Instant Wireless® Series

Dual-Band Wireless A+G Broadband Router

Use this guide to install:

WRT55AG

User Guide

LINKSYS®

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

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

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

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment or devices
- Connect the equipment to an outlet other than the receiver's
- Consult a dealer or an experienced radio/TV technician for assistance

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

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

FCC RF Radiation Exposure Statement
To comply with the FCC and ANSI C95.1 RF exposure limits, the antenna(s) for this device must comply with the following:

- Access points with 2.4 GHz or 5 GHz integrated antenna must operate with a separation distance of at least 20 cm from all persons using the cable provided and must not be co-located or operating in conjunction with any other antenna or transmitter.

End-users must be provided with specific operations for satisfying RF exposure compliance.
Note: Dual antennas used for diversity operation are not considered co-located.

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

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

For 11Mpbs, 2.4 GHz access points with 100 mW radios, the following standards were applied:

- ETS 300-826, 301 489-1 General EMC requirements for Radio equipment.
- EN 609 50 Safety
- ETS 300-328-2 Technical requirements for Radio equipment.

For 54 Mpbs, 5 GHz access points with 40 mW radios, the following standards were applied:

- ETS 301 489-1, 301 489-17 General EMC requirements for Radio equipment.
- EN 609 50 Safety
- ETS 301-893 Technical requirements for Radio equipment.

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

Caution: This equipment is intended to be used in all EU and EFTA countries. Outdoor use may be restricted to certain frequencies and/or may require a license for operation. Contact local Authority for procedure to follow.

Note: Combinations of power levels and antennas resulting in a radiated power level of above 100 mW equivalent isotropic radiated power (EIRP) are considered as not compliant with the above mentioned directive and are not allowed for use within the European community and countries that have adopted the European R&TTE directive 1999/5/EC and/or the CEPT recommendation Rec 70.03.

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

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

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

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

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Chapter 1: Introduction

The Dual-Band Wireless A+G Broadband Router

The Dual-Band Wireless A+G Broadband Router is like four devices in one box! The Router function lets you securely share one high-speed Internet connection among your entire network, while the 4-port full duplex 10/100 Switch jump-starts your wired-Ethernet network. Connect four PCs directly, or daisy-chain out to more hubs and switches to create as big a network as you need.

The Dual-Band Wireless A+G Broadband Router also contains two Wireless Access Points, supporting all three wireless networking specifications. The first Access Point uses the 2.4GHz radio band, supporting both the popular and inexpensive Wireless-B (802.11b) standard at 11Mbps, and the new, almost five times faster, Wireless-G (draft 802.11g) at 54Mbps. The second Access Point radio operates in the 5GHz band, and supports Wireless-A (802.11a) networking, also at 54Mbps. Since the two radios operate in different bands, they can work simultaneously, blanketing your wireless zone with bandwidth.

To protect your data and privacy, the Dual-Band Wireless A+G Broadband Router can encrypt all wireless transmissions. The MAC Address filter lets you decide exactly who has access to your wireless network. The Router also serves as a DHCP Server, has NAT technology to protect against Internet intruders, DMZ capability, supports VPN pass-through, and can be configured to filter internal users' access to the Internet. Configuration is a snap with the web browser-based configuration utility.

With the Linksys Dual-Band Wireless A+G Broadband Router at the center of your home or office network, you can share a high-speed Internet connection, files, printers, and multi-player games with the flexibility, speed, and security you need!

Features

- Dual-band, tri-standard Access Point communicates with Wireless-A (802.11a), Wireless-B (802.11b), and Wireless-G (draft 802.11g) wireless networks
- Protect your wireless investment while preparing your infrastructure for the future
- Built-in 4-port Switch jump-starts your wired network, while the Router functionality securely shares your high-speed Internet connection with wired and wireless computers
- Advanced Security: Wireless data encryption (WEP), VPN pass-through, Internet access control and Wireless filters
- Performance Investment Protection: Compatibility with Wireless-A (802.11a), Wireless-B (802.11b) and Wireless-G Standards
- Built-in 4-Port 10/100 Switch Supports Wired Ethernet Clients
- All Ethernet Ports Support Auto-MDI/MDI-X -- No Need for Crossover Cables or Uplink Port
- Wireless Security with up to 152-bit WEP Encryption
- Enhanced Security Management Functions: Port Filtering, MAC and IP Address Filtering, DMZ Hosting, and NAT Technology
- Access Your Corporate Network Remotely through Virtual Private Networking (VPN) -- Supports IPSec and PPTP Pass-Through
- Easily Configurable through a Web Browser -- Locally and over the Internet
- DDNS and DHCP Server Capability to Assign IP Addresses Automatically
- Supports Static and Dynamic Routing (RIP1 and 2)

The Router's Functions

Simply put, a router is a network device that connects two networks together. A wireless router connects three networks.

