

D-Link[®] *Air* DWL-650
2.4 GHz Wireless Cardbus Adapter

Manual

Version P

D-Link[®]
Building Networks for People

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1. Package Contents



Contents of Package:

- **D-Link Air DWL-650** 2.4GHz Wireless Cardbus Adapter
- Manual, QIG, and Drivers on CD
- Printed Quick Installation Guide

If any of the above items are missing, please contact your reseller.

System Requirements:

- A laptop computer with an available 32-bit Cardbus PC Card slot
- Windows XP, Windows 2000, Windows Me, or Windows 98SE
- Cardbus Controller, properly installed and working
- At least 32 MB of memory and a 300 MHz processor
- An 802.11b Access Point (e.g., DWL-1000AP for **Infrastructure Mode**) or another 802.11b wireless adapter (e.g., DWL-520 for **Ad-Hoc mode**.)

2. Introduction

The D-Link *Air* DWL-650 Wireless Cardbus Adapter is an enhanced 802.11b* high-performance, wireless adapter that supports high-speed wireless networking at home, at work or in public places.

The DWL-650 is compatible with existing 802.11b devices such as the D-Link *Air* family of products including the DWL-520 Wireless PCI Adapter, the DI-714 Wireless Router/Access Point and the DWL-120 Wireless USB Adapter.

It is an ideal way to connect one laptop computer to a Wireless Local Area Network (WLAN.) After completing the steps outlined in the **Quick Installation Guide** (included in the package) you will have the ability to share information and resources, such as files and printers, and take full advantage of a “connected” environment for work or play!

The DWL-650 includes software drivers for the most popular Microsoft Windows operating systems (Windows XP, Windows 2000, Windows Me, Windows 98SE) and can be integrated into a larger network, running, in either Ad Hoc mode (without an Access Point) or Infrastructure mode (with an Access Point.) *Please take a look at our **Getting Started** section in this manual to see examples of typical network setups using the DWL-650 in both Infrastructure and Ad-Hoc modes.*

This manual provides a quick introduction to wireless technology and its application as it relates to networking. Take a moment to read through this manual and get acquainted with wireless technology.

*Maximum wireless signal rate based on IEEE Standard 802.11b specifications. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead lower actual data throughput rate.

Product Features

- Provides high-speed wireless connection up to 11Mbps
- Operates in the 2.4GHz frequency range
- Maximum reliability, throughput and connectivity with automatic data rate switching
- Supports Wired Equivalent Privacy (WEP) data encryption at 64/128/256-bit encryption
- Supports infrastructure networks via an Access Point and peer-to-peer communication in ad-hoc mode
- Built-in dual diversity antenna for reduced interference in a multi-path environment
- 32-bit Cardbus Performance
- User-friendly configuration and diagnostic utilities

LEDs

LED stands for **L**ight-**E**mitting **D**iode. The DWL-650 has two LEDs:

1. **Power** - **Green** LED lights **on** steady to indicate a proper connection to a power source.
2. **Link** - **Green** LED flashes to indicate **activity** on the network and lights **on** steady to indicate that a **link** to the network is established.



3. Wireless Basics

D-Link *Air* wireless products are based on industry standards to provide easy-to-use and compatible high-speed wireless connectivity within your home, business or public access wireless networks. D-Link wireless products will allow access to the data you want, when and where you want it. You will be able to enjoy the freedom that wireless networking brings.

A wireless local area network (WLAN) is a cellular computer network that transmits and receives data with radio signals instead of wires. Wireless LANs are used increasingly in both home and office environments, and public areas such as airports, coffee shops and universities. Innovative ways to utilize WLAN technology are helping people to work and communicate more efficiently. Increased mobility and the absence of cabling and other fixed infrastructure have proven to be beneficial for many users.

Wireless users can use the same applications they use on a wired network. Wireless adapter cards used on laptop and desktop systems support the same protocols as Ethernet adapter cards.

People use wireless LAN technology for many different purposes:

Mobility - Productivity increases when people have access to data in any location within the operating range of the WLAN. Management decisions based on real-time information can significantly improve worker efficiency.

Low Implementation Costs - WLANs are easy to set up, manage, change and relocate. Networks that frequently change, can benefit from WLANs ease of implementation. WLANs can operate in locations where installation of wiring may be impractical.

Installation and Network Expansion - Installing a WLAN system can be fast and easy and can eliminate the need to pull cable through walls and ceilings.

Scalability - WLANs can be configured in a variety of ways to meet the needs of specific applications and installations. Configurations are easily changed and range from peer-to-peer networks suitable for a small number of users to larger infrastructure networks to accommodate hundreds or thousands of users, depending on the number of wireless devices deployed.

Inexpensive Solution - Wireless network devices are as competitively priced as conventional Ethernet network devices.

Wireless Basics

The DWL-650 is compatible with 802.11b wireless products which include:

D-Link Air DWL-650, D-Link AirPlus DWL-650+

2.4GHz Wireless Cardbus Adapter used with laptop computers

D-Link AirPlus DWL-520+

2.4GHz Wireless PCI cards used with desktop computers

D-Link AirPlus DWL-900AP+

Enhanced 2.4GHz Wireless Access Point

D-Link AirPlus DI-614+, DI-714P+

Enhanced 2.4GHz Wireless Broadband Routers

Standards - Based Technology

Based on the IEEE 802.11b standard, the DWL-650 is also interoperable with existing compatible 2.4GHz wireless technology with data transfer speeds of up to 11Mbps.

Installation Considerations

The D-Link *Air* DWL-650 lets you access your network, using a wireless connection, from virtually anywhere within its operating range. Keep in mind, however, that the number, thickness and location of walls, ceilings, or other objects that the wireless signals must pass through, may limit the range. Typical ranges vary depending on the types of materials and background RF (radio frequency) noise in your home or business. The key to maximizing wireless range is to follow these basic guidelines:

1. Keep the number of walls and ceilings between the DWL-650 and other network devices to a minimum - each wall or ceiling can reduce your D-Link *Air* Wireless product's range from 3-90 feet (1-30 meters.) Position your devices so that the number of walls or ceilings is minimized.
2. Be aware of the direct line between network devices. A wall that is 1.5 feet thick (.5 meters), at a 45-degree angle appears to be almost 3 feet (1 meter) thick. At a 2-degree angle it looks over 42 feet (14 meters) thick! Position devices so that the signal will travel straight through a wall or ceiling (instead of at an angle) for better reception.

Wireless Basics

3. Building Materials can impede the wireless signal - a solid metal door or aluminum studs may have a negative effect on range. Try to position wireless devices and computers with wireless adapters so that the signal passes through drywall or open doorways and not other materials.
4. Keep your product away (at least 3-6 feet or 1-2 meters) from electrical devices or appliances that generate RF noise.

4. Getting Started

Right out of the box, with its default settings, the DWL-650 will automatically connect with other D-Link *Air* or *AirPlus* products.

There are basically two modes of networking:

Infrastructure – using an Access Point, such as the DWL-6000AP

Ad-Hoc – directly connecting to another computer, for peer-to-peer communication, using wireless network adapters on each computer, such as two or more DWL-650 cardbus adapters.

