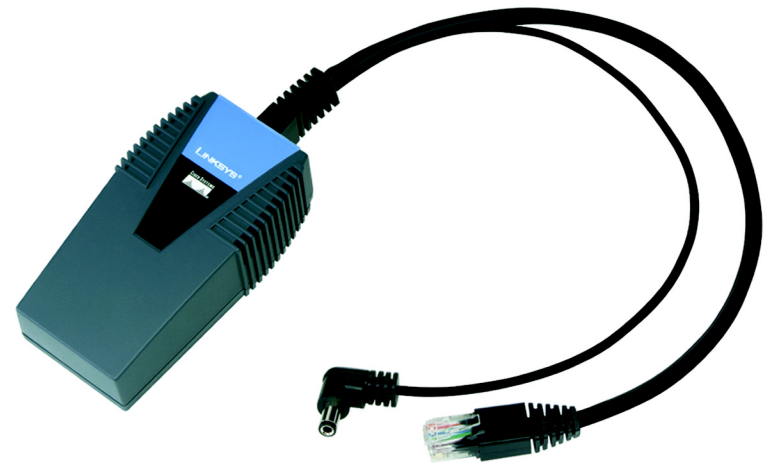


LINKSYS®

A Division of Cisco Systems, Inc.



2.4GHz
802.11g

Wireless-G

Bridge for Phone Adapters



User Guide

Model No. **WBP54G**

CISCO SYSTEMS



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

How to Use This User Guide

This User Guide has been designed to make understanding networking with the Wireless-G Bridge for Phone Adapters easier than ever. Look for the following items when reading this User Guide:



This checkmark means there is a note of interest and is something you should pay special attention to while using the Wireless-G Bridge for Phone Adapters.



This exclamation point means there is a caution or warning and is something that could damage your property or the Wireless-G Bridge for Phone Adapters.



This question mark provides you with a reminder about something you might need to do while using the Wireless-G Bridge for Phone Adapters.

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

word: *definition.*

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

Figure 0-1: Sample Figure Description

Figure numbers and descriptions can also be found in the “List of Figures” section in the “Table of Contents”.

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Chapter 1: Introduction

Welcome

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

How does the Bridge do this? You can put your Linksys phone adapter or IP phone almost anywhere, without the cost and hassle of running network cables. The Bridge was specially designed to convert your phone adapter or IP phone into a wireless device, so it can connect to your home network without an Ethernet cable. This lets you put your phone where it's most convenient for you, and not be limited to the area around your Internet connection.

To make installation even more convenient, the Bridge shares electrical power with the phone adapter or IP phone, so only one power adapter is needed. To get connected, just plug your existing power adapter's power jack into the Bridge, and connect the power and data cables of the Bridge to the phone adapter or IP phone. The included Setup Wizard makes it easy to configure the Bridge for your wireless network. To protect your data and privacy, all wireless transmissions can be encrypted with WEP or industrial-strength, Wi-Fi Protected Access (WPA/WPA2) security.

But what does all of this mean?

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

PCs equipped with wireless cards and adapters can communicate without cumbersome cables. By sharing the same wireless settings, within their transmission radius, they form a wireless network.

The included Setup Wizard walks you through configuring the Bridge for your wireless network, step by step. Use the instructions in this Guide to help you set up and connect the Bridge as you run the Setup Wizard. These instructions should be all you need to get the most out of the Wireless-G Bridge for Phone Adapters.

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

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

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

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

What's in This User Guide?

This user guide covers the steps for setting up and using the Wireless-G Bridge for Phone Adapters.

- **Chapter 1: Introduction**
This chapter describes the Bridge's applications and this User Guide.
- **Chapter 2: Planning Your Wireless Network**
This chapter discusses a few of the basics about wireless networking.
- **Chapter 3: Getting to Know the Wireless-G Bridge for Phone Adapters**
This chapter describes the physical features of the Bridge.
- **Chapter 4: Setting Up and Connecting the Wireless-G Bridge for Phone Adapters**
This chapter shows you how to set up and connect the Bridge.
- **Appendix A: Troubleshooting**
This appendix describes some problems and solutions, as well as frequently asked questions, regarding installation and use of the Bridge.
- **Appendix B: Wireless Security**
This appendix discusses security issues regarding wireless networking and measures you can take to help protect your wireless network.
- **Appendix C: Windows Help**
This appendix describes how you can use Windows Help for instructions about networking, such as installing the TCP/IP protocol.
- **Appendix D: Glossary**
This appendix gives a brief glossary of terms frequently used in networking.
- **Appendix E: Specifications**
This appendix provides the Bridge's technical specifications.
- **Appendix F: Warranty Information**
This appendix supplies the Bridge's warranty information.
- **Appendix G: Regulatory Information**
This appendix supplies the Bridge's regulatory information.
- **Appendix H: Contact Information**
This appendix provides contact information for a variety of Linksys resources, including Technical Support.

