Dual-Band Wireless A+B
Notebook Adapter

Use this guide to install:

WPC51AB

User Guide

LINKSYS®

SAFETY AND REGULATORY NOTICES

FCC STATEMENT
The Instant Wireless Dual-Band Wireless A+B Notebook Adapter has been tested and found to comply with the specifications for a Class B digital device, pursuant to Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

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 Caution: Any change or modification to the product not expressly approved by Linksys could void the user's authority to operate the device.

FCC Caution: Operation within the 5150 to 5250GHz band is restricted to indoor use only.

FCC RF Radiation Exposure Statement
To comply with the FCC and ANSI C95.1 RF exposure limits, the antenna(s) for this device must comply with the following:
• Access points with 2.4 GHz or 5 GHz integrated antenna must operate with a separation distance of at least 20 cm from all persons using the cable provided and must not be co-located or operating in conjunction with any other antenna or transmitter.
End-users must be provided with specific operations for satisfying RF exposure compliance.
Note: Dual antennas used for diversity operation are not considered co-located.

Canadian Department of Communications Industry Canada (IC) Notice
This Class B digital apparatus complies with Canadian ICES-003 and RSS-210.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 et CNR-210 du Canada.
"To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing."
" Pour empêcher que cet appareil cause du brouillage au service faisant l'objet d'une licence, il doit être utilisé à l'intérieur et devrait être placé loin des fenêtres afin de fournir un écran de blindage maximal. Si le matériel (ou son antenne d'émission) est installé à l'extérieur, il doit faire l'objet d'une licence. "

EC DECLARATION OF CONFORMITY (EUROPE)
Linksys Group declares that the Instant Wireless® Series products included in the Instant Wireless® Series conform to the specifications listed below, following the provisions of the European R&TTE directive 1999/5/EC, EMC directive 89/336/EEC, and Low Voltage directive 73/23/EEC:

For 11Mpbs, 2.4 GHz devices with 100 mW radios, the following standards were applied:
• ETS 300-826, 301 489-1 General EMC requirements for Radio equipment.
• EN 609 50 Safety
• ETS 300-328-2 Technical requirements for Radio equipment.

For 54 Mpbs, 5 GHz devices with 40 mW radios, the following standards were applied:
• ETS 301 489-1, 301 489-17 General EMC requirements for Radio equipment.
• EN 609 50 Safety
• ETS 301-893 Technical requirements for Radio equipment.

Caution: The frequencies used by 802.11a wireless LAN devices are not yet harmonized within the European community, 802.11a products are designed for use only in specific countries, and are not allowed to be operated in countries other than those of designated use. Contact local Authority for procedure to follow.

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 and/or the CEPT recommendation Rec 70.03.

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

- Linksys Group vakuuttaa täten että Instant Wireless Dual-Band A+B Notebook Adapter tyyppinen laite on direktiivin 1999/5/EY, direktiivin 89/336/EEC ja direktiivin 73/23/EEC oleellisten vaatimusten ja sitä koskevien näiden direktiivien muiden ehtojen mukainen.
- Linksys Group déclare que la Instant Wireless Dual-Band A+B Notebook Adapter est conforme aux conditions essentielles et aux dispositions relatives à la directive 1999/5/EC, la directive 89/336/EEC, et à la directive 73/23/EEC.
- Belgique B L'utilisation en extérieur est autorisé sur le canal 11 (2462 MHz), 12 (2467 MHz), et 13 (2472 MHz). Dans le cas d'une utilisation privée, à l'extérieur d'un bâtiment, au-dessus d'un espace public, aucun enregistrement n'est nécessaire pour une distance de moins de 300m. Pour une distance supérieure à 300m un enregistrement auprès de l'IBPT est requise. Pour une utilisation publique à l'extérieur de bâtiments, une licence de l'IBPT est requise. Pour les enregistrements et licences, veuillez contacter l'IBPT.
- France F:
  2.4 GHz Bande : les canaux 10, 11, 12, 13 (2457, 2462, 2467, et 2472 MHz respectivement) sont complétement libres d'utilisation en France (en utilisation intérieur). Pour ce qui est des autres canaux, ils peuvent être soumis à autorisation selon le départment. L'utilisation en extérieur est soumis à autorisation préalable et très restreint.
  5 GHz Bande: Conformément aux décisions de la CEPT, l'utilisation des fréquences de la bande 5150 MHz - 5350 MHz est autorisée à l'intérieur des bâtiments avec une puissance maximale de 200 mW, et interdite en extérieur. La bande 5470 MHz - 5725 MHz n'est pas ouverte aujourd'hui.
  Vous pouvez contacter l'Autorité de Régulation des Télécommunications (http://www.art-telecom.fr) pour de plus amples renseignements.

  2.4 GHz Band: only channels 10, 11, 12, 13 (2457, 2462, 2467, and 2472 MHz respectively) may be used freely in France for indoor use. License required for outdoor installations.
  5 GHz Band: frequencies in the 5150 MHz - 5350 MHz band may be used indoor with maximum power of 200 mW. Their use is forbidden outdoors. The 5470 MHz - 5725 MHz band is not currently open.
  Please contact ART (http://www.art-telecom.fr) for procedure to follow.

- Deutschland D: Anmeldung im Outdoor-Bereich notwending, aber nicht genehmigungspflichtig. Bitte mit Händler die Vorgehensweise abstimmen.
- Germany D: License required for outdoor installations. Check with reseller for procedure to follow.
- Italia I: E' necessaria la concessione ministeriale anche per l'uso interno. Verificare con i rivenditori la procedura da seguire. L'uso per installazione in esterni non e' permessa.
- Italy I: License required for indoor use. Use with outdoor installations not allowed.
- The Netherlands NL License required for outdoor installations. Check with reseller for procedure to follow.
- Nederlands NL Licentie verplicht voor gebruik met buitenantennes. Neem contact op met verkoper voor juiste procedure.

