size of the packet.

What IEEE 802.11b features are supported?

The product supports the following IEEE 802.11b 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 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.

ism band: radio bandwidth utilized in wireless transmissions.

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).

spread spectrum: wideband radio frequency technique used for more reliable and secure data transmission.

dsss: Frequency transmission with a redundant bit pattern resulting in a lower probability of information being lost in transit.

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 IEEE 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:

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: WPA-PSK and WPA-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 Standard), which utilizes a symmetric 128-Bit block data encryption. WPA-RADIUS offers two encryption methods, TKIP and AES, with dynamic encryption keys, and it uses a RADIUS (Remote Authentication Dial-In User Service) server for authentication.

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



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-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.

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

Most Linksys 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 - An IEEE wireless networking standard that specifies a maximum data transfer rate of 54Mbps and an operating frequency of 5GHz.

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.

Access Point - 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.

AES (Advanced Encryption Standard) - A 128-bit encryption technique used to secure data.

Adapter - This is 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.

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 - The frequency interval of the beacon, which is a packet broadcast by a router to synchronize a wireless network.

Bit - A binary digit.

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

Bridge - A device that connects two different kinds of local networks, such as a wireless network to a wired Ethernet network.

Broadband - An always-on, fast Internet connection.

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

Buffer - A block of memory that temporarily holds data to be worked on later when a device is currently too busy to accept the data.

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

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

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

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

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

DDNS (Dynamic Domain Name System) - The capability of having a website, FTP, or e-mail server-with a dynamic IP address-use a fixed domain name.

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

DHCP (Dynamic Host Configuration Protocol) - A protocol that lets one device on a local network, known as a DHCP server, assign temporary IP addresses to the other network devices, typically computers.

DMZ (Demilitarized Zone) - Removes the Router's firewall protection from one PC, allowing it to be "seen" from the Internet.

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.

Download - To receive a file transmitted over a network.

DSL (Digital Subscriber Line) - An always-on broadband connection over traditional phone lines.

DSSS (Direct-Sequence Spread-Spectrum) - A type of radio transmission technology that includes a redundant bit pattern to lessen the probability of data lost during transmission. Used in 802.11b networking.

DTIM (Delivery Traffic Indication Message) - A message included in data packets that can increase wireless efficiency.

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

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 to prevent it from being read by unauthorized people.

Ethernet - An IEEE standard network 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 - Security measures that protect the resources of a local network from intruders.

Firmware - 1. In network devices, the programming that runs the device. 2. Programming loaded into read-only memory (ROM) or programmable read-only memory (PROM) that cannot be altered by end-users.

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

FTP (File Transfer Protocol) - A standard protocol for sending files between computers over a TCP/IP network and the Internet.

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

Gateway - A system that interconnects networks.

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

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

HTTP (HyperText Transport Protocol) - The communications protocol used to connect to servers on the World Wide Web.

IEEE (The Institute of Electrical and Electronics Engineers) - An independent institute that develops networking standards.

Infrastructure - Currently installed computing and networking equipment.

Infrastructure Mode - Configuration in which a wireless network 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.

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

IPSec (Internet Protocol Security) - A VPN protocol used to implement secure exchange of packets at the IP layer.

ISM band - Radio band used in wireless networking transmissions.

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

LAN (Local Area Network) - The computers and networking products that make up the network in your home or office.

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.

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

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

NAT (Network Address Translation) - NAT technology translates IP addresses of a local area network to a different IP address for the Internet.

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

NNTP (Network News Transfer Protocol) - The protocol used to connect to Usenet groups on the Internet.

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

OFDM (Orthogonal Frequency Division Multiplexing) - A type of modulation technology that separates the data stream into a number of lower-speed data streams, which are then transmitted in parallel. Used in 802.11a, 802.11g, and powerline networking.

Packet - A unit of data sent over a network.

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

Ping (Packet INternet Groper) - An Internet utility used to determine whether a particular IP address is online.