Chapter 2: Planning Your Wireless Network

Network Topology

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

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

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

Roaming

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

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

topology: the physical layout of a network.

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

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

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

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

ssid: your wireless network's name.

Network Layout

Products using the 802.11g and 802.11b standards can communicate with each other.

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

Now with the Wireless-G Bridge for Phone Adapters, you can add wireless connectivity to your Linksys phone adapter or IP phone (compatible model numbers: PAP2, SPA-1001, SPA-2000, SPA-2002, SPA-3000, SPA-2100, SPA-841, SPA-842, SPA-941, SPA-942, and SPA-9000).

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

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

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

router: a networking device that connects multiple networks together

Chapter 3: Getting to Know the Wireless-G Bridge for Phone Adapters

Overview

The Bridge has a Power port and a permanently attached cable.

The Port

The Bridge does not include its own power adapter; instead, it uses the power adapter of the Linksys phone adapter or IP phone.

Power The Power port only supports a 5 V, 2 A, DC power adapter, which was included with your Linksys phone adapter or IP phone. Do NOT connect any other type of power adapter to the Bridge.



IMPORTANT: Using the wrong power adapter may cause malfunction or damage your equipment.



Figure 3-1: Power Port

The Cable

The Bridge has a combination Ethernet network and power cable.

Network For setup, you will use the Ethernet network cable to connect the Bridge to your network router or PC running the Setup Wizard. After setup, you will use this cable to connect the Bridge to the Linksys phone adapter or IP phone.

Power After the Bridge has been configured, you will connect this cable to the Power port of the Linksys phone adapter or IP phone. One power adapter will power the Bridge, as well as the phone adapter or IP phone.

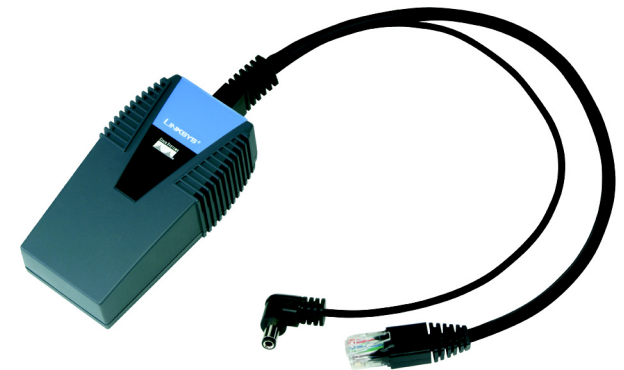


Figure 3-2: Combination Cable

Chapter 4: Setting Up and Connecting the Wireless-G Bridge for Phone Adapters

To configure the Bridge, run the Setup Wizard on the CD enclosed with the Bridge. This chapter and the Setup Wizard will guide you through the installation procedure.



IMPORTANT: Do not connect the Bridge until you are instructed to do so or the setup will not work.

Starting the Setup Wizard

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

On the *Welcome* screen, you have the following choices:

Click Here to Start or **Setup** - Click the **Click Here to Start** or **Setup** button to begin the software installation process.

User Guide - Click the **User Guide** button to open this User Guide.

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

Running the Setup Wizard

1. To install the Bridge, click the **Click Here to Start** button on the *Welcome* screen.
2. After reading the License Agreement, click **Next** if you agree and want to continue the installation, or click **Cancel** to end the installation.



Figure 4-1: Welcome Screen



Figure 4-2: License Agreement Screen

- This screen will inform you about which Linksys phone adapters and IP phones work with the Bridge. Make sure your phone adapter or IP phone is listed on-screen. Click **Next** to proceed with the installation process, or click **Back** to return to the previous screen. To exit the Setup Wizard, click **Exit**.



NOTE: The power adapter for your Linksys phone adapter or IP phone will be used to power the Bridge.

- You will use the PC running this Setup Wizard to set up the Bridge. Disconnect the power jack from the back of the Linksys phone adapter or IP phone. (You will use this power adapter to power the Bridge.) If your network router or this PC is in a different room, disconnect the power adapter from the electrical outlet. Move the power adapter and Bridge to the room where your router or PC is located.

Click **Next** to proceed, or click **Back** to return to the previous screen.

