

Instant Wireless™ Series

Wireless USB Network Adapter



Use this guide to install: WUSB11 ver. 2.5

User Guide

 **LINKSYS**®

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FCC STATEMENT

This Instant Wireless™ USB Network Adapter 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 Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with 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.

FCC RF Radiation Exposure Statement

This device and its antenna(s) must operate with a separation distance of at least 20 cm from all persons 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.

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Chapter 1: Introduction

The Instant Wireless™ USB Network Adapter

Put the “mobile” back into mobile computing with the Linksys Instant Wireless™ USB Network Adapter! The Linksys Instant Wireless™ USB Network Adapter operates in the ISM band, using Direct Spread Spectrum (DSSS) transmission to implement the IEEE 802.11b standard. Users can now move easily between Access Points without the hassle of reconfiguring their connection.

The Instant Wireless™ USB Network Adapter also gives you the freedom to work *your* way, from where *you* want, letting you take full advantage of your PC and providing you with access to all your networked resources from beyond your desktop, and a high-powered built-in antenna with LEDs indicates power and linkage. Compatible with Windows 98, 2000, Millennium, and XP, the Instant Wireless™ USB Network Adapter from Linksys is a true necessity for all your wireless PC applications.

Features

- Up to 11 Mbps High-Speed Data Transfer Rate
- Integrated Equalizer Recovers Weak Signals and Enhances Sensitivity
- Movable External Antenna Improves Signal Quality
- USB Port Powers Your Adapter—No Power Supply Needed!
- Compatible with Windows 98, Millennium, 2000, and XP
- User-Friendly Setup Software Provides Hassle-Free Configuration
- Plug-and-Play Operation Provides Easy Setup
- Works with All Standard Internet Applications
- Interoperable with IEEE 802.11b (DSSS) 2.4GHz-Compliant Equipment
- Capable of up to 128-Bit WEP Encryption
- Free Software Driver Upgrades
- Toll-Free Technical Support—24 Hours a Day, 7 Days a Week for U.S. Only
- 1-Year Limited Warranty

Package Contents



Figure 1-1

- One Instant Wireless™ USB Network Adapter
- One USB Cable
- One Setup Utility CD-ROM
- One Wall Mount
- One Quick Installation Guide and Registration Card (not shown)

System Requirements

- USB-Ready PC
- One free USB port
- Desktop or Notebook PC with CD-ROM Drive
- Microsoft Windows 98, 2000, Millennium, or XP
- Pentium-Class 90MHz or higher
- Minimum 32MB RAM

Chapter 2: Planning Your Wireless Network

Network Topology

A wireless LAN is exactly like a regular LAN, except that each computer in the LAN uses a wireless device to connect to the network. Computers in a wireless LAN must be configured to share the same frequency channel.

The Instant Wireless™ USB Network Adapter provides access to a wired LAN for wireless workstations. An integrated wireless and wired LAN is called an Infrastructure configuration. A group of Instant Wireless™ USB Network Adapter users and an Access Point compose a Basic Service Set (BSS). Each PC equipped with an Instant Wireless™ USB Network Adapter in a BSS can talk to any computer in a wired LAN infrastructure via the Access Point.

An infrastructure configuration extends the accessibility of an Instant Wireless™ USB Network Adapter PC to a wired LAN, and doubles the effective wireless transmission range for two Instant Wireless™ USB Network Adapter PCs. Since the Access Point is able to forward data within its BSS, the effective transmission range in an infrastructure LAN is doubled.

The use of a unique ID in a BSS is essential. All computers that have Instant Wireless™ USB Network Adapter configured without roaming options in an independent BSS must be configured with a BSS ID (that is used in the BSS).

The Wireless LAN Infrastructure configuration is appropriate for enterprise-scale wireless access to a central database, or as a wireless application for mobile users.

Roaming

Infrastructure mode also supports roaming capabilities for mobile users. More than one BSS can be configured as an Extended Service Set (ESS). This continuous network allows users to roam freely within an ESS. All Instant Wireless™ USB Network Adapter PCs within one ESS must be configured with the same ESS ID and use the same radio channel.

Before enabling an ESS with roaming capability, selecting a feasible radio channel and optimum Access Point position is recommended. Proper Access Point positioning combined with a clear radio signal will greatly enhance performance.

Chapter 3: Getting to Know the Wireless USB Network Adapter

The Wireless USB Network Adapter's Port and LEDs

The Wireless USB Network Adapter's USB port is located on the back of the Adapter.



Figure 3-1

The Wireless USB Network Adapter's USB port

USB Port The **USB Port** is a port installed in your PC, enabling you to connect to USB peripherals. To work with USB ports, your PC must be running Windows 98, 2000, Millennium, or XP.

Your Wireless USB Network Adapter comes with a USB cable that has two different types of connectors. Type A, the master connector, is shaped like a rectangle and plugs into your PC's USB port. Type B, the slave connector, resembles a square and connects to the USB port on the rear panel of your Wireless USB Network Adapter.

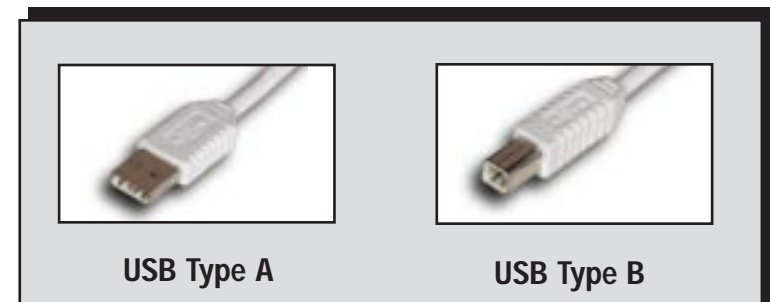


Figure 3-2



Note: Windows 95 and NT do not support the USB Adapter.