Table of Contents

Chapter 1: Introduction

The Dual-Band Wireless A+B Notebook Adapter

The Linksys Dual-Band Wireless A+B Notebook Adapter lets your notebook communicate with today's wireless network standard and prepares you for the future. With one PC Card, you can connect with the 2.4GHz, 802.11b wireless networks so prevalent in homes, businesses and public "hotspots" already, and also a growing number of 5GHz, 802.11a networks that are spreading across the country.

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. To keep your communications secure, the PC Card supports up to 152-bit data encryption.

802.11b wireless networks are commonly found in corporate environments and are used 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. The 802.11a standard is almost five times faster than 802.11b, and operates in the less crowded 5GHz radio band, but it's not as common—yet. It is quickly being deployed wherever higher-speed connectivity is desired.

Join the wireless revolution. With the Linksys Dual-Band Wireless Notebook Adapter, you'll be ready to connect to either type of wireless network, wherever you go, now and in the future.

Features

- Connects to Either 802.11b (2.4GHz) or 802.11a (5GHz) Networks without Changing Adapters
- Up to 152-bit WEP Encryption
- Easy-to-use Setup Wizard
- Detailed Monitoring and Performance Utility
- 802.11b and 802.11a Compliant
- Free Technical Support—24 Hours a Day, 7 Days a Week, Toll-Free US Calls
- 1-Year Limited Warranty

Chapter 2: Planning Your Wireless Network

Network Topology

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

Ad-Hoc versus Infrastructure Mode

Unlike wired networks, wireless networks have two different modes in which they may be set up: **infrastructure** and **ad-hoc**. An infrastructure configuration is a WLAN and wired LAN communicating to each other through an access point. An ad-hoc configuration is wireless-equipped computers communicating directly with each other. Choosing between these two modes depends on whether or not the wireless network needs to share data or peripherals with a wired network or not.

If the computers on the wireless network need to be accessed by a wired network or need to share a peripheral, such as a printer, with the wired network computers, the wireless network should be set up in **infrastructure** mode. (See Figure 2-1.) The basis of infrastructure mode centers around an *access point*, which serves

Figure 2-1

as the main point of communications in a wireless network. Access points transmit data to PCs equipped with wireless network cards, which can *roam* within a certain radial range of the access point. Multiple access points can be arranged to work in succession to extend the roaming range, and can be set up to communicate with your Ethernet (wired) hardware as well.

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

Figure 2-2

Chapter 3: Getting to Know the Dual-Band Wireless A+B Notebook Adapter

The Adapter's LEDs

Figure 3-1

Flash alternately

Green. The LEDs flash in alternate sequence, one after another, when the Adapter is searching for an access point or wireless router.

Flash in unison

Green. The LEDs flash in unison when the Adapter is connected to an access point or wireless router.

Chapter 4: Software Installation and Configuration for Windows 98, Me, and 2000

Overview

The Dual-Band Wireless A+B Notebook Adapter Setup Wizard will guide you through the installation procedure for Windows 98, Me, and 2000. The Setup Wizard will install the WLAN Monitor and driver, as well as configure the Adapter.

Important for Windows XP users: Do **NOT** run the Setup Wizard. Proceed directly to "Chapter 5: Hardware Installation."

Important for Windows 98, Me, and 2000 users: 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 Figure 4-1 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).

Figure 4-1

Setup Wizard Instructions for Windows 98, Me, and 2000

1. To install the Adapter, click the **Next** 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.
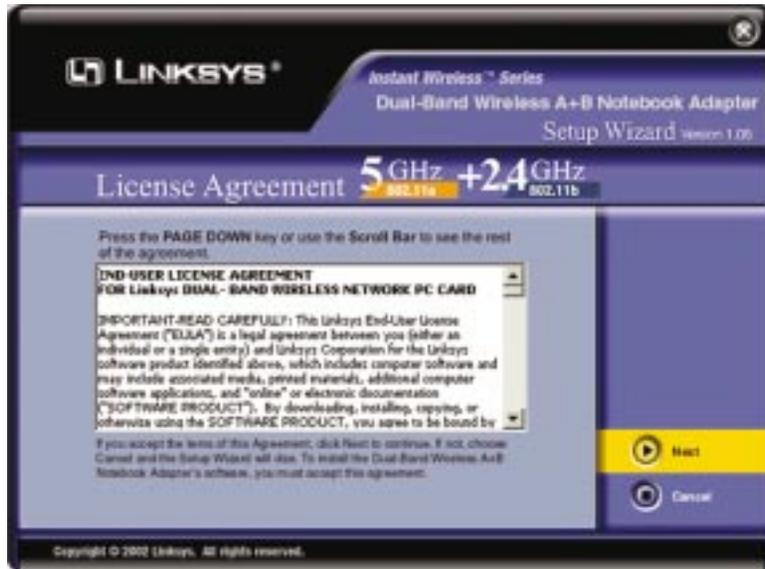
Figure 4-2

3. 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. Do not use the Ad-Hoc mode if you want your wireless computers to communicate with computers on your wired network.

In the *SSID* 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). Click the **Next** button.
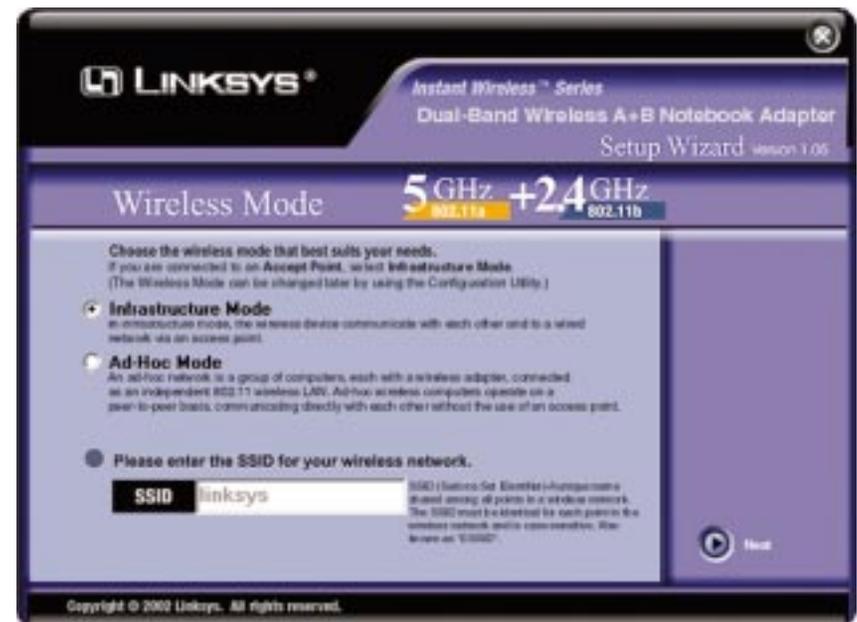
Figure 4-3