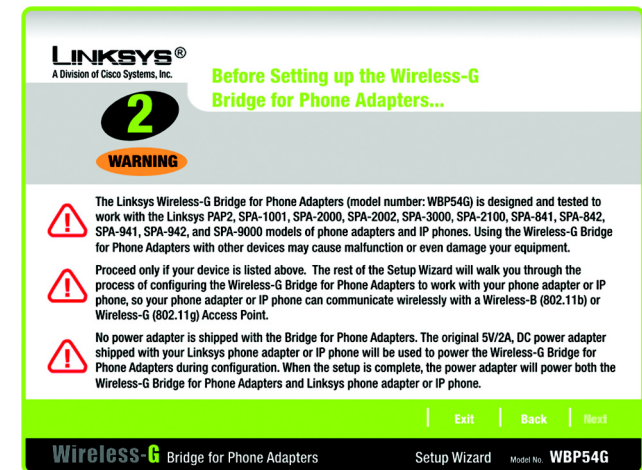


Figure 4-3: Check for Compatibility Screen

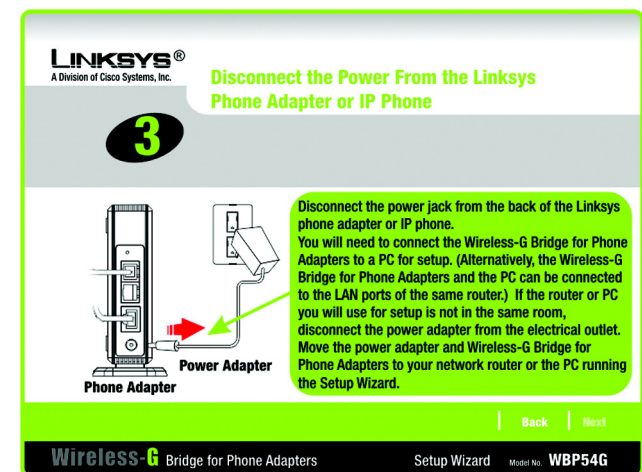


Figure 4-4: Disconnect the Power from the Phone Adapter or IP Phone Screen

5. Connect the power jack to the Power port of the Bridge. Then plug the power adapter into an electrical outlet.

Click **Next** to proceed with the installation process, or click **Back** to return to the previous screen.

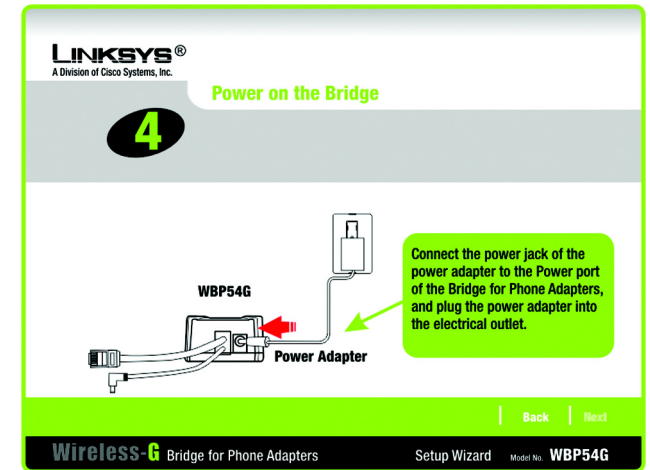


Figure 4-5: Power on the Bridge Screen

6. You will use the combination Ethernet network and power cable attached to the Bridge. Connect the Ethernet network cable of the Bridge to an Ethernet network (LAN) port of the router or PC. (Do not use the power cable now; you will use it later.)



NOTE: If you connect the Bridge to a router, make sure the Bridge and PC running the Setup Wizard are connected to the Ethernet network (LAN) ports of the same router.

Click **Next** to proceed, or click **Back** to return to the previous screen.

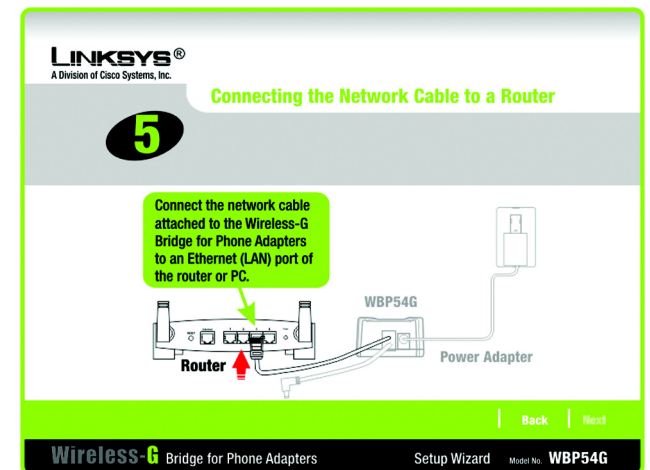


Figure 4-6: Connecting the Network Cable to a Router Screen

7. A list of all Bridges for Phone Adapters that can be detected by the Setup Wizard will be displayed. Select the Bridge you are installing and click **Next**. If the Bridge you want is not displayed, click the **Refresh List** button to search again.