Figure 3-3

The LED Indicators

- Power** *Green.* The **Power** LED lights up when the Wireless USB Network Adapter is powered on.
- Link** *Red.* The **Link** LED lights up when the Adapter has an active connection. If the LED is not on, the Adapter is not interfacing with the network.

Chapter 4: Installation and Configuration of the USB Adapter for Windows 98, 2000, and ME

This Wireless USB Network Adapter Setup Utility will guide you through the Install and Uninstall Procedure for Windows 98, 2000, and ME.



Important for Windows XP users: Do **NOT** run the Wireless Network Adapter Setup Utility. Proceed directly to Chapter 5: Connecting Your Wireless USB Network Adapter.



Note to Windows 98, 2000, and ME users: You must install this software before installation of the hardware.

Insert the **Setup Utility CD** into your CD-ROM Drive. The Setup Utility should run automatically and Figure 4-1 should appear. If it does not, click the **Start** button and choose **Run**. In the box that appears, enter **D:\setup.exe** (where “D” is the letter of your CD-ROM drive).



Figure 4-1

- The **Install** tab begins the software installation process, as shown on the next page.
- The **Uninstall** tab shows you how to uninstall the adapter (please see the section titled **Uninstall Procedures** for more information).
- The **User Guide** tab shows you a PDF file of the User Guide.
- The **Contact Us** tab links you to the Linksys website.
- The **Exit** tab allows you to exit the Setup Utility.

Software and Driver Installation for Windows 98, 2000, and ME

1. To install your Wireless USB Network Adapter, click on the **Install** tab.
2. Once you see Figure 4-2, click the **Next** button to continue.

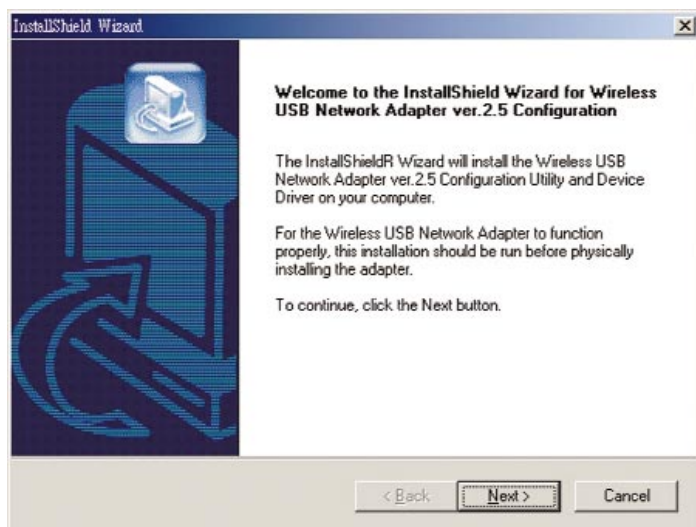


Figure 4-2

3. After reading the Warranty Policy, click the **Yes** button if you agree, or **No** to end the installation.

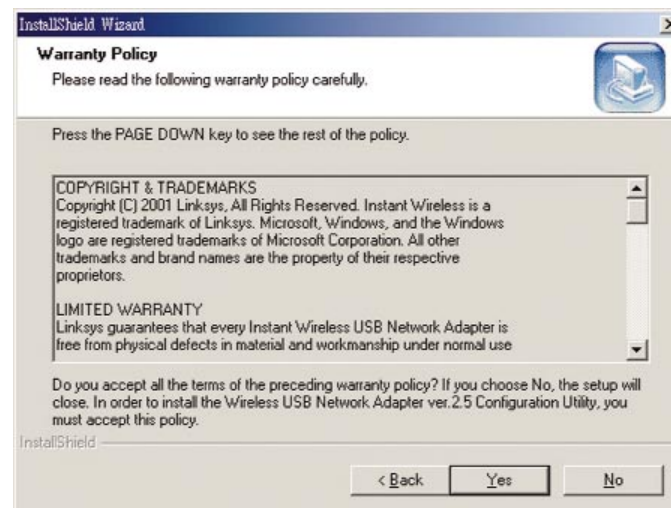


Figure 4-3

4. The InstallShield Wizard will automatically choose a folder where Setup will install files. Click the **Next** button.

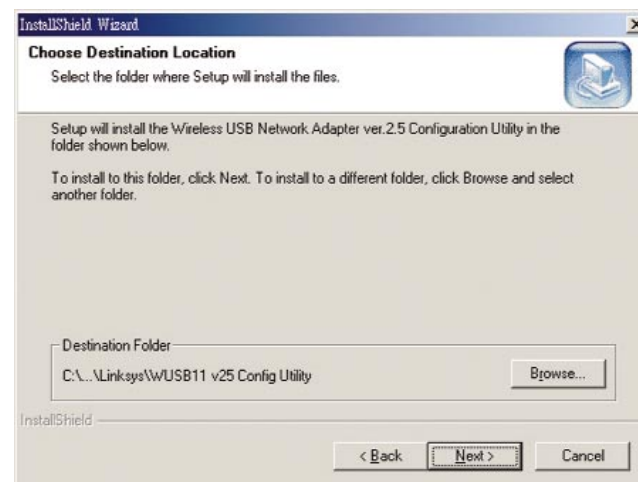


Figure 4-4

5. The InstallShield Wizard will ask you to choose a wireless mode. Choose the mode that applies to your network. **Ad-Hoc Mode** is used for simple peer-to-peer networking or sharing of local resources between wireless Networked PCs, and **Infrastructure Mode** allows a wireless network to be integrated into an existing, wired network through an access point, permitting roaming between access points while maintaining a connection to all network resources. Then, click the **Next** button.