4. If you chose Infrastructure Mode, go to *Step 5* now. If you chose Ad-Hoc Mode, select the type of network your notebook will connect to, **802.11a** or **802.11b**. Click the **Next** button, and go to *Step 5*. Click the **Back** button to change any settings.
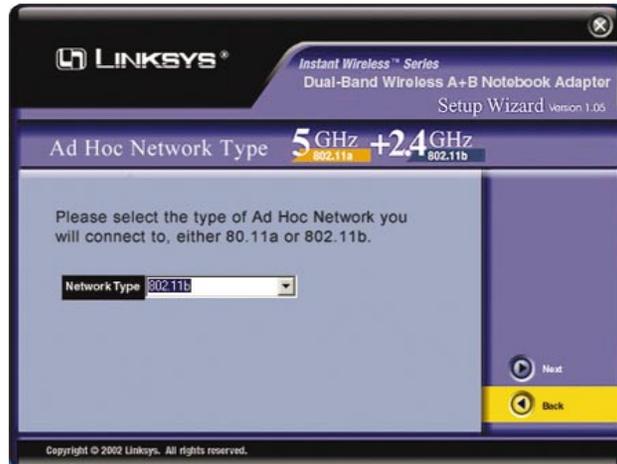
Figure 4-4

5. 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.
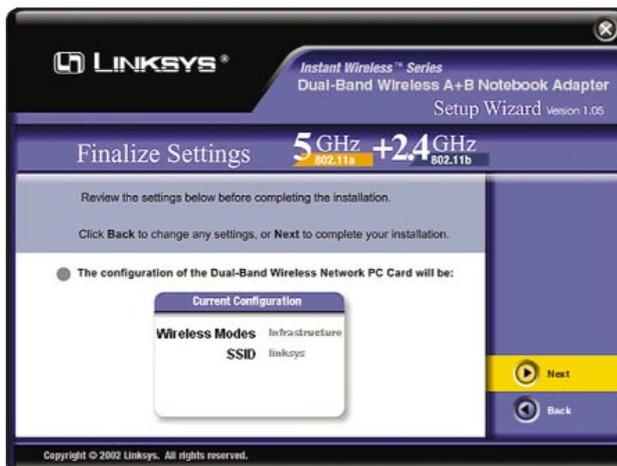
Figure 4-5

6. For Windows 2000, you may be informed that a digital signature has not been found (see Figure 4-6). This is normal, and it has been verified that the Adapter does work with Windows 2000. Click the **Yes** button to continue.
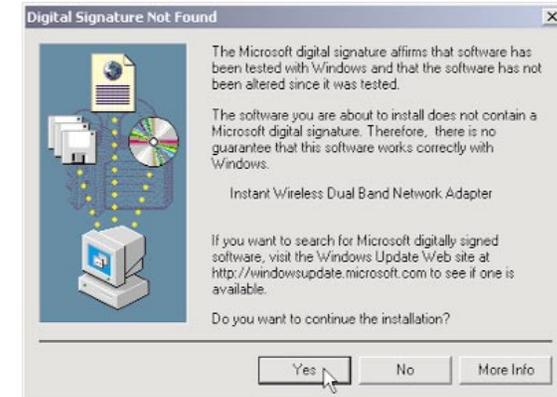
Figure 4-6

7. After the files have been successfully copied, the screen in Figure 4-7 will appear. Click the **Exit** button.

Figure 4-7

Proceed to "Chapter 5: Hardware Installation."

Chapter 5: Hardware Installation

![warning icon] **Important for Windows 98, Me, and 2000 users:** You must run the Setup Wizard to install the software before installing the hardware.

![warning icon] **Important for Windows XP users:** You must install the Adapter's hardware before installing the software.

1. Turn off your notebook PC.

2. Locate an available PCMCIA slot on your notebook PC.

3. With the Adapter's label facing up, as shown in Figure 5-1, slide the Adapter completely into the PCMCIA slot.

4. Restart your notebook PC.

Figure 5-1

5. You may see several screens appear as the driver installation is finalized. For Windows 2000, you may be informed that a digital signature has not been found. This is normal, and it has been verified that the Adapter does work with Windows 2000. Click the **Yes** button to continue.

6. 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 proper location (e.g., **D:**).

If your PC is using Windows 98, Me, or 2000, proceed to the next section, "Chapter 7: Using the WLAN Monitor for Windows 98, Me, and 2000."

If your PC is using Windows XP, proceed to "Chapter 6: Driver Installation and Configuration for Windows XP."

Chapter 6: Driver Installation and Configuration for Windows XP

Overview

After inserting the Adapter into your notebook, you will install the driver and configure the Adapter.

Driver Installation for Windows XP

1. Windows XP will automatically detect the Adapter. Insert the Setup CD-ROM into the CD-ROM drive. Click the radio button next to **Install the software automatically (Recommended)**. Then click the **Next** button.

Figure 6-1

2. Windows will notify you that the driver has not passed Windows Logo testing. This is normal, and it has been verified that the Adapter does work with Windows XP. Click the **Continue Anyway** button.