On the following pages we will show you an example of an **Infrastructure Network** and an **Ad-Hoc Network**.

An **Infrastructure** network contains an Access Point. The **Infrastructure Network** example shown on the following page contains the following D-Link network devices:

A wireless Broadband Router - **D-Link AirPlus DI-614+**

A laptop computer with a wireless network adapter - **D-Link Air DWL-650**

A desktop computer with an Ethernet adapter – (**D-Link DFE-530TX+**)

A Cable modem - **D-Link DCM-200**

***DHCP** stands for Dynamic Host Configuration Protocol. It is a protocol for assigning IP addresses “automatically.” With a DHCP-capable gateway/router, there is no need to manually assign an IP address.*

Getting Started

Setting Up an Infrastructure Network



Please remember that **D-Link Air** wireless devices are pre-configured to connect together, right out of the box, with the default settings.

- 1 You will need a broadband Internet access (Cable/DSL) subscription.
- 2 Consult with your Cable/DSL provider for proper installation of the modem.
- 3 Connect the modem to a wireless Broadband router (such as the **D-Link DI-614+**.) See the **Quick Installation Guide** included with the router.
- 4 If an Ethernet port is available on the router, connect a computer that is equipped with an Ethernet Network adapter (such as the **DFE-530TX+**) to the router.
- 5 Install the drivers for the wireless network adapter (such as the **D-Link Air DWL-650**) into the laptop computer. See the **Quick Installation Guide** included with the DWL-650.

Getting Started

Setting up a Wireless Ad Hoc Network



- 1** Install a network adapter into one computer. In the example above, the **D-Link Air DWL-120** USB Wireless Network adapter is installed. You can also install the **DWL-520** Wireless PCI Adapter in the desktop computer. See the **Quick Installation Guide** included with the product for installation instructions.
- 2** Install the **DWL-650** into a laptop computer. See the **Quick Installation Guide** included with the product.
- 3** Set the wireless configuration for the adapters to Ad-Hoc mode, set the adapters to the same channel, and assign an IP Address to each computer on the Ad-Hoc network. (See Box below)

IP Address

If you need to assign IP Addresses to the computers on the network, please remember that the **IP Address for each computer must be in the same IP Address range as all the computers in the network**, and the subnet mask must be exactly the same for all the computers in the network.


For example: If the first computer is assigned an IP Address of 192.168.0.2 with a Subnet Mask of 255.255.255.0, then the second computer can be assigned an IP Address of 192.168.0.3 with a Subnet Mask of 255.255.255.0, etc.

IMPORTANT: If computers or other devices are assigned the same IP Address, one or more of the devices may not be visible on the network.

5. Using the Configuration Utility

D-Link Air DWL-650 uses the **Configuration Utility** as the management software. The utility provides the user an easy interface to change any settings related to the wireless adapter. After you have completed the installation of the DWL-650 (refer to the **Quick Installation Guide** that came with your purchase) whenever you start the computer, the **Configuration Utility** starts automatically and the system tray icon is loaded in the toolbar (see illustration below*.) Clicking on the utility icon will start the **Configuration Utility**. Another way to start the **Configuration Utility** is to click on **Start>Programs>D-Link Air>D-Link Air Utility**.

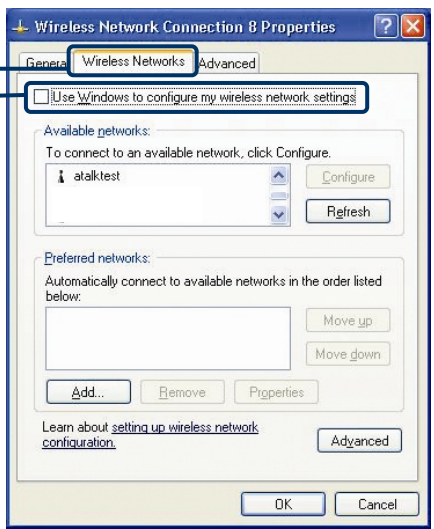
To use the D-Link Configuration Utility with XP, right-click on the Wireless network icon in the taskbar in the lower right-hand corner of your computer screen




In the window that appears, select **View Available Wireless Networks** and click the **Advanced** button. The screen at right will appear.

Select the **Wireless Networks** tab.


Uncheck the box in the properties window that enables windows configuration.



After you have done this, you can then use the D-Link Configuration Utility with XP by clicking on the D-Link Configuration Utility icon.



If the icon does not display in the taskbar, then click on this icon on your desktop to open.

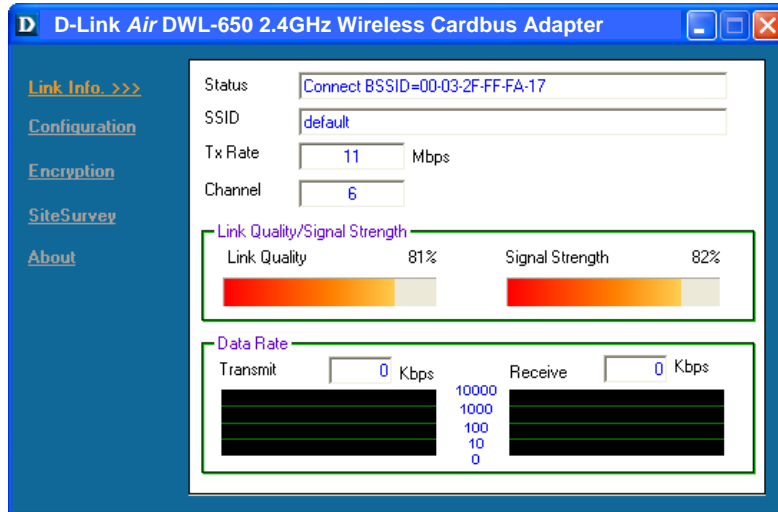


*Config Utility icon in system tray

Configuration Utility

Link Info

After clicking on the Configuration Utility icon, the **Link Info** screen will display the following:



This screen shot will be the same for all Windows operating systems

Status: Displays the MAC Address of the Access Point that is associated with the DWL-650.

SSID: The Service Set Identifier is the name assigned to the wireless network. The factory SSID setting is set to **default**.

TxRate: The factory setting is set to 11 Mbps; however, TxRate settings are automatically determined by the DWL-650 depending on the distance from the access point.

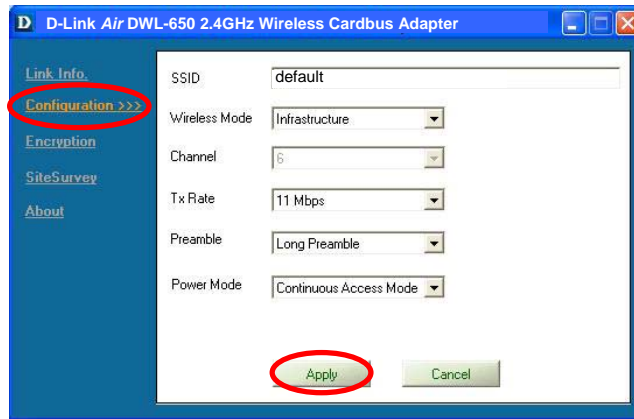
Channel: Displays the channel information. By default, the channel is set to 6 and selection is automatically determined by the DWL-650.