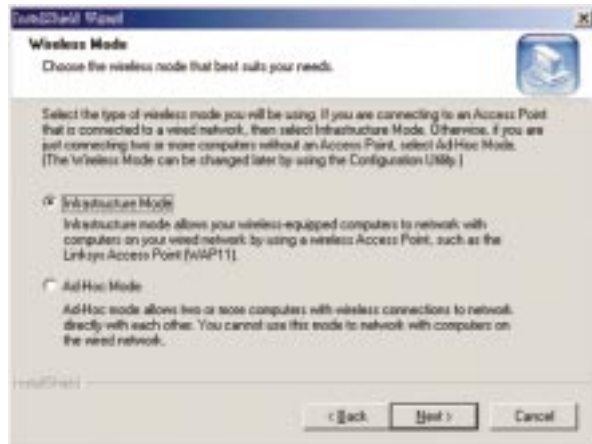


Figure 4-5

6. If you chose **Infrastructure Mode**, go on to Step 7 now. If you chose **Ad-Hoc Mode**, choose the correct operating channel that applies to your network. The channel you choose should be set as the same as the other points in your wireless network. The default channel is set to Channel 6. Click **Next**.

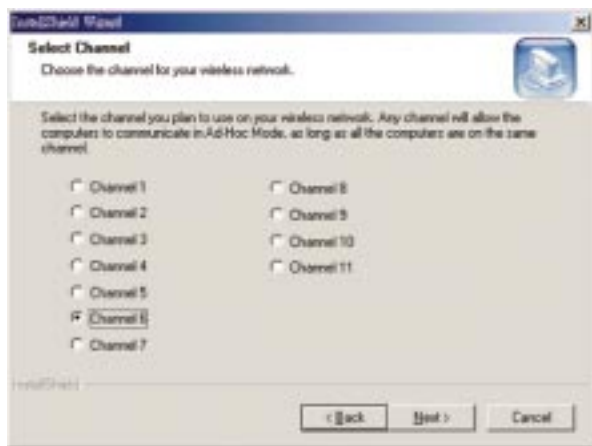


Figure 4-6

7. Enter in the name of your SSID for your Ad-Hoc or Infrastructure setting. The SSID must be identical for all points in the network. To join any available SSID, type **ANY**. The default setting is **linksys** (all lowercase). Click the **Next** button.

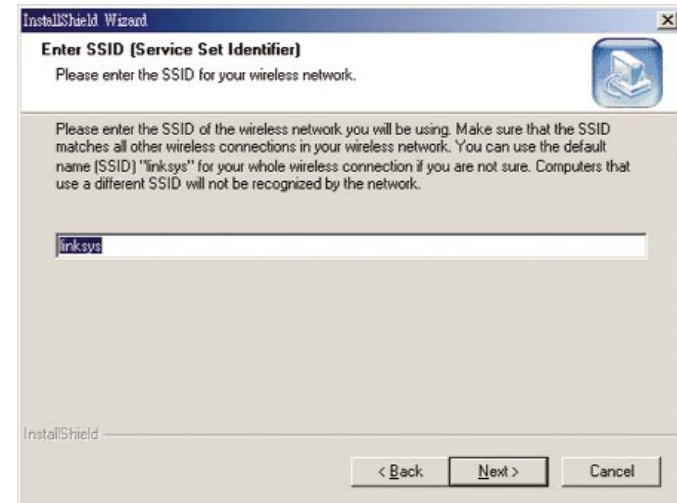


Figure 4-7

8. The Wizard will ask you to review your settings before starting to copy files. Select **Back** to review or change any settings, or select **Next** if you are satisfied with your settings.

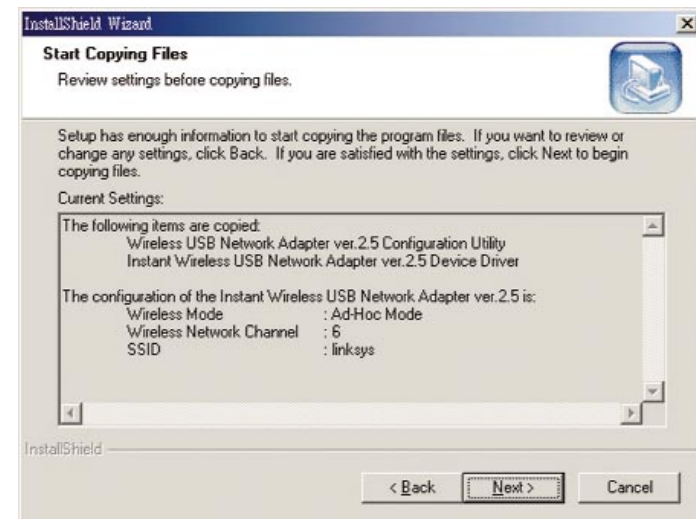


Figure 4-8

9. The InstallShield Wizard will begin copying the files. The bar in the middle of the screen below shows the percentage of files copied.