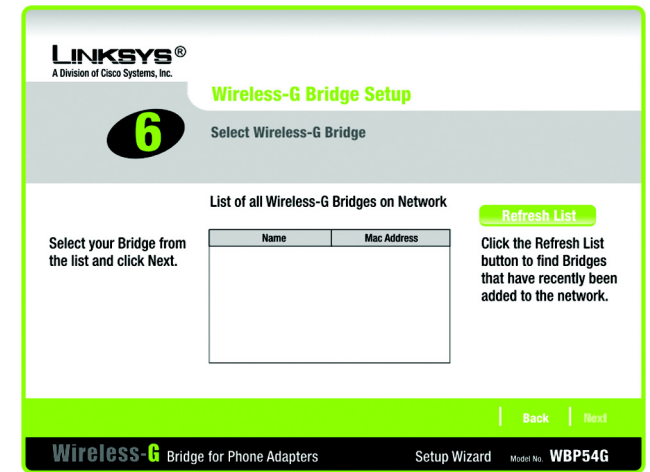


Figure 4-7: Wireless-G Bridge Setup Screen

8. This screen will display a list of wireless networks that can be detected and their status information: SSID (network name), MAC Address, Channel, Signal (strength), and Security (method). Select the wireless network you want.

If the network you want is not displayed, click the **Refresh List** button to search again.

To manually enter the SSID of the network you want, click the **SSID** radio button and complete the *SSID* field.



IMPORTANT: Some wireless access points or routers do not broadcast their status information. If you do not see the network you want, click the **SSID** radio button and manually enter its SSID.

Click **Next** to proceed, or click **Back** to return to the previous screen.

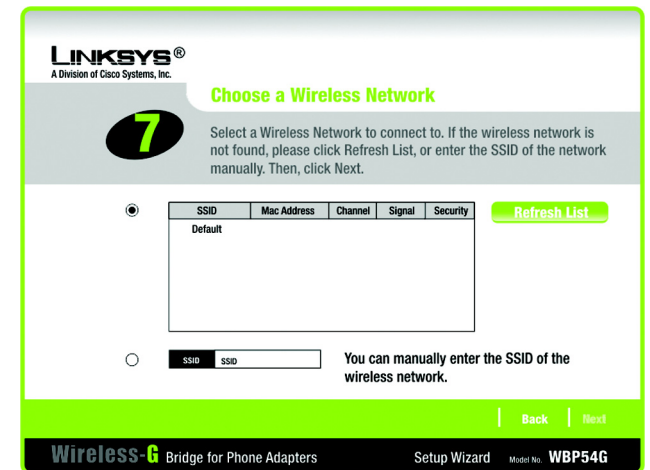


Figure 4-8: Choose a Wireless Network Screen

- Configure the wireless security settings. Select the method your network is using, WPA, WPA2, WEP (128-Bit), or WEP (64-Bit). Then proceed to the appropriate instructions. If you are not using wireless security, select **Disabled**, and proceed to step 10.

WPA

WPA automatically uses TKIP with dynamic encryption keys. Enter a passphrase on this screen.

Encryption - TKIP is automatically selected as the encryption method.

Passphrase - Enter a Passphrase, also called a pre-shared key, of 8-63 characters in the *Passphrase* field. The longer and more complex your Passphrase is, the more secure your network will be.

Click **Next** to proceed, or click **Back** to return to the previous screen.

WPA2

WPA2 automatically uses AES with dynamic encryption keys (AES is a stronger encryption method than TKIP). Enter a passphrase on this screen.

Encryption - AES is automatically selected as the encryption method.

Passphrase - Enter a Passphrase, also called a pre-shared key, of 8-63 characters in the *Passphrase* field. The longer and more complex your Passphrase is, the more secure your network will be.

Click **Next** to proceed, or click **Back** to return to the previous screen.

encryption: encoding data transmitted in a network.

wpa (wi-fi protected access): a wireless security protocol using TKIP (Temporal Key Integrity Protocol) encryption.

wpa2 (wi-fi protected access 2): a wireless security protocol using AES (Advanced Encryption Standard) encryption.

wep (wired equivalent privacy): a method of encrypting network data transmitted on a wireless network.

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Security Settings

If you would like to use Wi-Fi Protected Access (WPA), enter the required information below.

Security

Security: [WPA] Please choose disabled, WEP (64-bit), WEP (128-bit), WPA, or WPA2.

Encryption

Encryption: [TKIP] TKIP is automatically selected as the encryption for WPA.