Figure 6-2

3. When Windows has finished installing the driver, click the **Finish** button.
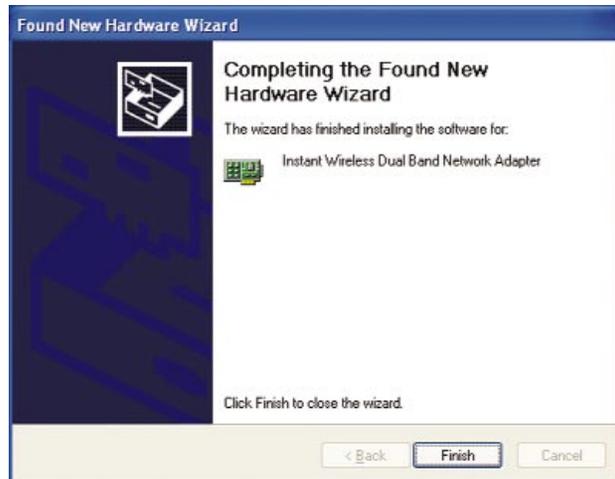
Figure 6-3

You have now completed the driver installation for the Adapter. To configure the Adapter, proceed to the next section, "Windows XP Wireless Zero Configuration."

Windows XP Wireless Zero Configuration

For Windows XP users: Windows XP has a built-in configuration tool. Use Windows XP Wireless Zero Configuration (in the system tray at the bottom of your screen) to configure the Adapter.

1. After installing the Adapter, the Windows XP Wireless Zero Configuration icon will appear in your computer's system tray (see Figure 6-4). Double-click the icon.

Figure 6-4

2. The screen that appears will show any available wireless network. Select the network you want.

   If this network has WEP encryption enabled, go to step 3. If this network does not have WEP encryption enabled, then the screen in Figure 6-5 will appear. Check the box next to *Allow me to connect to the selected wireless network, even though it is not secure*. Then click the **Connect** button and go to step 4.

Figure 6-5

Note: In Steps 2 and 3, these are the instructions and screenshots for Windows XP with Service Pack 1 installed. If you have not installed Service Pack 1, select the network you want, and click the **Connect** button. If the network has WEP encryption enabled, enter the WEP key in the *Network key* field, and then click the **Connect** button.

3. The screen in Figure 6-6 will appear. Enter the WEP key of your wireless network in the *Network key* field, and re-enter it in the *Confirm network key* field. Click the **Connect** button.

> ⚠️ **Note:** Wireless Zero Configuration does not support the use of a passphrase. Enter the exact WEP key used by your access point.
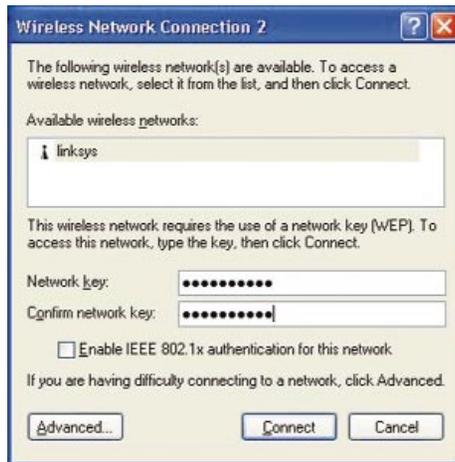
Figure 6-6

4. The screen in Figure 6-7 will appear if your connection is active.

Figure 6-7

For more information about WEP, refer to your access point's documentation, or visit *www.linksys.com*.

For more information about wireless networking on a Windows XP computer, enter the keyword **wireless** in the Windows XP search engine.

Congratulations!
Your notebook is now connected to your wireless network.

Chapter 7: Using the WLAN Monitor for Windows 98, Me, and 2000

Overview

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+B Notebook Adapter WLAN Monitor icon will appear in your system tray. Double-click the icon (see Figure 7-1).

Figure 7-1

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.

Figure 7-2

Link Information

The *Link Information* screen displays signal strength and link quality information about the current connection and provides a button to click for additional status information.
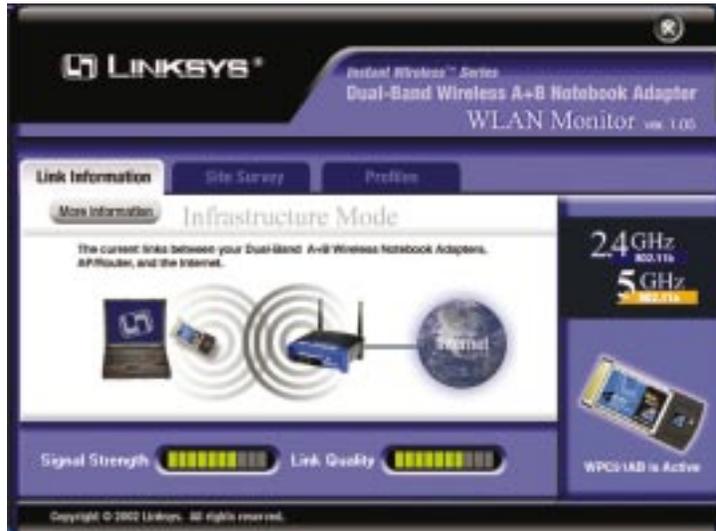
Figure 7-3

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 more information about the wireless network connection.

Click the **X** (Close) button in the upper right corner to exit the WLAN Monitor.
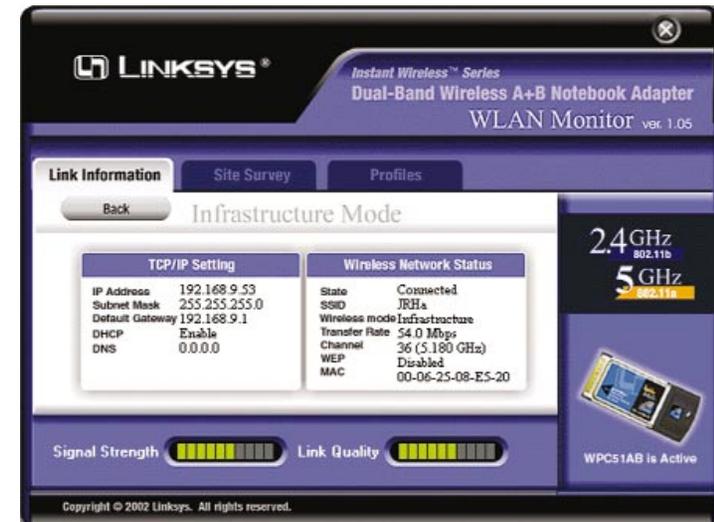
Figure 7-4

TCP/IP Setting
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.
DHCP - The status of the DHCP client.
DNS - The DNS address of the Adapter.