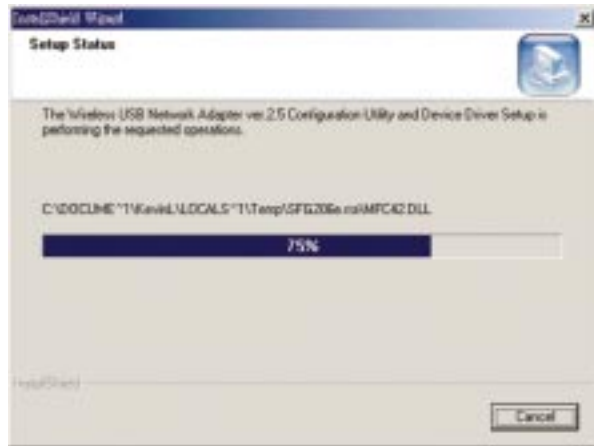


Figure 4-9

10. Once the Wireless USB Network Adapter Configuration Utility has been successfully installed, the Wizard will ask you to restart your computer. Select **Yes, I want to restart my computer now**, and then click the **Finish** button to restart.



Figure 4-10

You have now completed the installation of your Wireless USB Network Adapter Configuration Utility. To connect the Wireless USB Network Adapter, please go to Chapter 5: Connecting Your Wireless USB Network Adapter.

Chapter 5: Connecting Your Wireless USB Network Adapter



Important for Windows 98, 2000, and ME users: You must install the Adapter's software before installation of the hardware.



Important for Windows XP users: You must install the Adapter's hardware before installation of the software.

To install your Wireless USB Network Adapter, first connect one end of the USB cable to the Adapter. Then, connect the other end of the USB cable to the USB port on your desktop or notebook PC. Since the Adapter gets its power from the PC's USB port, there is no external power adapter. The Power LED should light up green when the Adapter is attached and the PC is on.

The USB Icon

The USB icon shown below marks a USB port on a PC or device.

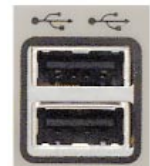


Figure 5-1

USB Cabling

The Wireless USB Network Adapter comes with one USB cable. One end of the USB cable has a rectangular connector called a **Type A** connector. The other end of the cable has a square **Type B** connector.

The USB cable's **Type B** tip connects to the USB device, that is, your USB Network Adapter. The **Type A** end connects to a computer's USB port.



The picture shows two USB ports as they might appear on your computer. Note the two USB icons marking the ports.

Figure 5-2

Removing the Wireless USB Network Adapter

The adapter is Hot Swappable; this means that you can remove or reconnect the adapter whenever you want.



Note: If you have multiple USB ports on your PC, plug the adapter into the same port; otherwise, the adapter will be detected as a new device.

Using the Wireless USB Network Adapter's Wall Mount

The Wireless USB Network Adapter's Wall Mount allows you to easily install the Wireless USB Network Adapter onto your wall for convenient use and better reception.

Before installing the Wall Mount into the Wireless USB Network Adapter, take the separate adhesive strip of velcro and attach it to the wall where you will be mounting the Wireless USB Network Adapter.



Figure 5-3

The Wall Mount, shown in Figure 5-3, is included with the Wireless USB Network Adapter.

To install it into the Wireless USB Network Adapter, simply slide it into the Adapter's back, as shown in steps one, two, and three.

STEP ONE



Figure 5-4

STEP TWO



Figure 5-5

STEP THREE



Figure 5-6

Once the Wall Mount is attached to the Wireless USB Network Adapter, stick it to the velcro strip you've attached to your wall for wall mounting.

Hardware Detection for Windows 98, 2000, and ME

After the Wireless USB Network Adapter has been physically connected to your computer, Windows will detect the new hardware. In most cases, Windows will then automatically copy all of the files needed for networking. If Windows asks you for the files, and D is your computer's CD-ROM drive, they may be located at:

- D:\win98 for Windows 98
- D:\Win9x for Windows ME, or
- D:\I386 for Windows 2000.

These files may also be located at C:\windows\options\cabs. Please check with your operating system's user guide for the exact location.



Note to Windows 2000 Users: You may be prompted at this time that a digital signature has not been found. Click **Yes** to continue, and then click the **Finish** button to end the hardware detection process.



Important for Windows XP users: After the Wireless USB Network Adapter has been physically connected to your computer, Windows will detect the new hardware. Proceed to Chapter 6: Installation and Configuration of the USB Adapter for Windows XP.

Chapter 6: Installation and Configuration of the USB Adapter for Windows XP

After installing the Wireless USB Network Adapter in your computer, you will install the network driver.



Important for Windows XP users: Do **NOT** run the Wireless Network Adapter Setup Utility. If the Setup Utility runs automatically after the Setup Utility CD has been inserted, then click the **Exit** tab.

1. Windows XP will automatically detect the presence of the Wireless USB Network Adapter in your computer. Insert the **Setup Utility CD** into your CD-ROM Drive. Click the radio button next to **Install from a list or specific location (Advanced)**. Then click the **Next** button to continue.



Figure 6-1

- Click the radio button next to **Search for the best driver in these locations**. Select **Include this location in the search;** and enter **D:\WINXP** in the **location** field (if “D” is the letter of your CD-ROM drive). Click the **Next** button.