In this instance, the Router connects your wired network and wireless network, or the group of PCs in your home or office, to the Internet. The Router processes and regulates the data that travels between these networks.

The Router's NAT feature protects your network of PCs so users on the public, Internet side cannot "see" your PCs. This is how your network remains private. The Router protects your network by inspecting every packet coming in through the Internet port before delivery to the appropriate PC on your network. The Router inspects Internet port services like the web server, ftp server, or other Internet applications, and, if allowed, it will forward the packet to the appropriate PC on the LAN side.

Remember that the Router's ports connect to two sides. The 10/100 LAN ports connect to the LAN, and the Internet port connects to the Internet. The LAN ports transmit data at 10 Mbps or 100 Mbps, and the broadband port, or Internet port, transmits data at 10/100 Mbps. Your wireless devices connect to the Router through either 802.11a, 802.11b, or draft-802.11g wireless technology.

IP Addresses

What's an IP Address?

IP stands for Internet Protocol. Every device on an IP-based network, including PCs, print servers, and routers, requires an IP address to identify its "location," or address, on the network. This applies to both the Internet and LAN connections. There are two ways of assigning an IP address to your network devices. You can assign static IP addresses or use the Router to assign IP addresses dynamically.

Note: Since the Router uses NAT technology, the only IP address that can be seen from the Internet for your network is the Router's Internet IP address.

However, even this Internet IP address can be blocked, so that the Router and network seem invisible to the Internet—see the Block WAN Requests description under Filters in "Chapter 7: The Router's Web-based Utility."

Static IP Addresses

A static IP address is a fixed IP address that you assign manually to a PC or other device on the network. Since a static IP address remains valid until you disable it, static IP addressing ensures that the device assigned it will always have that same IP address until you change it. Static IP addresses must be unique and are commonly used with network devices such as server PCs or print servers.

If you use the Router to share your cable or DSL Internet connection, contact your ISP to find out if they have assigned a static IP address to your account. If so, you will need that static IP address when configuring the Router. You can get that information from your ISP.

Dynamic IP Addresses

A dynamic IP address is automatically assigned to a device on the network, such as PCs and print servers. These IP addresses are called "dynamic" because they are only *temporarily* assigned to the PC or device. After a certain time period, they expire and may change. If a PC logs onto the network (or the Internet) and its dynamic IP address has expired, the DHCP server will automatically assign it a new dynamic IP address.

DHCP (Dynamic Host Configuration Protocol) Servers

PCs and other network devices using dynamic IP addressing are assigned a new IP address by a DHCP server. The PC or network device obtaining an IP address is called the DHCP client. DHCP frees you from having to assign IP addresses manually every time a new user is added to your network.

A DHCP server can either be a designated PC on the network or another network device, such as the Router. By default, the Router's DHCP Server function is enabled.

If you already have a DHCP server running on your network, you *must* disable one of the two DHCP servers. If you run more than one DHCP server on your network, you will experience network errors, such as conflicting IP addresses. To disable DHCP on the Router, see the DHCP section in "Chapter 7: The Router's Web-based Utility."

Note: Even if you assign a static IP address to a PC, other PCs can still use DHCP's dynamic IP addressing, as long as the static IP address is not within the DHCP range of the LAN IP Addresses.

If the dynamic IP addressing fails to provide a dynamic IP address, refer to "Appendix A: Troubleshooting."

Router Setup Overview

This User Guide covers the steps for setting up a network with the Router. After going through "Chapter 2: Getting to Know the Dual-Band Wireless A+G Broadband Router," most users will only need to use the following chapters:

- Chapter 3: Connect the Router
  This chapter instructs you on how to connect a cable or DSL modem to the Router and connect your PC(s) to the Router.

- Chapter 4: Configure the PCs
  This chapter instructs you on how to configure your PCs to be DHCP clients, if you have previously set static IP addresses on your PCs.

- Chapter 5: Setting up the Dual-Band Wireless A+G Broadband Router
  This chapter will walk you through the Setup Wizard included on the Setup CD-ROM.

- Chapter 6: Configuring the Router's Basic Settings with the Web-based Utility
  While you should always use the Setup Wizard when setting up the Router, more advanced users may wish to do this through the Web-based Utility. This chapter shows you how to configure the Router's basic settings this way.