Wireless Network Status
State - The status of the wireless network connection.
SSID - The unique name of the wireless network.
Wireless Mode - The mode of the wireless network currently in use.
Transfer Rate - The data transfer rate of the current connection.
Channel - The channel to which the wireless network devices are set.
WEP - The status of the WEP encryption security feature.
MAC - The MAC address of the wireless network's access point.

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 **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.
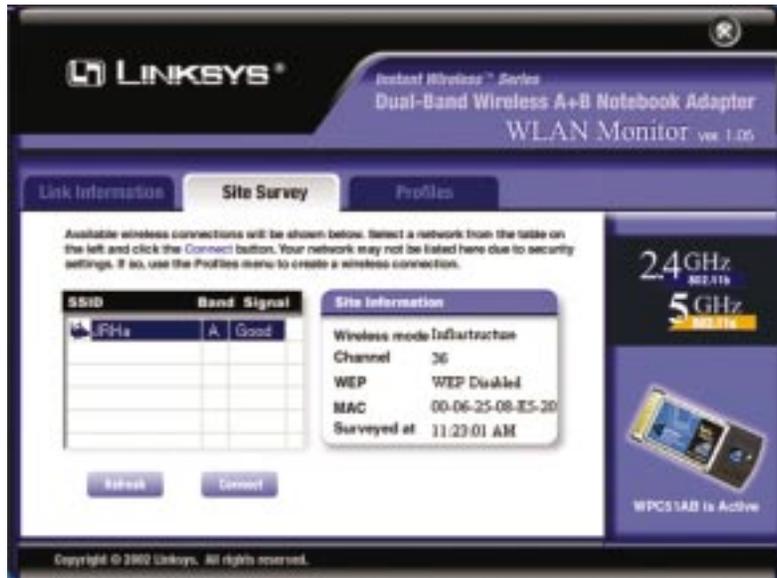
Figure 7-5

SSID - The SSID or unique name of the wireless network.
Band - The type of wireless network. "A" represents 802.11a (5GHz), and "B" represents 802.11b (2.4GHz).
Signal - The percentage of signal strength, from 0 to 100%.

Site Information
Wireless Mode - The mode of the wireless network currently in use.
Channel - The channel to which the wireless network devices are set.
WEP - The status of the WEP 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. If the wireless network has WEP encryption enabled, you will see the screen shown in Figure 7-6.

Figure 7-6

In the *WEP* drop-down box, select the type of WEP encryption used by the wireless network: **64-bit**, **128-bit**, or **152-bit** WEP.

If the wireless network uses a passphrase, enter the passphrase in the *Passphrase* field. If the wireless network uses a WEP key, enter the WEP key in the *Key 1* field.

Click the **OK** button to complete the network connection and return to the *Site Survey* screen, or click the **Cancel** button to cancel the network connection and return to the *Site Survey* screen.

On the *Site Survey* screen, click the **X** (Close) button in the upper right corner to exit the WLAN Monitor.

Profiles

The *Profiles* screen lets you save different configuration profiles for different network setups. You can also import or export profiles. The default profile holds the initial configuration saved when you ran the Setup Wizard.

Figure 7-7

Profile - Name of the connection profile.
SSID - The wireless network's unique name, as set in the connection profile.

Profile Information
Network Type - The mode of the wireless network currently in use.
Transfer 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.)
Channel - The channel to which the wireless network devices are set.
WEP - The status of the WEP 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.
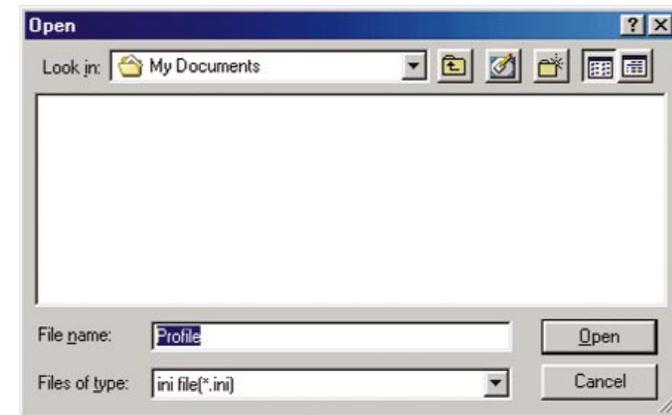
Figure 7-8

Export - To save the profile(s) in a different location, click the **Export** button. Direct Windows to the appropriate folder, and click the **Save** button.
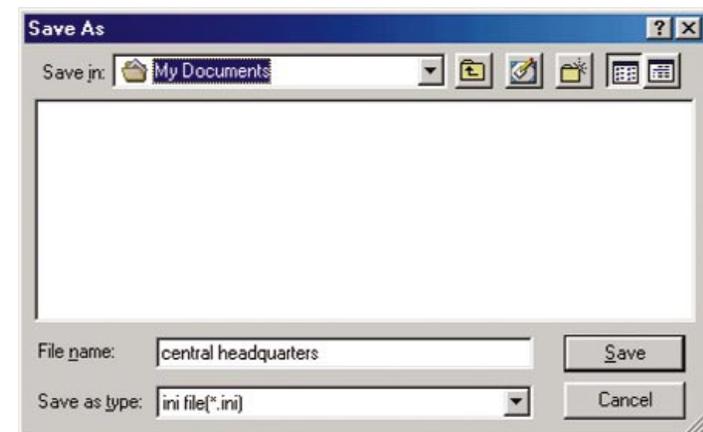
Figure 7-9

> **Note:** If you have more than one profile, all profiles will be automatically selected and exported to the same folder.