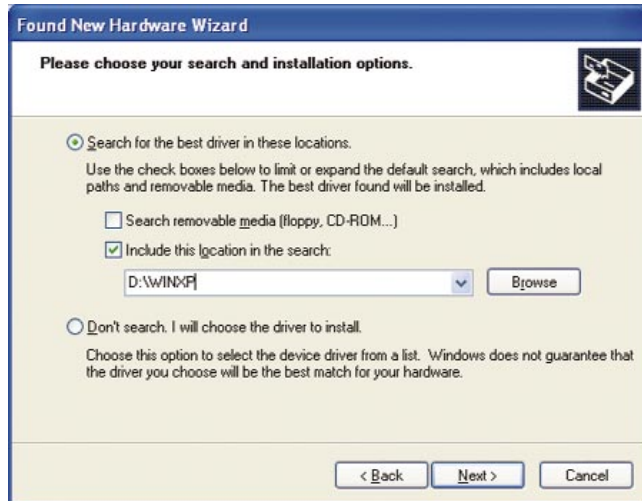


Figure 6-2

- Windows will notify you that the driver has not passed Windows Logo testing. Since this product has been tested to work with Windows XP, click the **Continue Anyway** button.



Figure 6-3

- Windows will tell you when it has finished installing the new driver. Click the **Finish** button.



Figure 6-4

You have now completed the installation of your Wireless USB Network Adapter. Proceed to Chapter 8: Configuring the Wireless USB Network Adapter.

Chapter 7: Installing Network Protocols

Protocols are necessary for computers to be recognized on your network. Windows 2000 and XP users need to check their Windows User Guides for protocol installation.

Installing the Network Protocols for Windows 98 and ME

1. From the **Start** Menu, select **Settings** and bring up the **Control Panel**. From the Control Panel, double-click on the **Network** icon.

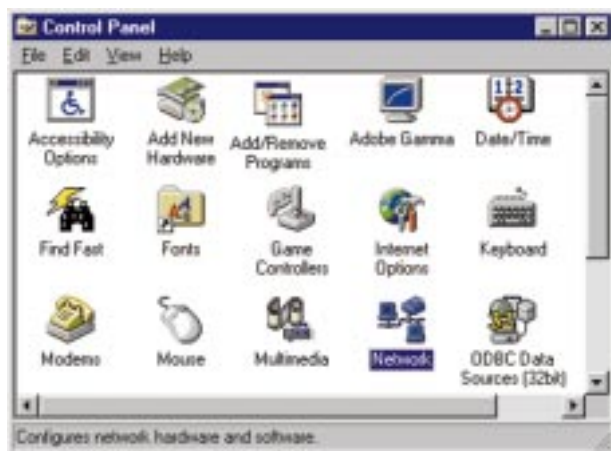


Figure 7-1



Note: Before adding any network protocols, verify that the protocol is not already installed. Never install duplicate protocols.

2. Select **Network USB Card** from the list, and click the **Add** button.

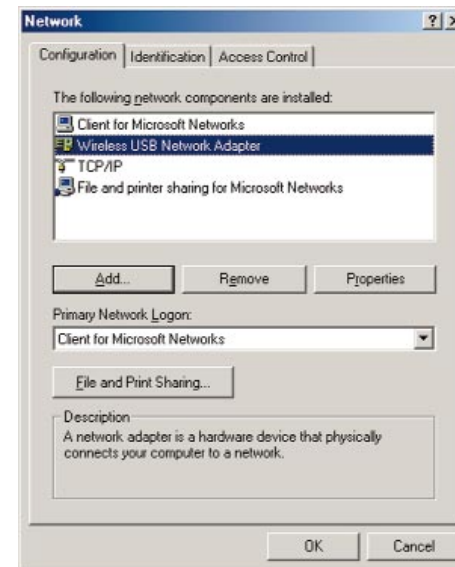


Figure 7-2

3. Highlight **Protocol**, and click the **Add** button.

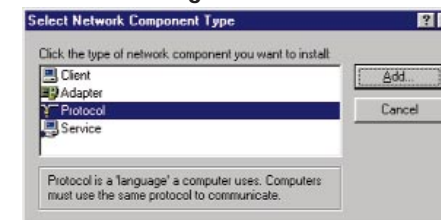


Figure 7-3

4. Select **Microsoft** from the list of "Manufacturers" and **TCP/IP** from the list of "Network Protocols." Click the **OK** button to close the Network window. Windows may start copying some files or ask you for your Windows installation files at this time. After the files are copied, Windows may ask you to restart. Click **Yes** to restart and complete the installation process.

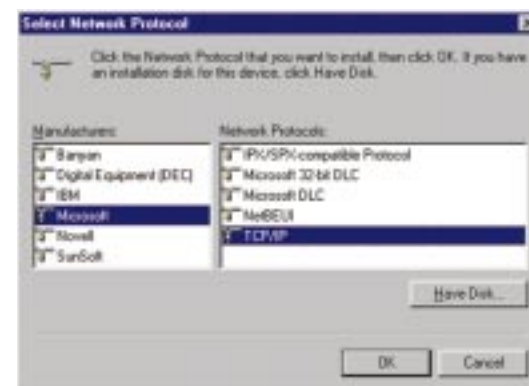


Figure 7-4

Chapter 8: Configuring the Wireless USB Network Adapter

After installing the Network Adapter, Windows 98, Millennium, 2000, and XP will automatically identify the Adapter. Next, you may need to configure the Adapter's driver software.



Important for Windows XP users: Windows XP has built-in configuration tools. Use the Windows XP Wireless Zero Configuration to configure the Adapter.