Passphrase

Passphrase: [] Enter the passphrase that will be used to generate the WPA key. The passphrase is case-sensitive and should be between 8 and 63 characters in length.

Back Next

Wireless-G Bridge for Phone Adapters Setup Wizard Model No. WBP54G

Figure 4-9: Security Settings - WPA Screen

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Security Settings

If you would like to use Wi-Fi Protected Access 2 (WPA2), enter the required information below.

Security

Security: [WPA2] Please choose disabled, WEP (64-bit), WEP (128-bit), WPA, or WPA2.

Encryption

Encryption: [AES] AES is automatically selected as the encryption for WPA2.

Passphrase

Passphrase: [] Enter the passphrase that will be used to generate the WPA2 key. The passphrase is case-sensitive and should be between 8 and 63 characters in length.

Back Next

Wireless-G Bridge for Phone Adapters Setup Wizard Model No. WBP54G

Figure 4-10: Security Settings - WPA2 Screen

WEP (128-Bit) or WEP (64-Bit)

Enter a passphrase in the *Passphrase* field and click **Next**. If you want to manually enter a WEP key, leave the *Passphrase* field blank and click **Next**.

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

A new screen will appear. If you entered a Passphrase, the WEP key(s) will be displayed. If you did not enter a Passphrase, enter the WEP key(s) on this screen. Then select the key you will use from the *Key Index* drop-down menu.

Key 1-4 - One to four fields will be displayed, depending on the level of encryption you have selected. The WEP key you enter must match the WEP key of your wireless network. For 64-bit WEP encryption, enter exactly 10 hexadecimal characters. For 128-bit WEP encryption, enter exactly 26 hexadecimal characters. Valid hexadecimal characters are "0" to "9" and "A" to "F".

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

Click **Next** to proceed, or click **Back** to return to the previous screen.

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8
Security

Security Settings

Wired Equivalent Privacy (WEP) is an encryption method used to secure your wireless network. If your network uses WEP encryption, then enter its WEP settings on this screen.

Security WEP (64-Bit) Select the level of WEP encryption used. A higher level of encryption means greater security. If your network is not using WEP encryption, keep the default setting, Disabled.

Passphrase Enter the passphrase that will be used to generate the WEP key. The passphrase is case-sensitive and should not have more than 16 characters.

If you have entered a passphrase, then a WEP key will be automatically generated and displayed after you click Next. To manually enter a WEP key, leave the Passphrase field blank. Click Next and enter the WEP key on the following screen.

[Back](#) [Next](#)

Wireless-G Bridge for Phone Adapters Setup Wizard Model No. **WBP54G**

Figure 4-11: Security Settings - WEP (64-Bit) Screen

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Wireless-G Security Settings Continued (Optional)

If you had entered a passphrase on the previous screen, then the WEP key will be displayed on this screen.

Key 1
Key 2
Key 3
Key 4
Key Index

If you are manually entering the WEP key, enter 10 hexadecimal characters if you are using 64-bit WEP encryption. Enter 26 hexadecimal characters if you are using 128-bit WEP encryption. Valid hexadecimal characters are "A" through "F" and numbers "0" and "9".

[Back](#) [Next](#)

Wireless-G Bridge for Phone Adapters Setup Wizard Model No. **WBP54G**

Figure 4-12: Security Settings - WEP Keys Screen

10. The new settings will be displayed. Review them before you proceed. Click **Next** to save your new settings, or click **Back** to return to the previous screen.

11. The Bridge will attempt to connect to the wireless network using the new settings. If the attempt succeeds, proceed to step 12.

If the attempt fails, you have two options offered by a pop-up screen. Click the **Yes** button to save the new settings and proceed, or click the **No** button to return to the *Choose a Wireless Network* screen and reconfigure the settings.

12. Disconnect the Ethernet network cable of the Bridge from the router or PC.

Click **Next** to proceed, or click **Back** to return to the previous screen.