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

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

Creating a New Profile

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

Figure 7-10

2. The *Choose a 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. 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.

Figure 7-11

3. The *Basic Settings* screen will appear. Complete the *Profile Name* and *SSID* fields. The default SSID setting is **linksys** (all lowercase). Then select the appropriate setting from the *Network Type* drop-down box. Click the **Next** button to continue or the **Back** button to return to the previous screen.

    Profile Name - Give this new profile a name.

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

    Network Type - For infrastructure networks, the Network Type is set to Auto and cannot be changed. For ad-hoc networks, choose the appropriate setting, **802.11a** (5GHz) or **802.11b** (2.4GHz).
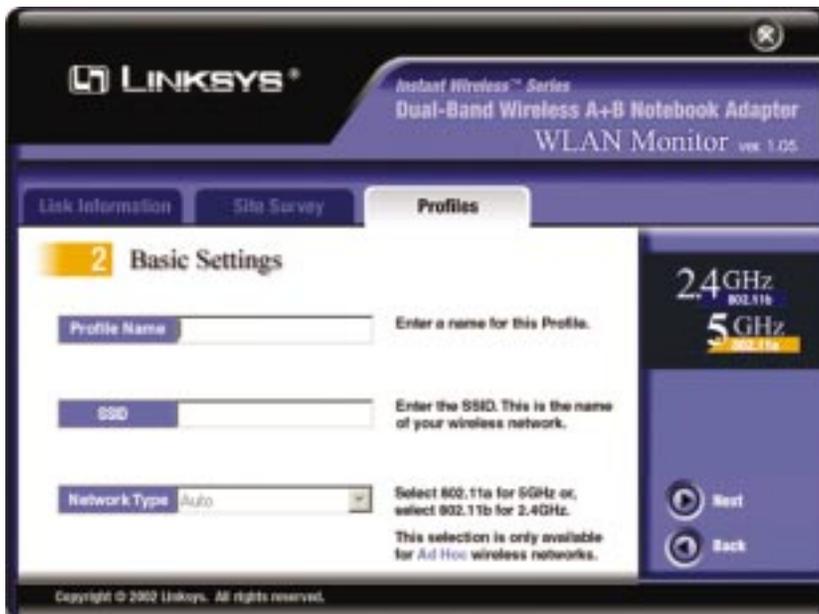
Figure 7-12

4. The *Network Setting* screen will appear.

    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 **Back** button to return to the previous screen. Then go to *Step 6*.

    If your network does not have a DHCP server, click the radio button next to **Specify the IP address**. Click the **Next** button to continue, or click the **Back** button to return to the previous screen. Then go to *Step 5*.
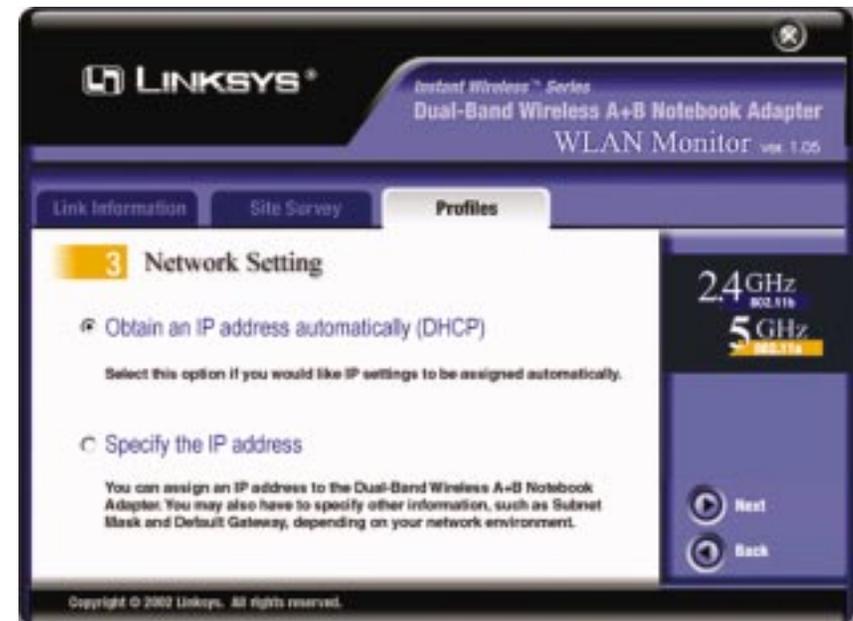
Figure 7-13

5. The *Network Setting - Specify IP address* screen will appear. Enter an **IP Address**, **Subnet Mask**, **Default Gateway**, and **DNS** appropriate for your network. Enter each address in this format: **xxx.xxx.xxx.xxx** (the x's represent the numbers that make up each address). You must specify the IP Address and Subnet Mask on this screen. If you are unsure about the Default Gateway and DNS addresses, then leave these fields alone.

Click the **Next** button to continue or the **Back** button to return to the previous 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 - Enter the DNS addresses of your Ethernet (wired) network here.
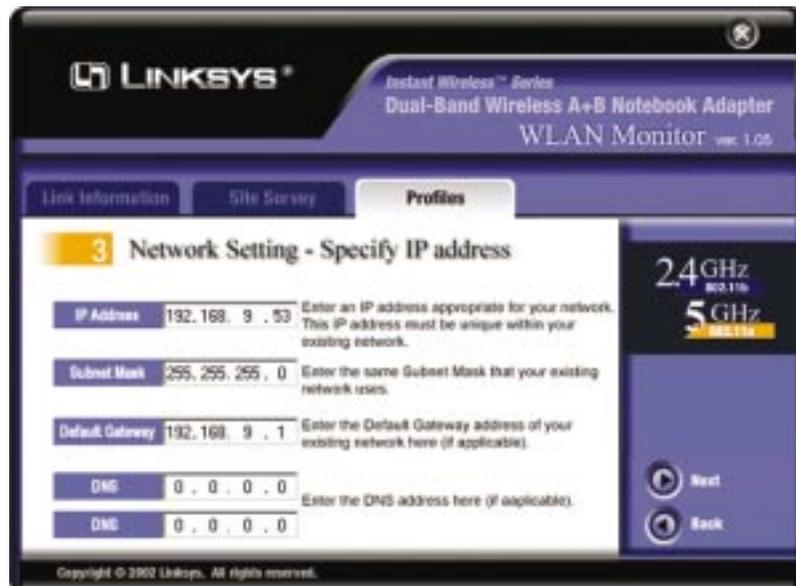
Figure 7-14

6. If you are configuring the Adapter for a 2.4GHz, 802.11b network, then go to *Step 7*. If you are configuring the Adapter for a 2.4GHz, 802.11b network, then go to *Step 8*.