1. After installing the Adapter, the **Wireless USB Network Adapter Configuration Utility** icon will appear on your system tray. Double-click on the icon of the green monitor in Figure 8-1, and then Figure 8-2 will appear:



Figure 8-1



Figure 8-2

Figure 8-2 shows you the status of your current connection. Click the **OK** button to close the Configuration Utility.

2. Select the **Configuration** tab. In the Profile box, you can enter a name for a profile or group of settings, and change any of the settings on this page. Then, multiple profiles can be saved with different settings. These profiles allow multiple configurations for quick switching between networks, etc. Under the **Wireless Mode** drop-down box, you may choose either Infrastructure or Ad-Hoc.

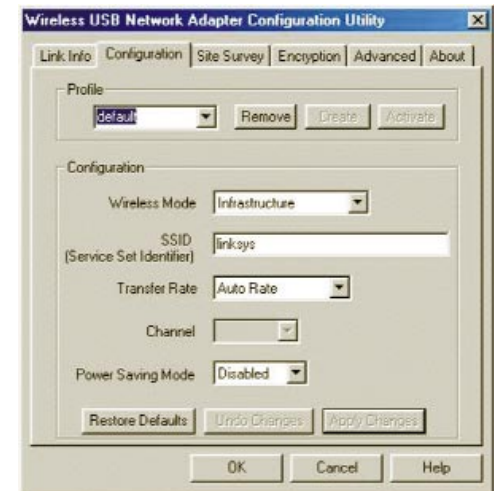


Figure 8-3

Infrastructure Mode allows a wireless adapter to

communicate with a wired network employing an access point, while the Ad-Hoc mode allows wireless-to-wireless, peer-to-peer communication. If you choose Infrastructure, the **SSID** should have the same name as the Access Point. If you choose **Ad-Hoc**, all clients should share the same **SSID** name. You may also select which **Transfer Rate** you wish to use: **Auto Rate** or **1, 2, 5.5, or 11Mbps**. Under **Power Saving Mode**, select **Disabled** for uninterrupted data communication, or **Enabled** to allow your PC to enter “sleep” mode, during which data communication could be interrupted. Click **Apply Changes** to save the settings.

3. Select the **Site Survey** tab. The list in Figure 8-4 shows you available access points and their features. Click on the desired access point, and then click **Connect** to connect or **Search** to search for more access points. Click the **OK** button when you are finished.

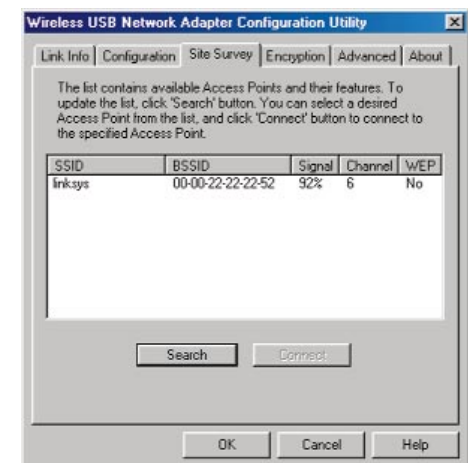


Figure 8-4

4. Click on the **Encryption** tab. Under the drop-down box, you can choose to have WEP encryption **Disabled**, **64-**, or **128- Bit**. Wired Equivalent Privacy (WEP) is an encryption scheme used to protect wireless data communication. The Disabled setting prevents the sharing of data with other computers on the WEP network. When selecting **Manual Entry** for the WEP Key Entry, enter the hexadecimal number set by other wireless WEP settings; these settings have to be identical to the WEP encryption in order to network to your Wireless USB Network Adapter.

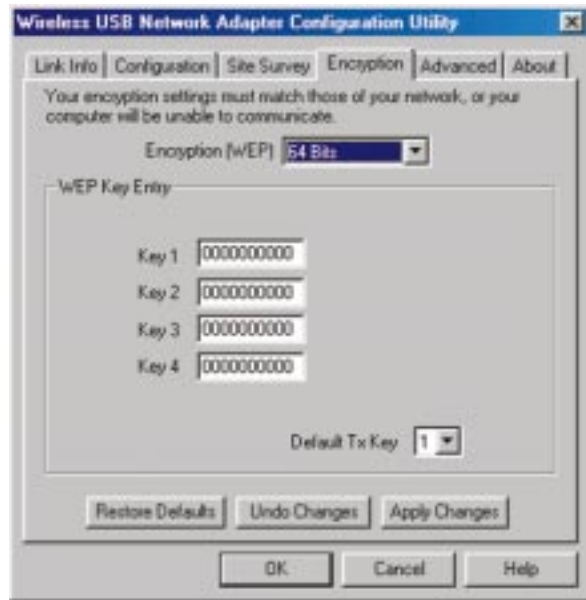


Figure 8-5

In order to find out the WEP encryption set by other wireless products in your network, such as the WAP11, you may run the USB utility or SNMP configuration program to check the Encryption tab for the correct key entries. If you are using other access points, please check their respective user guides for more information on WEP encryption configuration.



Note: In order to enable WEP encryption, hexadecimal values must be entered.



Figure 8-6

In order to enable 128-Bit WEP encryption, choose **128-Bits** in the drop-down box. In the drop-down box near the bottom right-hand corner of the page, choose which **Default Tx Key** will be used for the encryption. By default, **Key 1** will be used. In the box corresponding to the default you chose, enter a hexadecimal number* that the encryption algorithm will be based on. Click **Apply Changes** when you are done.



Important: This number must match the Key on all other devices on the wireless network, or else this device will be unable to transmit or receive data.