Link Quality / Signal Strength: Displays the Link Quality for the DWL-650 wireless connection to the access point. The Signal Strength represents the wireless signal between the access point and the DWL-650. The percentage coincides with the graphical bar.

Data Rate: Displays the statistics of data transmitted and received.

Configuration Utility Configuration

This Configuration screen displays the default settings for the DWL-650.



To communicate on the network all devices must have the same settings for the following properties:

SSID - (Service Set Identifier) is a name that identifies a wireless network. Access Points and wireless clients attempting to connect to a specific WLAN (Wireless Local Area Network) must use the same SSID. The default setting is **default**.

Wireless Mode - Click on the pull-down menu; select from the following options:

Infrastructure - connecting the WLAN using an Access Point such as the DWL-6000AP. (The **default** setting.)

Ad-Hoc – wireless mode used when connecting directly to a computer equipped with a wireless adapter such as the D-Link Air DWL-520 Wireless PCI adapter in a peer-to-peer environment.

Channel – The **default** channel setting is channel 6. However, the DWL-650 will automatically select the channel to match the channel setting for the selected Access Point. In Ad Hoc mode, the channel must be manually set to the same channel for each wireless adapter.

TX Rate - Select the transmission rate on the network. 11Mbps is the **default** setting.

Preamble - Select **Long** or **Short Preamble**. The Preamble defines the length of the CRC block (Cyclic Redundancy Check is a common technique for detecting data transmission errors) for communication between the Access Point and the roaming wireless Network adapters. **Long Preamble** is the **default** setting. *Note: High network traffic areas should use the shorter preamble type.*

Power Mode – Select from three modes:

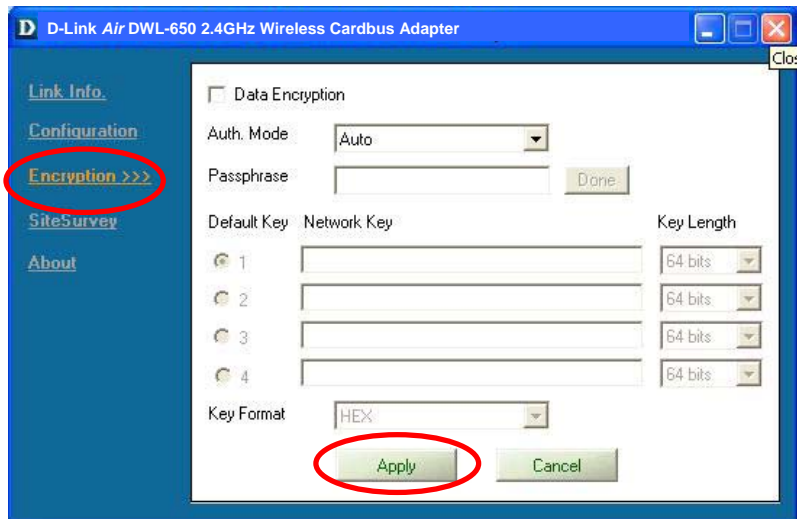
Continuous Access Mode-this **default** setting consumes the most power

Maximum Power Save-this setting consumes the least power

Power Save- this setting consumes a moderate amount of power

*If any changes are made to the configuration of the wireless adapter, click **Apply** to save the changes.*

Configuration Utility Encryption



Please note that all devices must share the same Encryption settings to communicate on the network.

Data Encryption – enable Encryption by clicking on the box. The DWL-650 has Encryption disabled as the default setting.

Authorization mode – choose one of the following modes:

Open Authentication – communicates the key across the network

Shared Authentication – allows communication only with other devices with identical WEP settings

Auto – will automatically adjust to the Authentication mode of the wireless client

Network Key – enter a key in either ASCII (e.g., a word) or hexadecimal format

Key Format - ASCII or Hexadecimal

Hexadecimal digits consist of the numbers 0-9 and the letters A-F
ASCII (American Standard Code for Information Interchange) is a code for representing English letters as numbers from 0-127

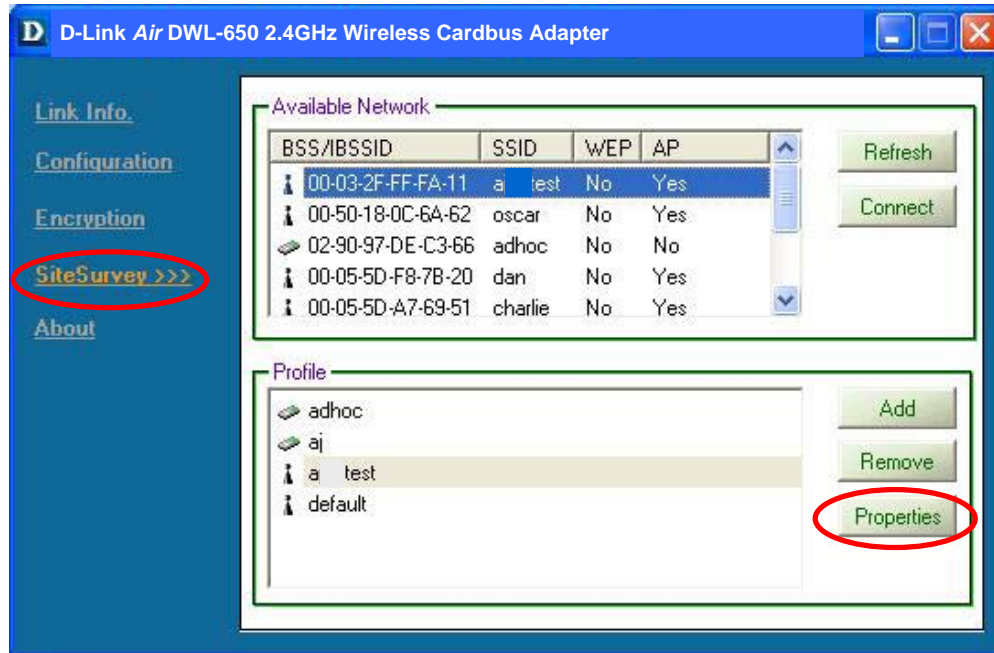
Key type - select the key length, either 64, 128 or 256 bits

Key Index – you can create up to 4 different security keys

Click **Apply** to save the changes.

Configuration Utility

Site Survey



Available Networks

The top section of the window displays the **Available Networks**. Scroll up and down the list and highlight the network to which you wish to connect. Click on the **Connect** button.

Profiles

In the lower half of the screen, you can manage the profiles that you have created for the wireless network at home, at the office and in public places. Scroll up and down and highlight the profile that you wish to configure. You can **ADD** or **REMOVE** a profile, or configure the **Properties** of the profile in order to connect with an available network.

Properties

Click on **Properties** and the screen on the next page will appear.