7. The *Security Settings* screen will appear. Enable or disable Wired Equivalent Privacy (WEP) encryption for your wireless network. If you enable WEP, enter a Passphrase or WEP key. Click the **Next** button to continue or the **Back** button to return to the previous screen.

WEP (Disabled/64-bit WEP/128-bit WEP) - If you do not want to use WEP encryption, choose **Disabled**. To use WEP encryption (recommended to increase network security), select **64-bit** or **128-bit WEP** from the drop-down menu, and enter either a Passphrase or WEP key.

Passphrase - Instead of manually entering WEP keys, you can enter a Passphrase, 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 wireless network and is compatible with Linksys wireless products only. (If you have any non-Linksys wireless products, enter the WEP key(s) manually on those products.)

Key 1 - This WEP key 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".
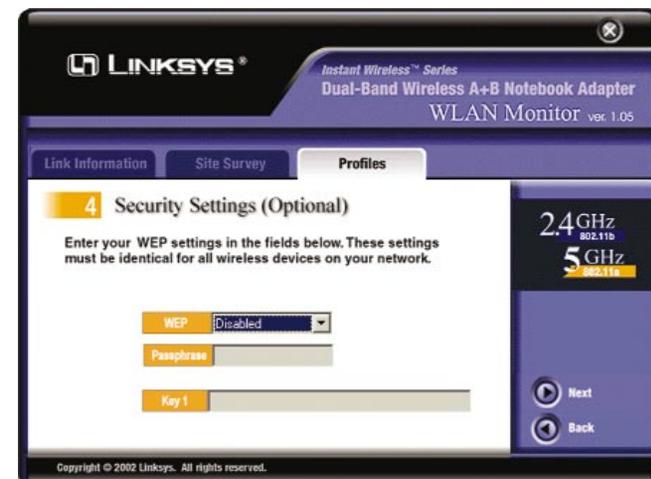
Figure 7-15

8. The *Security Settings* screen will appear. Set the Wired Equivalent Privacy (WEP) encryption for your wireless network by selecting a WEP configuration method (recommended to increase network security). If you enable WEP encryption, enter a WEP key in the *Key 1* field. Click the **Next** button to continue or the **Back** button to return to the previous screen.

WEP (Disabled/64-bit WEP/128-bit WEP/152-bit WEP) - If you do not want to use WEP encryption, choose **Disabled**.

To use WEP encryption, select **64-bit**, **128-bit WEP**, or **152-bit WEP** from the drop-down menu. Then enter the WEP key of your wireless network in the *Key 1* field.

Key 1 - This WEP key 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 in length. If you are using 128-bit WEP encryption, then the key must consist of exactly 26 hexadecimal characters in length. Valid hexadecimal characters are "0" to "9" and "A" to "F".
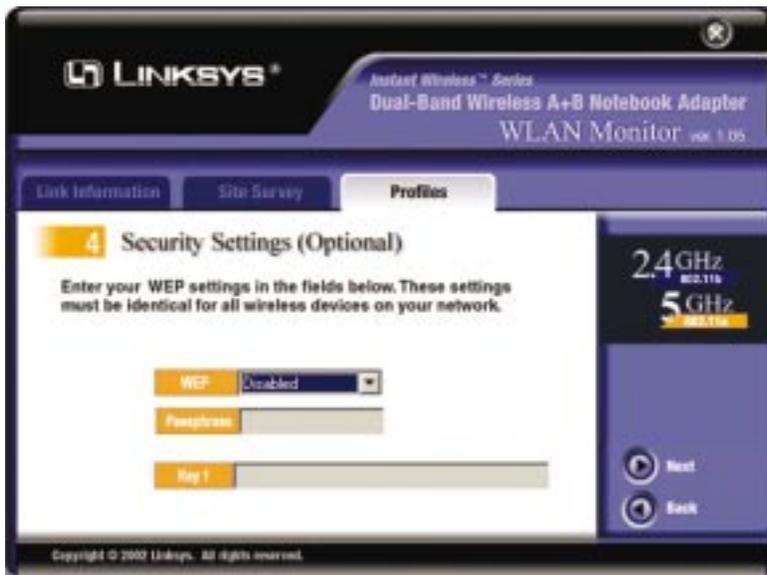
Figure 7-16

9. The *Confirm New Settings* screen will appear. To save the new settings, click the **Yes** button. To cancel the settings and return to the *Profiles* screen, click the **No** button. To edit the new settings, click the **Back** button.

Figure 7-17

10. 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.

Figure 7-18

You have successfully created a connection profile. Click the X (Close) button in the upper right corner to exit the WLAN Monitor.

Appendix A: Troubleshooting

Common Problems and Solutions

This chapter provides solutions to problems that may occur during the installation and operation of the Dual-Band Wireless A+B Notebook Adapter. Read the descriptions below to solve your problems. If you can't find an answer here, check the Linksys website at *www.linksys.com.*

1. My computer does not recognize the Adapter.
• Make sure the Adapter is properly inserted into the PCMCIA slot. Note that the Adapter can be inserted either way, but is correctly only when it is inserted so that the "Instant Wireless" logo on the front of the Adapter cannot be seen. If in doubt, try inserting the Adapter both ways. The Adapter will slide in further when it is correct.