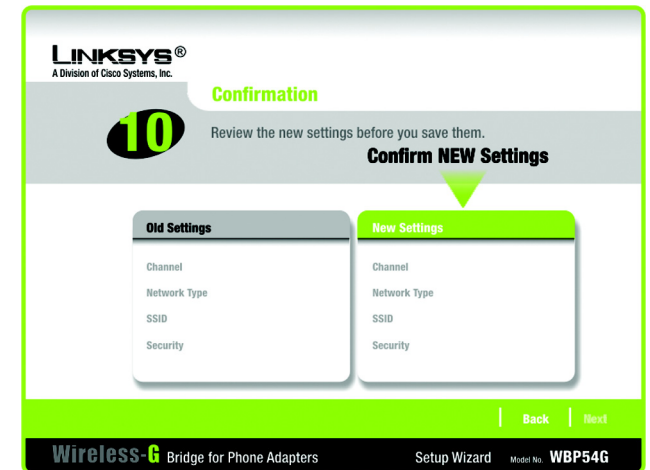


Figure 4-13: Confirmation Screen

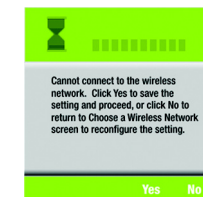


Figure 4-14: If the Bridge Does Not Connect... Screen

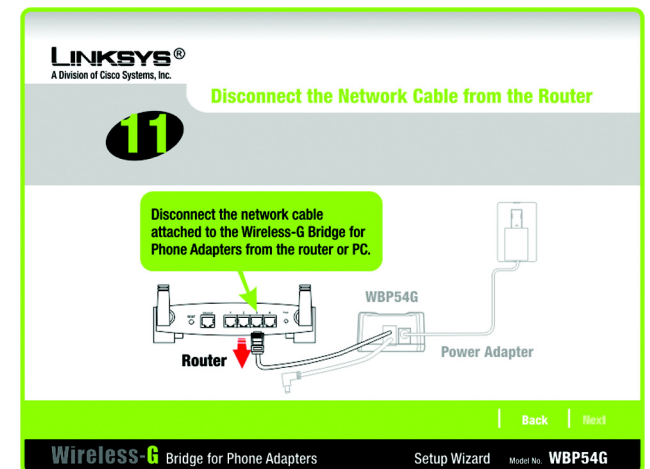


Figure 4-15: Disconnect the Network Cable from the Router Screen

13. If the phone adapter or IP phone is in a different room, disconnect the power adapter from the electrical outlet. Move the power adapter and Bridge to the location of the phone adapter or IP phone.

Click **Next** to proceed, or click **Back** to return to the previous screen.

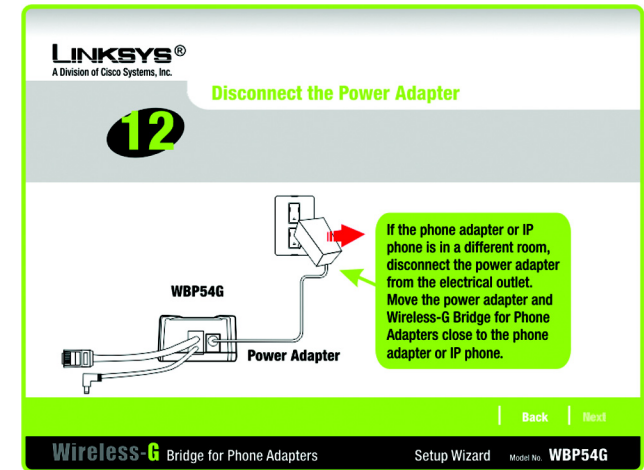


Figure 4-16: Disconnect the Power Adapter Screen

14. Disconnect the Ethernet network cable from the phone adapter or IP phone.

You will use the combination Ethernet network and power cable attached to the Bridge. Connect the Ethernet network cable of the Bridge to the phone adapter or IP phone.

Click **Next** to proceed, or click **Back** to return to the previous screen.

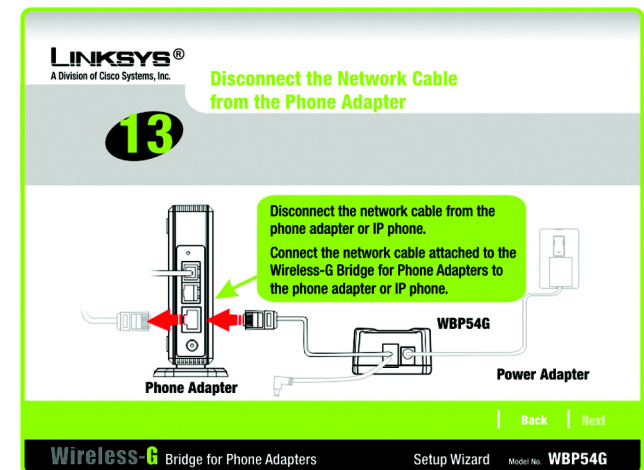


Figure 4-17: Disconnect the Network Cable from the Phone Adapter Screen

15. Connect the power cable of the Bridge to the Power port of the phone adapter or IP phone. Then connect the power adapter to an electrical outlet.

Click **Next** to proceed, or click **Back** to return to the previous screen.