Configuration Utility Properties

Profile: Current Setting

Profile Name: Current Setting/Default Setting

SSID: default

Wireless Mode: Infrastructure

Channel: 6

Tx Rate: 11 Mbps

Preamble: Long Preamble

Power Mode: Continuous Access Mode

Data Encryption

Auth. Mode: Auto

Passphrase: Done

Default Key	Network Key	Key Length
1	<input type="text"/>	64 bits
2	<input type="text"/>	64 bits
3	<input type="text"/>	64 bits
4	<input type="text"/>	64 bits

Key Format: HEX

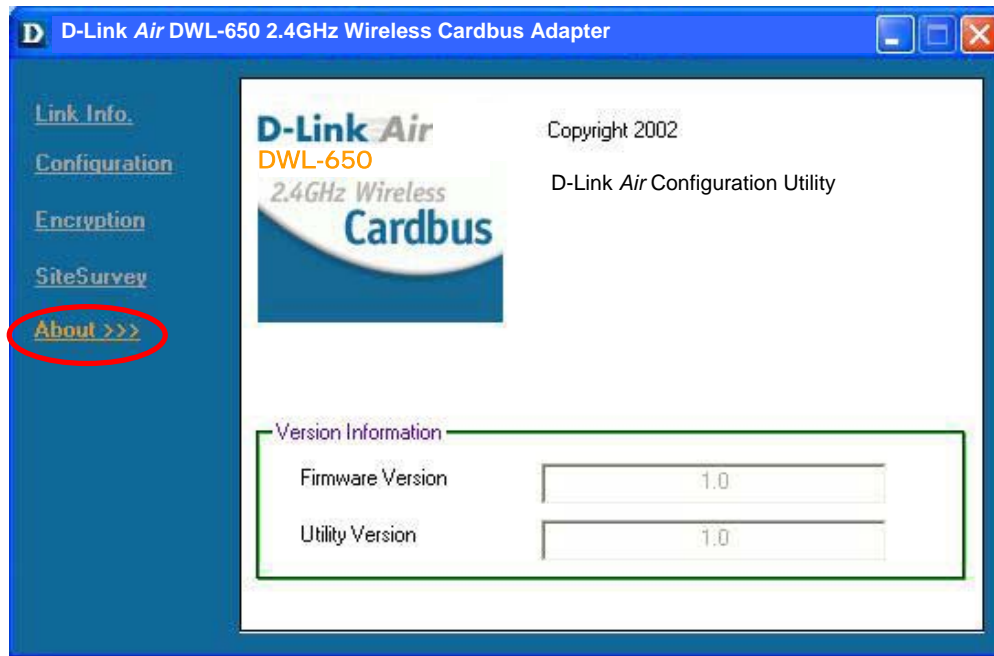
OK Cancel

In this window you can configure all the properties of a profile in order to connect with a network of your choice.

After you have entered your changes in this window, click **OK** to save the changes.

Configuration Utility

About



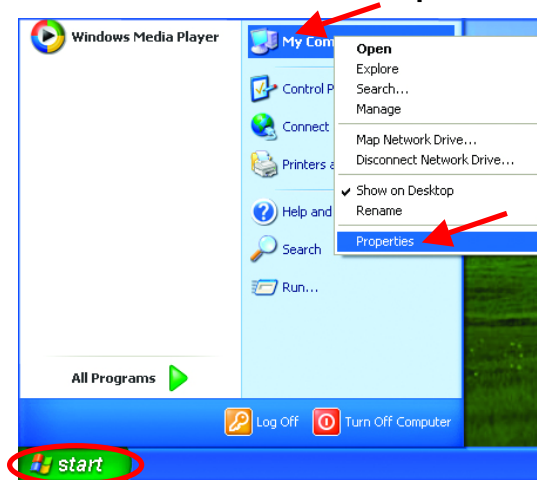
The **ABOUT** screen gives you information about the **Firmware** and **Utility Versions** of the DWL-650.

6. Troubleshooting

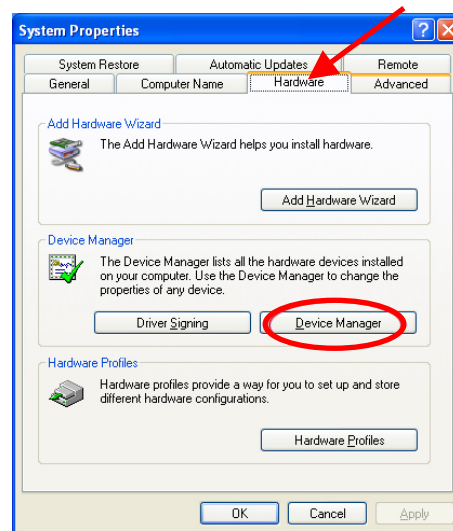
This chapter provides solutions to problems that can occur during the installation and operation of the DWL-650 Wireless Adapter. Read the following descriptions if you are having problems. *(The examples below are illustrated in Windows XP. If you have another operating system, these solutions will still apply although the appearance on your computer screen may differ.)*

1. Checking the Installation of the Drivers for the Wireless Adapter

- Go to **Start**
- Right-click on **My Computer**
- Click **Properties**

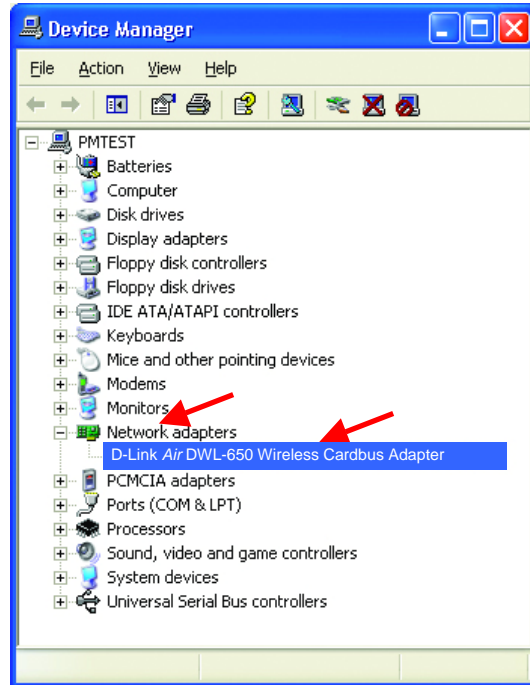


- Select the **Hardware Tab**
- Click **Device Manager**

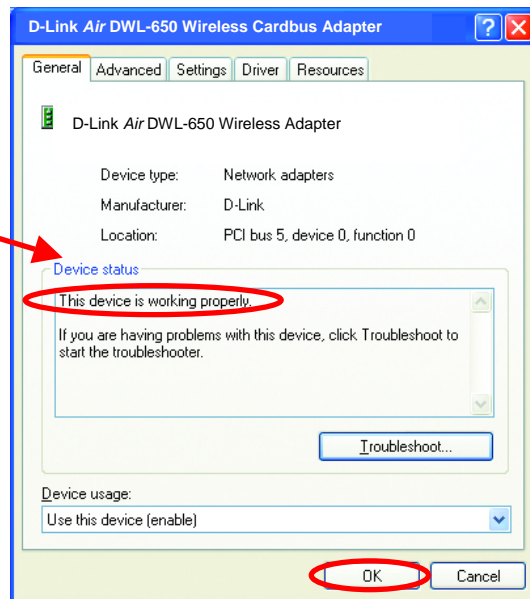


Troubleshooting

- Double-click on **Network Adapters**
- Right-click on **D-Link Air DWL-650 Wireless Adapter**
- Select **Properties** to check that the drivers are installed properly.