2. The Adapter does not work properly.
• Reinsert the Adapter into your notebook's PCMCIA slot. A beep should be heard if the Adapter is properly inserted.
• For non-Windows environments, make sure that a PCMCIA card service driver is installed on your PC.
• Open the **Control Panel** and click the **PC Card**. Check whether it has a PCMCIA card in one of the sockets or not. If you find the Adapter in one of the sockets, it means that the Adapter has been detected properly. If you see a yellow question mark, the resources are in conflict.
• Right-click **My Computer** and select **Properties**. Select **Device Manager** and click the **Network Adapter**. You will find the Dual-Band Wireless A+B Notebook Adapter if it is installed successfully. If you see the yellow exclamation mark, the resources are in conflict. Click **PCMCIA card** and then click **PCMCIA card service**. You will see the status of the Adapter. If there is a yellow question mark please check the following:
  • Make sure that your notebook has a free IRQ.
  • Make sure that you have inserted the right Adapter and installed the proper driver.
If the Adapter does not function after attempting the above steps, remove the Adapter and do the following:
  • 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 a wired computer linked via an access point in the infrastructure configuration.
• Make sure that the notebook PC is powered on.
• Make sure that the Adapter is configured with the same SSID and security options 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.

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

What IEEE 802.11a features are supported?
The product supports the following IEEE 802.11a functions:
• OFDM protocol
• Multi-Channel Roaming
• Automatic Rate Selection
• RTS/CTS feature
• Fragmentation

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 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 64-bit or 128-bit shared key algorithm, as described in the IEEE 802.11 standard.

Appendix B: Glossary

802.11a - One of the IEEE standards for wireless networking hardware. Products that adhere to a specific IEEE standard will work with each other, even if they are manufactured by different companies. It specifies a maximum data transfer rate of 54Mbps and an operating frequency of 5GHz. The 802.11a standard uses the Orthogonal Frequency Division Multiplexing (OFDM) transmission method. Additionally, the 802.11a standard supports 802.11 features such as WEP encryption for security.

802.11b - One of the IEEE standards for wireless networking hardware. Products that adhere to a specific IEEE standard will work with each other, even if they are manufactured by different companies. The 802.11b standard specifies a maximum data transfer rate of 11Mbps, an operating frequency of 2.4GHz, and WEP encryption for security. 802.11b networks are also referred to as Wi-Fi networks.

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

CTS (**C**lear **T**o **S**end) - An RS-232 signal sent from the receiving station to the transmitting station that indicates it is ready to accept data.

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

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

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

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

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

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

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

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

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

IEEE - The Institute of Electrical and Electronics Engineers. The IEEE describes itself as "the world's largest technical professional society—promoting the development and application of electrotechnology and allied sciences for the benefit of humanity, the advancement of the profession, and the well-being of our members."

The IEEE fosters the development of standards that often become national and international standards. The organization publishes a number of journals, has many local chapters, and several large societies in special areas, such as the IEEE Computer Society.

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

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

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

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

LAN - A local area network (LAN) is a group of computers and associated devices that share a common communications line and typically share the resources of a single processor or server within a small geographic area (for example, within an office building).

MAC Address - The MAC (Media Access Control) address is your computer's unique hardware number.

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

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

OFDM - Developed for wireless applications, Orthogonal Frequency Division Multiplexing (OFDM) technology offers superior performance-increased data rates and more reliable transmissions-than previous technologies, such as DSSS. OFDM is a scheme in which numerous signals of different frequencies are combined to form a single signal for transmission on the medium.

OFDM works by breaking one high-speed data stream into a number of lower-speed data streams, which are then transmitted in parallel. Each lower speed stream is used to modulate a subcarrier. Essentially, this creates a multi-carrier transmission by dividing a wide frequency band or channel into a number of narrower frequency bands or sub-channels. OFDM is also used for other applications, including powerline networking.

Plug-and-Play - The ability of a computer system to configure expansion boards and other devices automatically without requiring the user to turn off the system during installation.

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

SSID (**S**ervice **S**et **I**dentifier) - An identification name that wireless devices use to make connections. In order for wireless devices to communicate, they must all be set to the same channel and they all must use the same SSID. For instance, if you are using an access point to connect two computers using wireless devices, the access point and each of the wireless devices must use the same SSID. Even if they are set to the same channel, they cannot communicate unless the SSID is the same.

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

Subnet Mask - The method used for splitting IP networks into a series of sub-groups, or subnets. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets.

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

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

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

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

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

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

Appendix C: Specifications

Standards	IEEE 802.11a, EEE 802.11b

Channels

802.11a	8 Channels (USA)
802.11b	11 Channels (USA)
	13 Channels (Europe)
	14 Channels (Japan)

Transmit	16 dBm
Receive Sensitivity (typical)	-83 dBm
Network Protocols	TCP/IP, NetBEUI, IPX/SPX
LEDs	2 (not labeled)

Environmental

Dimensions	4.4" x 2.13" x 0.4" (110 mm x 54 mm x 10 mm)
Unit Weight	1.5 oz. (0.043 kg)
Certifications	FCC Class B, CE Mark
Operating Temp.	32ºF to 140ºF (0ºC to 60ºC)
Storage Temp.	-40ºF to 185ºF (-40ºC to 85ºC)
Operating Humidity	10% to 85%, Non-Condensing
Storage Humidity	5% to 90%, Non-Condensing

Appendix D: Warranty Information

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

IN NO EVENT SHALL LINKSYS' LIABILITY EXCEED THE PRICE PAID FOR THE PRODUCT FROM DIRECT, INDIRECT, SPECIAL, INCIDEN-TAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THE PRODUCT, ITS ACCOMPANYING SOFTWARE, OR ITS DOCU-MENTATION. LINKSYS DOES NOT OFFER REFUNDS FOR ANY PROD-UCT.

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

Appendix E: Contact Information

For help with the installation or operation of the Dual-Band Wireless A+B Notebook Adapter, contact Linksys Technical Support at one of the phone numbers or Internet addresses below.

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

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