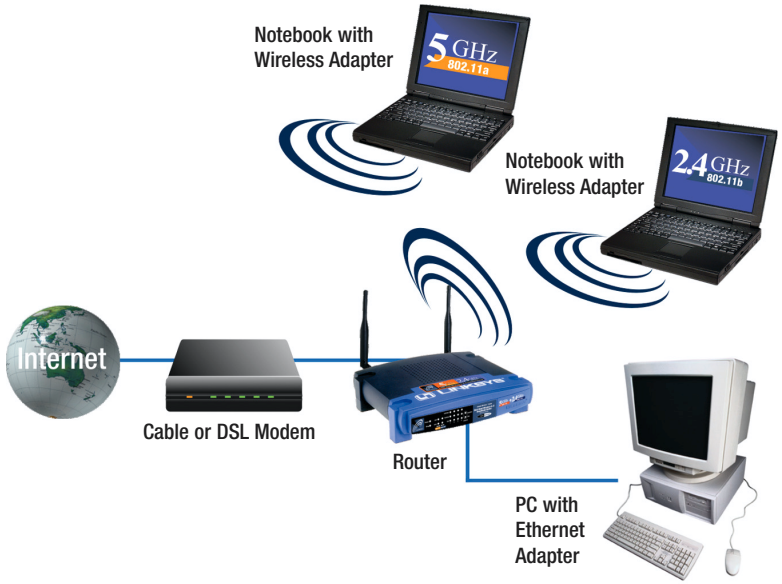

Figure 1-1

- Chapter 7: The Router's Web-based Utility
  The Web-based Utility controls all of the Router's functions and settings. This chapter shows you how to use this Utility.

When you're finished with these basic steps, you will be ready to connect to the Internet. You can also modify the Router's settings further; for example, you can adjust security features and other settings to enable online gaming (see "Chapter 7: The Router's Web-based Utility").

Chapter 2: Getting to Know the Dual-Band Wireless A+G Broadband Router

The Router's Back Panel

The Router's ports, shown in Figure 2-1, are located on the Router's back panel.

Figure 2-1

Internet The Internet port is where you connect your cable or DSL modem through an Ethernet network cable. Your modem connection will not work from any other port.

Ports 1-4 These four LAN (Local Area Network) ports connect to network devices, such as PCs, print servers, and network attached storage (NAS). Each of the ports will auto-detect whether a straight-through or crossover cable is plugged into it, so there is no need for an uplink port. Any one of the four ports can serve as an uplink port to other network devices.

Power The Power port is where you will connect the power adapter.

The Reset Button

The **Reset** button can be used in one of two ways:

1. If the Router is having problems connecting to the Internet, press the **Reset** button for just a moment with a paper clip or a pencil tip. This clears up any jammed connections, and is similar to pressing the **Reset** button on your PC to reboot it.

   This will reboot the Router while keeping all of the Router's settings.

2. If you are experiencing extreme problems with the Router and have tried all other troubleshooting measures, press the **Reset** Button and hold it down for 10 seconds.

   This will restore factory defaults and clear all of the Router's settings, including settings such as a new password or wireless settings.

The Router's Front Panel

The Router's LEDs, shown in Figure 2-2, display information about the Router's status.

Figure 2-2

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

Diag *Red*. The **Diag** LED lights up when the Router goes through its self-diagnosis mode during every boot-up. It will turn off upon successful completion of the diagnosis.

If this LED stays on for one minute or longer, see "Appendix A: Troubleshooting."

The 802.11a WLAN Indicators

Act *Green*. When the **Act** LED flickers, the 802.11a wireless network is active.

Link *Green*. When the **Link** LED is continuously lit, the 802.11a wireless network is available.

The 802.11b WLAN Indicators

Act *Green*. When the **Act** LED flickers, the 802.11b wireless network is active.

Link *Green*. When the **Link** LED is continuously lit, the 802.11b wireless network is available.

The LAN Indicators

Link/Act *Green*. The **Link/Act** LED serves two purposes. If the LED is continuously lit, the Router is successfully connected to a device through the corresponding port. If the LED is flickering, the Router is actively sending or receiving data over that port.

Full/Col *Green*. The **Full/Col** LED also serves two purposes. If this LED is lit up solidly, the connection made through the corresponding port is running in Full Duplex mode. If the LED flickers, the connection is experiencing collisions (when two PCs send data at the same time). Infrequent collisions are normal.

100 *Orange*. The **100** LED lights up when a successful 100Mbps connection is made through the corresponding port.

If this LED does not light up, then your connection speed is 10Mbps.

The Internet Indicators

Link/Act *Green*. The **Link/Act** LED lights up when a successful connection is made between the Router and your cable or DSL modem (the Internet). The **Link/Act** LED flickers when the Router is sending or receiving data over the **Internet** port.

100 *Orange*. The **100** LED lights up when a successful 100Mbps connection is made through the corresponding port.

If this LED does not light up, then your connection speed is 10Mbps.

Proceed to "Chapter 3: Connect the Router."

Chapter 3: Connect the Router

Overview

Note: These directions on connecting the Router are provided only to help when you are making the connections. If you are using the Setup Wizard, make your connections only when the Wizard asks.