- Look under **Device Status** to check that the device is working properly.



- Click **OK**

Troubleshooting

2. I cannot connect to the access point or the wireless router.

- Make sure that the SSID on the DWL-650 Cardbus adapter is exactly the same as the SSID on the Access Point or wireless router.

3. The DWL-650 Power and Link lights are not on.

- Check to see if the DWL-650 Cardbus adapter is firmly inserted into a PC Cardbus slot.

4. I forgot my Encryption key.

- Reset the Access Point to its factory default settings and restore the DWL-650 Wireless Cardbus Adapter to the factory default settings. (The default settings are listed in Ch.5: **Using the Configuration Utility** in this manual.)

5. The computer does not recognize the DWL-650 Wireless Adapter.

- Make sure that the DWL-650 Wireless Adapter is properly seated in the computer's Cardbus slot.
- If Windows does not detect the hardware upon insertion of the adapter, make sure to completely remove drivers that were previously loaded. To remove the drivers, do the following:
 - A. Under **Tools**> select **Folder Options...**> select **View** > under **Hidden files and folders** > select **Show hidden files and folders**
 - B. Uncheck **Hide extension for known file types** > click on **Apply**
 - C. Search for the files **TIACXLN.INF** and **TIACXLN.SYS**. Remove these files from the **INF** and **SYSTEM32 (DRIVERS)** folders in the Windows directory. Note: Windows XP and Windows 2000 will rename **.inf** files that have not received WHQL certification into **oem.inf** files (e.g., **oem1.inf**)

6. The computer with the DWL-650 installed is unable to connect to the wireless network.

- Check that the LED indicators for the broadband modem are indicating normal activity. If not, there may be a problem with the broadband connection.

Troubleshooting

- Check that the LED indicators on the wireless router are functioning properly. If not, check that the AC power and Ethernet cables are firmly connected.
- Check that the IP Address, subnet mask, gateway, and DNS settings are correctly entered for the network
- In **Infrastructure** mode, make sure the same **Service Set Identifier (SSID)** is specified on the settings for the wireless clients and access points. The **SSID** factory default setting for the D-Link *Air* products is **default**. (Double-click on the WLAN icon in the taskbar. The **Link Info** screen will display the SSID setting.)
- In **Ad-Hoc** mode, both wireless clients will need to have the same **SSID**. Please note that it might be necessary to set up one client to establish a **BSS (Basic Service Set)** and wait briefly before setting up other clients. This prevents several clients from trying to establish a **BSS** at the same time, which can result in multiple singular **BSSs** being established, rather than a single **BSS** with multiple clients associated to it.
- Check that the **Network Connection** for the wireless client is configured properly. Select **AP (Infrastructure)** when connecting to an access point and select **Ad-Hoc mode** when connecting without an access point. Double-click on the **WLAN icon** in the taskbar > click on **Configuration** to change the settings for the wireless adapter.
- If **Security** is enabled, make sure that the correct encryption keys are entered on both the DWL-650 and the access point. Double-click on the **WLAN icon** in the taskbar > click **Encryption**. Check to see that the key selected is set to the same key as other devices on the network.

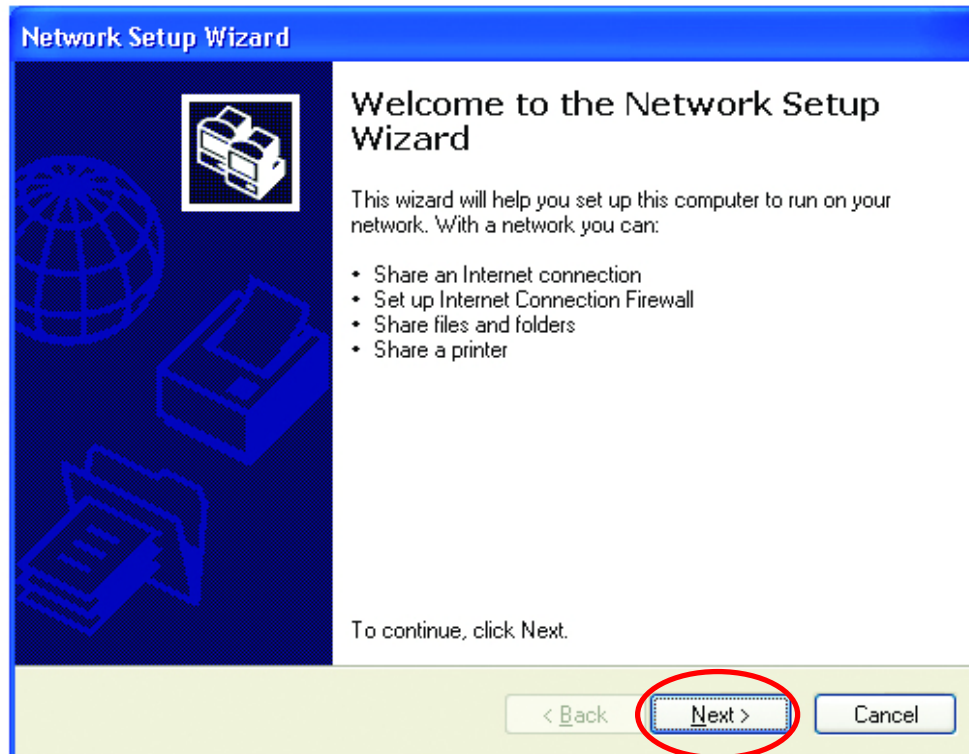
7. Networking Basics

Using the Network Setup Wizard in Windows XP

In this section you will learn how to establish a network at home or work, using **Microsoft Windows XP**.

Note: Please refer to websites such as <http://www.homenethelp.com> and <http://www.microsoft.com/windows2000> for information about networking computers using Windows 2000, Me or 98SE.

Go to **Start > Control Panel > Network Connections**
Select **Set up a home or small office network**

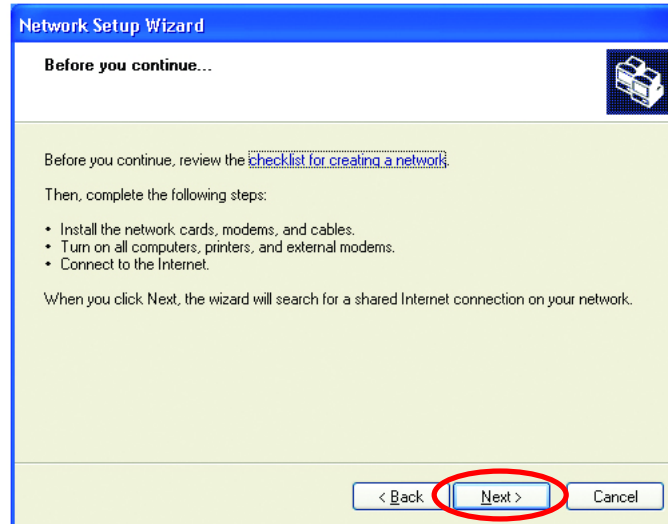


When this screen appears, click **Next**.