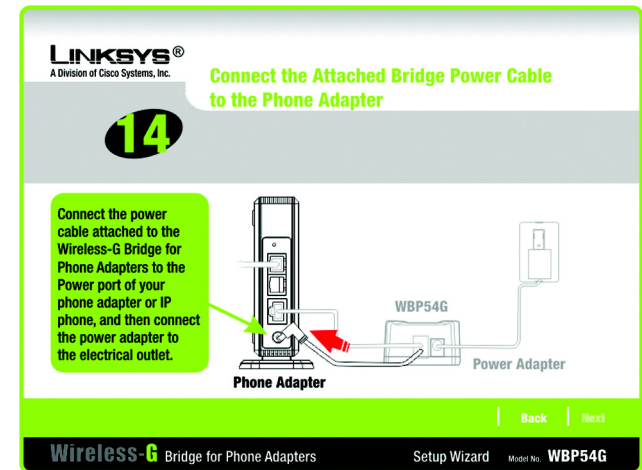


Figure 4-18: Connect the Attached Bridge Power Cable to the Phone Adapter Screen

16. Make sure your cable connections match the cable connections shown on-screen.

Click **Next** to proceed, or click **Back** to return to the previous screen.



Figure 4-19: Wireless is Now Active Screen

17. The *Congratulations* screen will appear. Click **Exit** to exit the Setup Wizard, or click **Online Registration** to register the Bridge at www.linksys.com/registration.

Congratulations! Setup is complete.



Figure 4-20: Congratulations Screen

Appendix A: Troubleshooting

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

Common Problems and Solutions

1. *The Setup Wizard cannot detect the Wireless-G Bridge for Phone Adapters.*

The Bridge cannot be configured over the wireless network. Confirm that the Bridge is properly connected to your network router or PC running the Setup Wizard. Make sure the Ethernet network cable is securely connected.

2. *The speed of the wireless connection is very slow.*

If there is significant traffic (“noise”) in your wireless environment, then the speed will drop. Make sure you have a clear line of sight between your wireless devices. Also, some electrical and electronic devices generate interference. You can often locate these by checking wireless data transmission speeds by powering on and off a different device, one at a time.

3. *The Linksys phone adapter or IP phone connected to the Bridge does not have a valid IP address.*

This problem does not involve the Bridge (the Bridge only provides a connection between the wireless network and the phone adapter or IP phone). Make sure the phone adapter or IP phone has been configured properly, so that it is assigned a valid IP address. (The Bridge does not have its own IP address.)

4. *The Setup Wizard reported that the Bridge has successfully connected to the wireless network; however, the wireless connection does not seem to be working.*

There may be an error with the Bridge's security settings. Make sure you have written down the correct settings for your wireless network. Then run the Setup Wizard for the Bridge. Check the following:

- If your wireless network has its security enabled, make sure the WEP key and other settings you entered during the Bridge's Setup Wizard are correct.
- If your wireless network has its security disabled, make sure no WEP key or other security setting was entered during the Bridge's Setup Wizard.

Frequently Asked Questions

Which Linksys products will the Bridge work with?

The Bridge will work with these Linksys phone adapters and IP phones, listed by model number: PAP2, SPA-1001, SPA-2000, SPA-2002, SPA-3000, SPA-2100, SPA-841, SPA-842, SPA-941, SPA-942, and SPA-9000. Do not use the Bridge with any other products; otherwise, this may cause malfunction or even damage your equipment.

The Bridge does not include a power adapter. How do I supply power to it?

The Bridge uses the power adapter for your Linksys phone adapter or IP phone. A combination power and Ethernet network cable is attached to the Bridge. You will use the power adapter and this cable to power the Bridge and your Linksys phone adapter or IP phone. Refer to "Chapter 4: Setting Up and Configuring the Wireless-G Bridge for Phone Adapters" for instructions.

What is the IEEE 802.11b standard?

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

What is the IEEE 802.11g standard?

It is one of the IEEE standards for wireless networks. The 802.11g standard allows wireless networking hardware from different manufacturers to communicate, provided that the hardware complies with the 802.11g standard. The 802.11g standard states a maximum data transfer rate of 54Mbps and an operating frequency of 2.4GHz.

What IEEE 802.11b features are supported?

The product supports the following IEEE 802.11b functions:

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

What IEEE 802.11g features are supported?

The product supports the following IEEE 802.11g functions:

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

What is 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 to communicate continuously while the user is 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 the 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?

The Bridge 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, the Bridge offers a variety of security methods, including WEP and WPA, to enhance security and access control. For more information, refer to "Appendix B: Wireless Security."

What is WEP?

WEP is Wired Equivalent Privacy, a data privacy mechanism based on a shared key algorithm, as described in the IEEE 802.11 standard. For more information, refer to "Appendix B: Wireless Security."