The Router's setup consists of more than simply plugging hardware together. You will have to configure your networked PCs to accept the IP addresses that the Router assigns them (if applicable), and you will also have to configure the Router with setting(s) provided by your Internet Service Provider (ISP).

The installation technician from your ISP should have left the setup information for your modem with you after installing your broadband connection. If not, you can call your ISP to request that data.

Once you have the setup information you need for your specific type of Internet connection, you can begin installation and setup of the Router.

If you want to use a PC with an Ethernet adapter to configure the Router, go to "Wired Connection to a PC and Boot-Up." If you want to use a PC with a wireless adapter to configure the Router, go to "Wireless Connection to a PC and Boot-Up."

Wired Connection to a PC

1. Before you begin, make sure that all of your network's hardware is powered off, including the Router, PCs, and cable or DSL modem.

2. Connect one end of an Ethernet network cable to one of the LAN ports (labeled 1-4) on the back of the Router, and the other end to an Ethernet port on a PC.

   Repeat this step to connect more PCs, a switch, or other network devices to the Router.

Figure 3-1

3. Connect a different Ethernet network cable from your cable or DSL modem to the Internet port on the Router's rear panel. This is the only port that will work for your modem connection.

Figure 3-2

4. Power on the cable or DSL modem.

5. Connect the power adapter to the Router's Power port, and then plug the power adapter into a power outlet.

Note: You should always plug the Router's power adapter into a power strip with surge protection.

Figure 3-3

The **Power** LED on the front panel will light up green as soon as the power adapter is connected properly.

The **Diag** LED will light up red for a few seconds. It will turn off when the self-test is complete. If this LED stays on for one minute or longer, see "Appendix A: Troubleshooting."

6. Power on one of your PCs.

Have you checked that the **Link/Act** LEDs for all your LAN connections and the **Link** LED for your Internet connection light up?

If all of your **Link** LEDs are not lighting up, make sure that all your cables are securely plugged in, and that all of your hardware is powered on properly. Verify that the modem is plugged into the Internet port on the Router.

Wireless Connection to a PC

If you want to use a wireless connection to access the Router, follow these instructions:

1. Before you begin, make sure that all of your network's hardware is powered off, including the Router, PCs, and cable or DSL modem.

2. Connect an Ethernet network cable from your cable or DSL modem to the Internet port on the Router's rear panel, as shown in Figure 3-4. This is the only port that will work for your modem connection.

Figure 3-4

3. Power on the cable or DSL modem.

4. Connect the power adapter to the Power port, and then plug the power adapter into a power outlet.

Note: You should always plug the Router's power adapter into a power strip with surge protection.

- The **Power** LED on the front panel will light up green as soon as the power adapter is connected properly.

- The **Diag** LED will light up red for a few seconds and turn off when the self-test is complete. If this LED stays on for one minute or longer, see "Appendix A: Troubleshooting."

4. Power on one of the PCs on your wireless network(s).

5. For initial access to the Router through a wireless connection, make sure the PC's wireless adapter has its SSID set to **linksys-a** or **linksys-g** (which are the Router's default SSID settings, depending upon the wireless devices you are using), and its WEP encryption is **disabled**. After you have accessed the Router, you can change the Router and this PC's adapter settings to match the your usual network settings.

The Router's hardware installation is now complete.

Go to "Chapter 4: Configure the PCs."

Note: You should always change the SSID from its default, **linksys**, and enable WEP encryption.

Chapter 4: Configure the PCs

Overview

The instructions in this chapter will help you configure each of your computers to be able to communicate with the Router.

To do this, you need to configure your PC's network settings to obtain an IP (or TCP/IP) address automatically, so your PC can function as a DHCP client. Computers use IP addresses to communicate with the Router and each other across a network, such as the Internet.

First, find out which Windows operating system your computer is running. You can find out by clicking the **Start** button. Read the side panel of the Start menu to find out which operating system your PC is running.

You may need to do this for each computer you are connecting to the Router.

The next few pages tell you, step by step, how to configure your network settings based on the type of Windows operating system you are using. Make sure that an Ethernet or wireless adapter (also known as a network adapter) has been successfully installed in each PC you will configure. Once you've configured your computers, setup the Router, either by using the Setup Wizard as shown in "Chapter 5: Setting Up the Dual-Band Wireless A+G Broadband Router" or by using the Web-based Utility as shown in "Chapter 6: Configuring the Router's Basic Settings with the Web-based Utility".

Important: By default Windows 98, 2000, Me, and XP has TCP/IP installed and set to obtain an IP address automatically.

If your PC does not have TCP/IP installed, click **Start** and then **Help**. Search for the keyword **TCP/IP**. Then follow the instructions to install TCP/IP.