Networking Basics

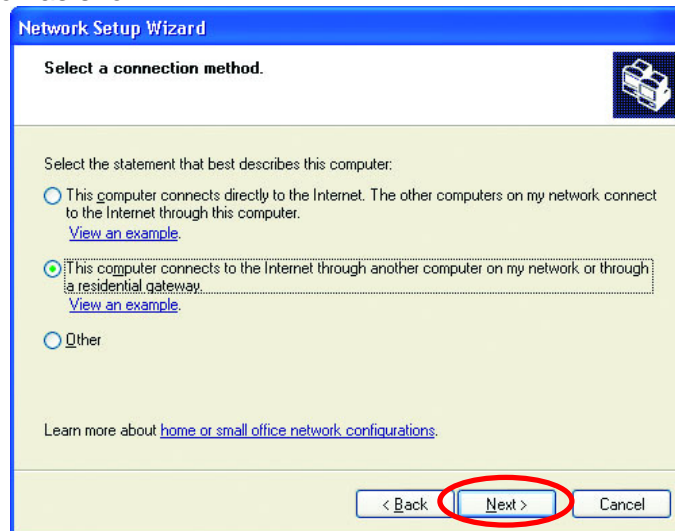
Using the Network Setup Wizard in Windows XP

Please follow all the instructions in this window:



Click **Next**

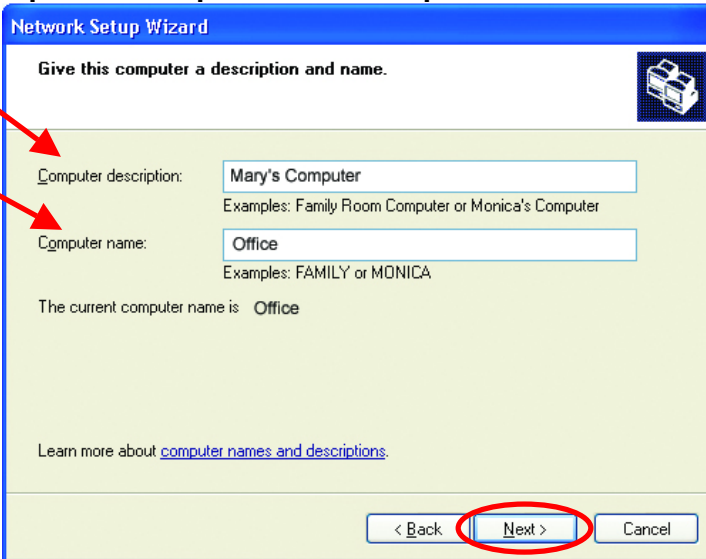
In the following window, select the best description of your computer. If your computer connects to the Internet through a gateway/router, select the second option as shown.



Click **Next**

Networking Basics

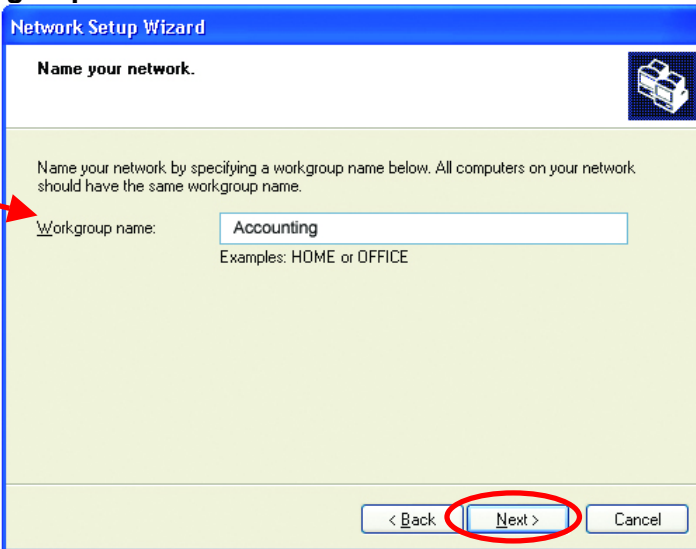
Enter a **Computer description** and a **Computer name**.



The screenshot shows the 'Network Setup Wizard' window with the title 'Give this computer a description and name.' The window contains two text input fields. The first is labeled 'Computer description:' and contains the text 'Mary's Computer'. Below it are examples: 'Examples: Family Room Computer or Monica's Computer'. The second is labeled 'Computer name:' and contains the text 'Office'. Below it are examples: 'Examples: FAMILY or MONICA'. Below the input fields, it says 'The current computer name is Office'. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'. The 'Next >' button is circled in red. Two red arrows point to the 'Computer description:' and 'Computer name:' labels.

Click **Next**

Enter a **Workgroup** name. All computers on your network should have the same **Workgroup name**.

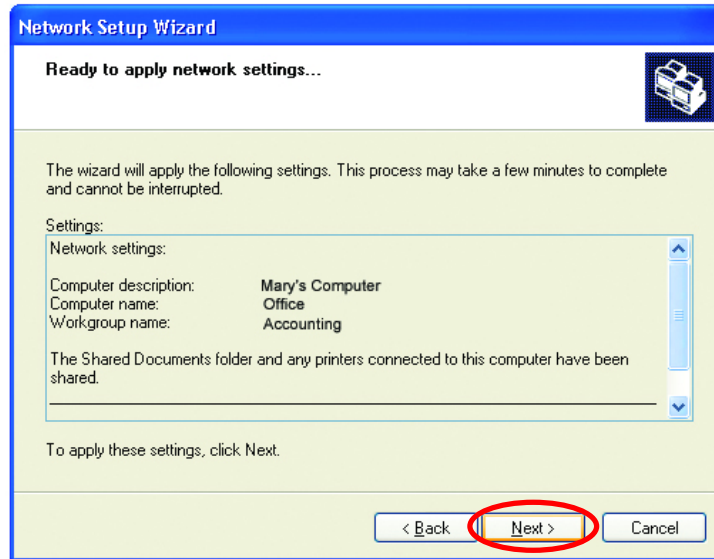


The screenshot shows the 'Network Setup Wizard' window with the title 'Name your network.' The window contains a text input field labeled 'Workgroup name:' which contains the text 'Accounting'. Below it are examples: 'Examples: HOME or OFFICE'. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'. The 'Next >' button is circled in red. A red arrow points to the 'Workgroup name:' label.