What is WPA?

WPA is Wi-Fi Protected Access, a wireless security protocol that can be used in conjunction with a RADIUS (Remote Authentication Dial-In User Service) server. For more information, refer to "Appendix B: Wireless Security."

Appendix B: Wireless Security

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

Security Precautions

The following is a complete list of security precautions to take (at least steps 1 through 5 should be followed):

1. Change the default SSID.
2. Disable SSID Broadcast.
3. Change the default password for the Administrator account.
4. Enable MAC Address Filtering.
5. Change the SSID periodically.
6. Use the highest encryption algorithm possible. Use WPA if it is available. Please note that this may reduce your network performance.
7. Change the encryption keys periodically.



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

Security Threats Facing Wireless Networks

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

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

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

1. Disable Broadcast
2. Make it unique
3. Change it often

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

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

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

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

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

There are several ways that WEP can be maximized:

1. Use the highest level of encryption possible
2. Use "Shared Key" authentication
3. Change your WEP key regularly

WPA. Wi-Fi Protected Access (WPA) is the newest and best available standard in Wi-Fi security. Two modes are available: WPA and WPA2. For encryption, WPA automatically uses Temporal Key Integrity Protocol (TKIP), which incorporates Message Integrity Code (MIC) to provide protection against hackers. WPA2-Personal only uses Advanced Encryption Standard (AES) encryption, which is stronger than TKIP and utilizes a symmetric 128-bit block data encryption.

WPA. Enter a password in the *Passphrase* field of 8-63 characters.



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

WPA2. Enter a password in the *Passphrase* field of 8-63 characters.

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

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

Appendix C: Windows Help

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

TCP/IP

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

Shared Resources

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

Network Neighborhood/My Network Places

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

Appendix D: Glossary

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

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

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

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

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

AES (Advanced Encryption Standard) - A method that uses up to 256-bit key encryption to secure data.

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

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

Bit - A binary digit.

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

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

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

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

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

Domain - A specific name for a network of computers.

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

Encryption - Encoding data transmitted in a network.

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

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

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

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

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

IP (Internet Protocol) - A protocol used to send data over a network.

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

ISM band - Radio bandwidth utilized in wireless transmissions.

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

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

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

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

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

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

Packet - A unit of data sent over a network.

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

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

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

Router - A networking device that connects multiple networks together.

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

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

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

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

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

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

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

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

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

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

Topology - The physical layout of a network.

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

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

WPA2 (Wi-Fi Protected Access 2) - a wireless security protocol using AES (Advanced Encryption Standard) encryption, which can be used in conjunction with a RADIUS server.

Appendix E: Specifications

Model	WBP54G
Standards	IEEE 802.3, IEEE 802.3u, IEEE 802.11b, IEEE 802.11g
Port	One 5V/2A DC power input port
Cabling Type	One combo-power/Ethernet cable attached to the device with DC power jack and RJ-45 Ethernet connector
# of Antennas	One internal PIFA antenna
Connector Type	One combo-power/Ethernet cable attached to the device with DC power jack and RJ-45 Ethernet connector
RF Pwr (EIRP) in dBm	13 \pm 1.5dBm (802.11g) / 17 \pm 1.5dBm (802.11b)
Antenna Gain in dBi	1 dBi
Security Features	WPA2, WPA, WEP
WEP Key Bits	64, 128
Dimensions	2.01" x 3.62" x 1.14" (51 mm x 92 mm x 29 mm)
Unit Weight	2.54 oz. (0.072 kg)
Power	External, 5V DC, 2.0A (Not included, use the power adapter shipped with Linksys phone adapter or IP phone products)
Certifications	FCC, CE, cUL, IC-03, Wi-Fi, WPA, WPA2

Wireless-G Bridge for Phone Adapters

Operating Temp.	0° C to 40° C (32° F to 104° F)
Storage Temp.	-20° C to 70° C (-4° F to 158° F)
Operating Humidity	10% to 85% Non-Condensing
Storage Humidity	5% to 90% Non-Condensing

Appendix F: Warranty Information

LIMITED WARRANTY

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

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

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

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

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

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

Appendix G: Regulatory Information

FCC STATEMENT

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

Reorient or relocate the receiving antenna

Increase the separation between the equipment or devices

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

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

FCC Radiation Exposure Statement

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

INDUSTRY CANADA (CANADA)

This device complies with Canadian ICES-003 and RSS210 rules.

Cet appareil est conforme aux normes NMB-003 et RSS210 d'Industry Canada.

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

SAFETY NOTICES

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

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

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

Appendix H: Contact Information

Need to contact Linksys?

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

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

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

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

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

800-326-7114
support@linksys.com

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

949-823-3000