Note: In most cases, you will not need to change these settings.



Figure 8-7

- The **Advanced** tab, as shown in Figure 8-7, allows you to set the **Fragmentation Threshold**, the **RTS/CTS Threshold**, and the **Preamble Type**. The **Fragmentation Threshold Value** indicates how much of the network resources are devoted to recovering packet errors. The value should remain at its default setting of **2,436**. If you experience high packet error rates, you can decrease this value, but it will likely decrease overall network performance. Only minor modifications of this value are recommended.

The **RTS Threshold Value** should remain at its default setting of **2,437**. A preamble is a signal used to synchronize the transmission timing between two or more systems. A series of transmission pulses is sent before the data to indicate that “someone is about to transmit data.” This ensures that systems receiving the information correctly interpret when the data transmission starts.

Security is used for WEP only. By selecting **Deny Unencrypted Data Frames**, all unencrypted data will not be seen. For **Authentication Type**, you may choose between **Open System** or **Shared Key**.

Shared Key is when both the sender and recipient share a secret key. Both units use this key for an extended length of time, sometimes indefinitely. Any eavesdropper that discovers the key may decipher all packets until the key is changed.

Open System, the default setting, is when the sender and the recipient do not share a secret key. Each party generates its own key-pair and asks the receiver to accept the (usually randomly) generated key. Once accepted, this key is used for a short time only, and then a new key is generated and agreed upon. Even if the secret key is discovered, only a small amount of data may be decrypted.

The **Preamble Mode** should be set to **Long** (if in a “noisy” network environment), **Short** (if the environment is clear), or click the **OK** button to complete the configuration.

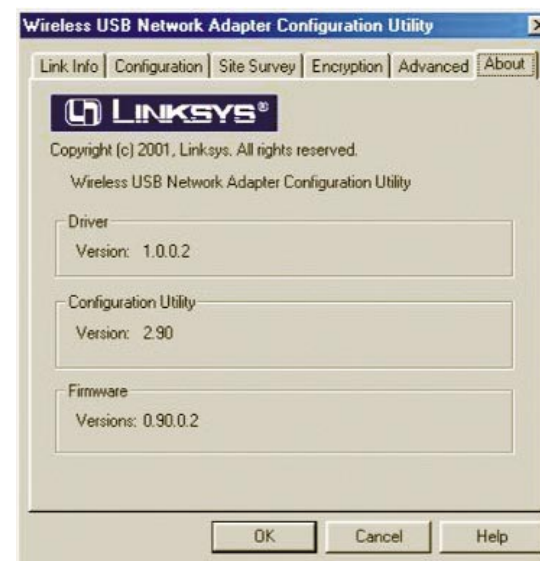


Figure 8-8

- The **About** tab, as shown in Figure 8-8, shows you copyright and version information about the driver, the configuration utility, and the firmware. The version number of the driver may vary from this screen, depending on which version was shipped with your Adapter. You can always visit www.linksys.com for the latest version of the driver. Click the **OK** button to complete the configuration.

Appendix A: Troubleshooting

Common Problems and Solutions

This chapter provides solutions to problems usually occurring during the installation and operation of the USB Network 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.

1. My computer does not recognize the Wireless USB Network Adapter.
 - Make sure that the Wireless USB Network Adapter is properly inserted into the USB port.
 - Also, make sure that the USB Controller is enabled in the BIOS. Check with your motherboard User Guide for more information.
2. The Wireless USB Network Adapter does not work properly.
 - Reinsert the Wireless USB Network Adapter into the notebook or desktop's USB port.
 - For Windows 98 or ME, right click on **My Computer**, and select **Properties**. Select the **Device Manager** tab, and click on the Network Adapter. You will find the Wireless USB Network 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 your Wireless USB Network Adapter is configured on the same channel, SSID, and WEP 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.

Wireless USB Network Adapter

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 802.11b standard?

The IEEE 802.11b Wireless LAN standards subcommittee, which is formulating a standard for the industry. The objective is to enable wireless LAN hardware from different manufacturers to communicate.

What IEEE 802.11 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?

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

What is Infrastructure?

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

What is Roaming?

Roaming is the ability of a portable computer 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 nodes 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 reregisters, and the communication process continues.

What is BSS ID?

A specific Ad hoc LAN is called a Basic Service Set (BSS). Computers in a BSS must be configured with the same BSS ID.

What is ESS ID?

An Infrastructure configuration could also support roaming capability for mobile workers. More than one BSS can be configured as an Extended Service Set (ESS). Users within an ESS could roam freely between BSSs while served as a continuous connection to the network wireless stations, and Access Points within an ESS must be configured with the same ESS ID and the same radio channel.

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. Users can set it up depending upon their needs.

Can Instant Wireless™ products support printer sharing?

Instant Wireless™ products perform the same function as LAN products. Therefore, Instant Wireless™ products can work with NetWare, Windows NT/2000, or other network operating systems to support printer or file sharing.

What is WEP?

WEP is Wired Equivalent Privacy, a data privacy mechanism based on a 40 bit shared key algorithm, as described in the IEEE 802.11b standard.

Appendix B: Glossary

Ad-hoc Network - An ad-hoc network is a wireless network or other small network in which some of the network devices are part of the network only for the duration of a communications session while in some close proximity to the rest of the network.

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

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

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

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

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

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 - More than one BSS in a network.

Firmware - Programming that is inserted into programmable read-only memory (programmable read-only memory), thus becoming a permanent part of a computing device.