Click **Next**

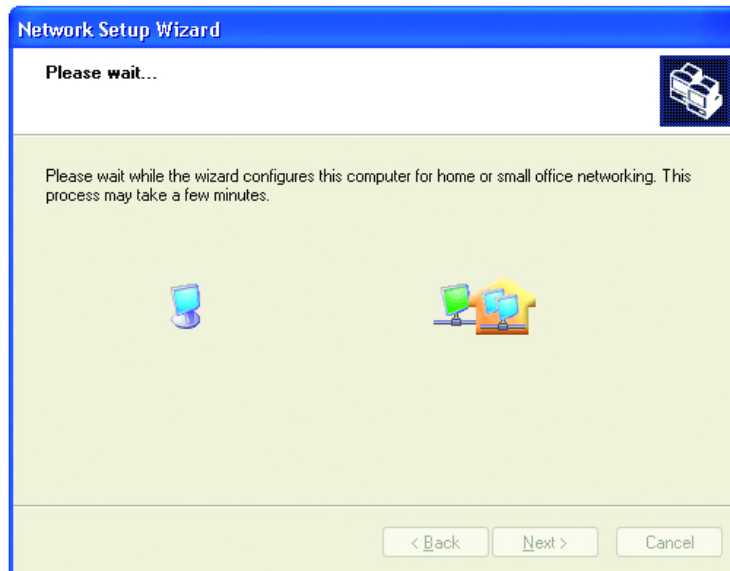
Networking Basics

Please wait while the wizard applies the changes.



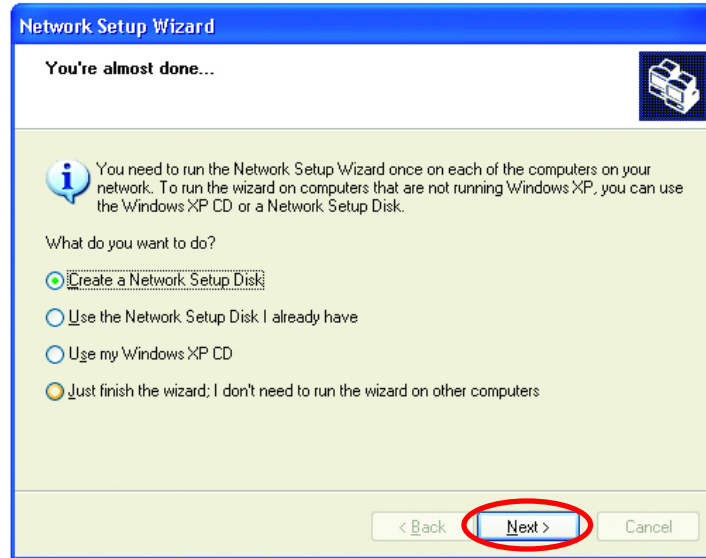
When the changes are complete, click **Next**.

Please wait while the wizard configures the computer.
This may take a few minutes.

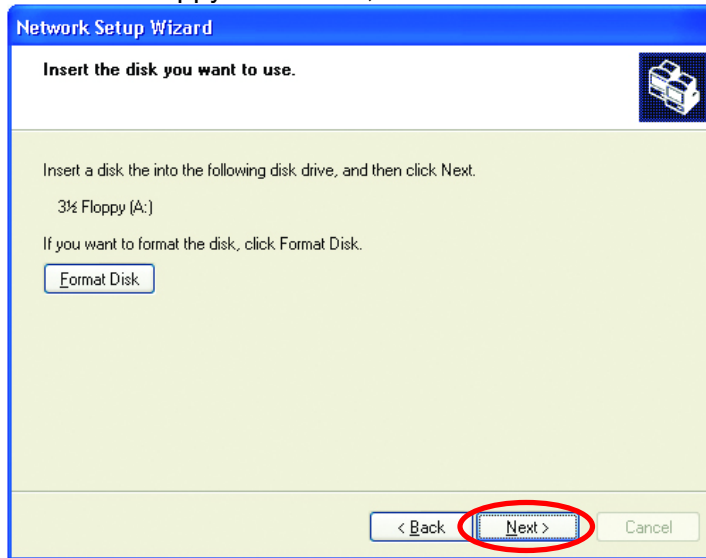


Networking Basics

In the window below, select the best option. In this example, **Create a Network Setup Disk** has been selected. You will run this disk on each of the computers on your network. Click **Next**.



Insert a disk into the Floppy Disk Drive, in this case drive **A:**



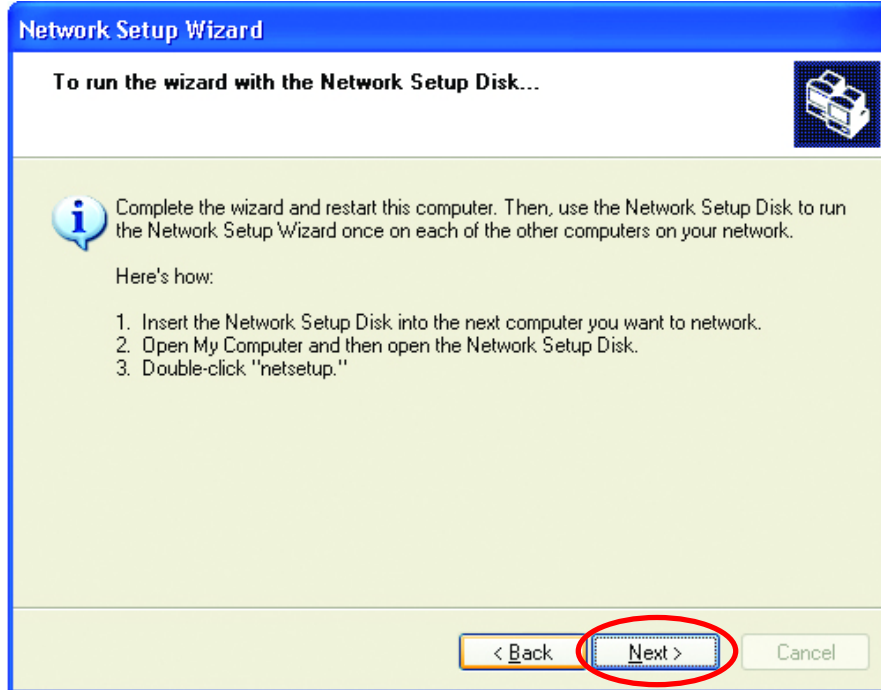
Format the disk if you wish, and click **Next**.

Networking Basics

Please wait while the wizard copies the files.

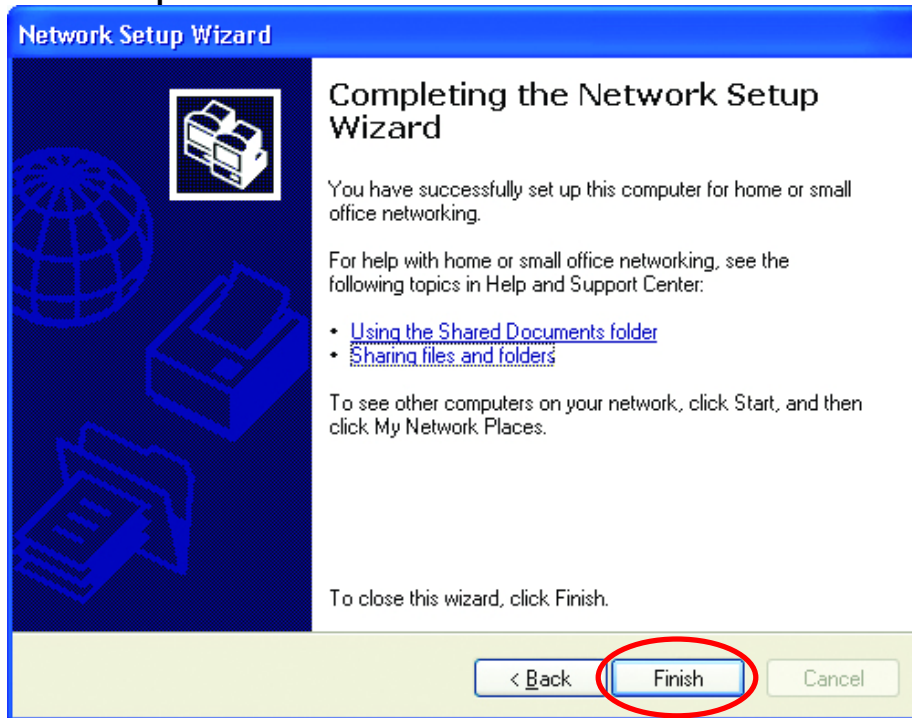


Please read the information under **Here's how** in the screen below. After you complete the **Network Setup Wizard** you will use the **Network Setup Disk** to run the **Network Setup Wizard** once on each of the computers on your network. To continue, click **Next**