POP3 (Post Office Protocol 3) - A standard protocol used to retrieve e-mail stored on a mail server.

Port - 1. The connection point on a computer or networking device used for plugging in a cable or an adapter. 2. The virtual connection point through which a computer uses a specific application on a server.

Power over Ethernet (PoE) - A technology enabling an Ethernet network cable to deliver both data and power.

PPPoE (Point to Point Protocol over Ethernet) - A type of broadband connection that provides authentication (username and password) in addition to data transport.

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

Preamble - Part of the wireless signal that synchronizes network traffic.

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, such as a local network and the Internet.

RTS (Request To Send) - A packet sent when a computer has data to transmit. The computer will wait for a CTS (Clear To Send) message before sending data.

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

SMTP (Simple Mail Transfer Protocol) - The standard e-mail protocol on the Internet.

SNMP (Simple Network Management Protocol) - A widely used network monitoring and control protocol.

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

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

SSID (Service Set Identifier) - 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. Device that is the central point of connection for computers and other devices in a network, so data can be shared at full transmission speeds. 2. A device for making, breaking, or changing the connections in an electrical circuit.

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

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

TFTP (Trivial File Transfer Protocol) - A version of the TCP/IP FTP protocol that uses UDP and has no directory or password capability.

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

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.

TX Rate - Transmission Rate.

UDP (User Datagram Protocol) - A network protocol for transmitting data that does not require acknowledgement from the recipient of the data that is sent.

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

Upload - To transmit a file over a network.

URL (Uniform Resource Locator) - The address of a file located on the Internet.

VPN (Virtual Private Network) - A security measure to protect data as it leaves one network and goes to another over the Internet.

WAN (Wide Area Network) - The Internet.

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

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

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	IEEE 802.11a, IEEE 802.11b, IEEE 802.11g
Interface	CardBus
LEDs	Power, Link
Transmit Power	11 dBm to 17 dBm
Modulation	802.11a and 802.11g: OFDM; 802.11b: CCK, DQPSK, DBPSK
Security Features	WEP, WPA, RADIUS, TKIP, AES, LEAP
WEP Key Bits	64, 128, 152 Bits
Protocol	TCP/IP
Dimensions	4.72" x 0.51" x 2.13" (120 mm x 13 mm x 54 mm)
Unit Weight	1.48 oz. (0.04 kg)
Certifications	FCC, CE, IC-03, Wi-Fi (802.11a, 802.11b, 802.11g), WPA, CCX, WHQL: XP, 2000, Me
Operating Temp.	32°F to 131°F (0°C to 55°C)
Storage Temp.	-4°F to 185°F (-20°C to 85°C)
Operating Humidity	10% to 85%, Non-Condensing
Storage Humidity	5% to 90%, 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.

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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.

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

Appendix G: Regulatory Information

FCC STATEMENT

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

Reorient or relocate the receiving antenna

Increase the separation between the equipment or devices

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

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

FCC Radiation Exposure Statement

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

INDUSTRY CANADA (CANADA)

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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

EC DECLARATION OF CONFORMITY (EUROPE)

Linksys declares that the Dual-Band Wireless A+G Notebook Adapter 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

Dual-Band Wireless A+G Notebook Adapter

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 Dual-Band Wireless A+G Notebook Adapter tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien näiden direktiivien muiden ehtojen mukainen.

Linksys Group déclare la Dual-Band Wireless A+G Notebook Adapter 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.

Appendix H: Contact Information

Need to contact Linksys?

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

<http://www.linksys.com> or
<ftp.linksys.com>

Can't find information about a product you want to buy on the web? Do you want to know more about networking with Linksys products? Give our advice line a call at:
Or fax your request in to:

800-546-5797 (LINKSYS)
949-823-3002

If you experience problems with any Linksys product, you can call us at:
Don't wish to call? You can e-mail us at:

800-326-7114
support@linksys.com

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

949-823-3000