Hot Swap - The ability to replace a card or other hardware part in a hardware device without turning it off or losing functionality.

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 - An infrastructure network is a wireless network or other small network in which the wireless network devices are made a part of the network through the Access Point which connects them to the rest of the network.

IP Address - In the most widely installed level of the Internet Protocol (Internet Protocol) today, an IP address is a 32-bit 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."

Ping - (Packet INternet Groper) An Internet utility used to determine whether a particular IP address is online. It is used to test and debug a network by sending out a packet and waiting for a response.

Roaming - The ability to use a wireless device and be able to move from one access point's range to another without losing the connection.

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 subgroups, or subnets. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets.

TCP (Transmission Control Protocol) - A method (protocol) used along with the Internet Protocol (Internet Protocol) to send data in the form of message units between computers over the Internet. While IP takes care of handling the actual delivery of the data, TCP takes care of keeping track of the individual units of data (called packet) that a message is divided into for efficient routing through the Internet.

TCP/IP - Transmission Control Protocol/Internet Protocol (TCP/IP) is the basic communication language or protocol of the Internet. It can also be used as a communications protocol in a private network (either an intranet or an extranet). When you are set up with direct access to the Internet, your comput-

er is provided with a copy of the TCP/IP program just as every other computer that you may send messages to or get information from also has a copy of TCP/IP.

UDP (User Datagram Protocol) - A communications method (protocol) that offers a limited amount of service when messages are exchanged between computers in a network that uses the Internet Protocol (IP). UDP is an alternative to the Transmission Control Protocol (TCP) and, together with IP, is sometimes referred to as UDP/IP. Like the Transmission Control Protocol, UDP uses the Internet Protocol to actually get a data unit (called a datagram) from one computer to another. Unlike TCP, however, UDP does not provide the service of dividing a message into packets (datagrams) and reassembling it at the other end. Specifically, UDP doesn't provide sequencing of the packets that the data arrives in. This means that the application program that uses UDP must be able to make sure that the entire message has arrived and is in the right order. Network applications that want to save processing time because they have very small data units to exchange (and therefore very little message reassembling to do) may prefer UDP to TCP.

USB (Universal Serial Bus) - A "plug-and-play" interface between a computer and add-on devices (such as audio players, joysticks, keyboards, telephones, scanners, and printers). With USB, a new device can be added to your computer without having to add an adapter card or even having to turn the computer off. The USB peripheral bus standard was developed by Compaq, IBM, DEC, Intel, Microsoft, NEC, and Northern Telecom; and the technology is available without charge for all computer and device vendors.

USB supports a data speed of 12 megabit per second. This speed will accommodate a wide range of devices, including MPEG video devices, data gloves, and digitizers. It is anticipated that USB will easily accommodate plug-in telephones that use Integrated Services Digital Network and digital private branch exchange.

Since October 1996, the Windows operating systems have been equipped with USB driver or special software designed to work with specific I/O device types. USB is integrated into Windows 98. Today, most new computers and peripheral devices are equipped with USB.

A different "plug-and-play" standard, FireWire/IEEE 1394, is designed to support much higher data rates and devices such as video camcorders and DVD (digital video disk or digital versatile disk) players. Both standards are expected to exist together, serving different device types.

WEP (Wired Equivalent Privacy) - 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 Millennium, for configuring networks with static IP addresses.

Appendix C: Specifications

| | |
|-------------------------|--|
| Standards: | IEEE 802.11b, USB Standard 1.0 and 1.1 Type B |
| WEP: | 64 and 128 bit |
| Channels: | 11 Channels (US, Canada) 13 Channels (Europe) 14 Channels (Japan) |
| Operating Range: | |
| Indoors: | up to 50M (164 ft.) @ 11 Mbps up to 80M (263 ft.) @ 5.5 Mbps or lower |
| Outdoors: | up to 150M (492 ft.) @ 11 Mbps up to 300M (984 ft.) @ 5.5 Mbps or lower |
| Data Rate: | Up to 11Mbps (with Automatic Scale Back) |
| LEDs: | Power, Link |

Appendix D: Environmental

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|-----------------------------------|---|
| Dimensions: (L x W x D) | 3.98" x 3.11" x 0.91" (101 mm x 79 mm x 23 mm) |
| Unit Weight: | 2.9 oz. (0.08 kg) |
| Power Output: | 15 dBm (typical) |
| Certifications: | FCC Class B, CE Mark, Wi-Fi |
| Operating Temp.: | 32°F to 131°F (0°C to 55°C) |
| Storage Temp.: | -13°F to 158°F (-25°C to 70°C) |
| Operating Humidity: | 0% to 70% Non-Condensing |
| Storage Humidity: | 10% to 90% Non-Condensing |

Appendix E: Warranty Information

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

IN NO EVENT SHALL LINKSYS' LIABILITY EXCEED THE PRICE PAID FOR THE PRODUCT FROM DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THE PRODUCT, ITS ACCOMPANYING SOFTWARE, OR ITS DOCUMENTATION. LINKSYS DOES NOT OFFER REFUNDS FOR ANY PRODUCT.

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Appendix F: Contact Information

For help with the installation or operation of this product, contact Linksys Technical Support at one of the phone numbers or Internet addresses below.

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| Sales Information | 800-546-5797 (LINKSYS) |
| Technical Support | 866-242-8558 |
| RMA Issues | 949-261-1288 |
| Fax | 949-261-8868 |
| Email | support@linksys.com |
| Web | http://www.linksys.com |
| FTP Site | ftp.linksys.com |



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