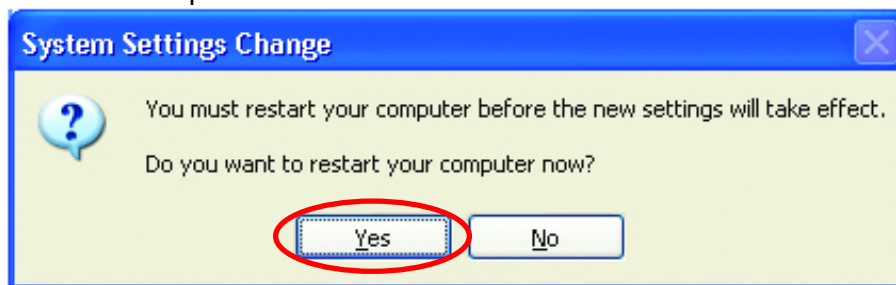


Networking Basics

Please read the information on this screen, then click **Finish** to complete the **Network Setup Wizard**.



The new settings will take effect when you restart the computer. Click **Yes** to restart the computer.



You have completed configuring this computer. Next, you will need to run the **Network Setup Disk** on all the other computers on your network. After running the **Network Setup Disk** on all your computers, your new wireless network will be ready to use.

Networking Basics

Naming your Computer

To name your computer, please follow these directions:

In **Windows XP**:

- Click **Start** (in the lower left corner of the screen)
- Right-click on **My Computer**
- Select **Properties** and click

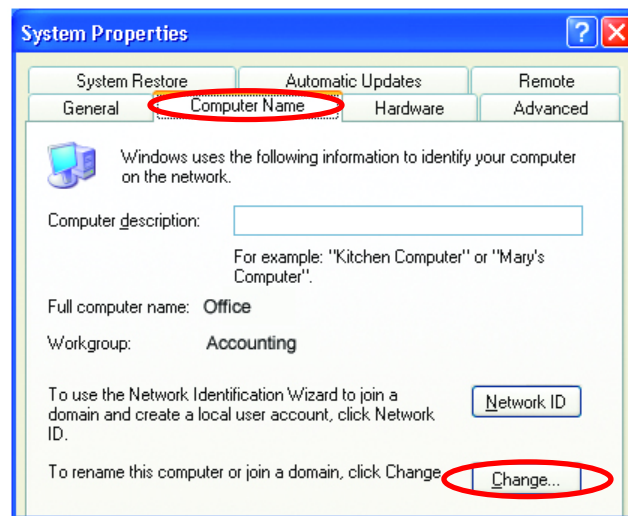


- Select the **Computer Name** Tab in the **System Properties** window.

*You may enter a **Computer description** if you wish; this field is optional.*

To rename the computer or join a domain,

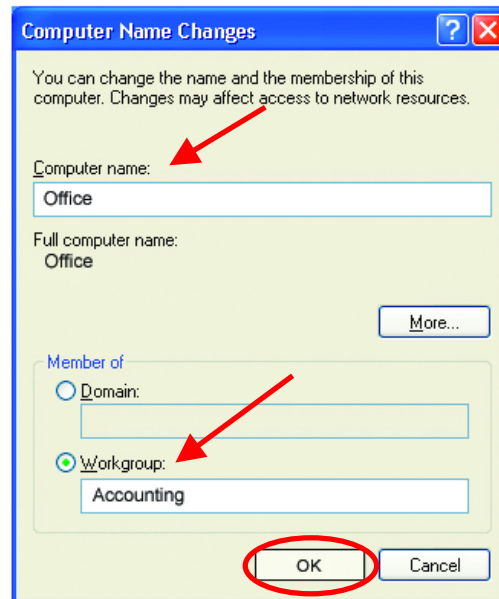
- Click **Change**



Networking Basics

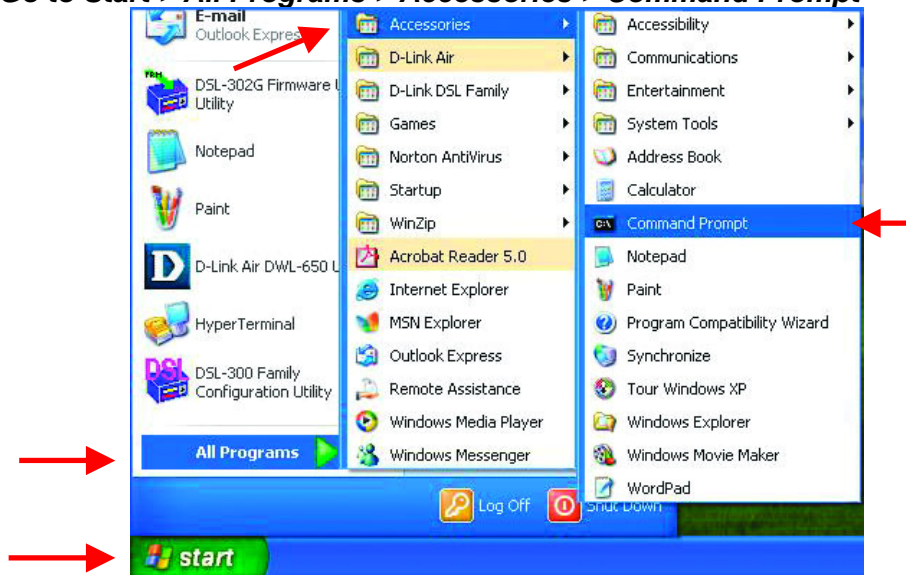
Naming your Computer

- In this window, enter the **Computer name**.
- Select **Workgroup** and enter the name of the **Workgroup**.
- All computers on your network must have the same **Workgroup** name.
- Click **OK**



Checking the IP Address in Windows XP/2000

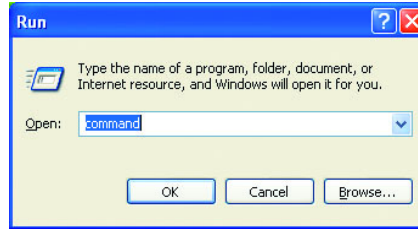
Go to **Start > All Programs > Accessories > Command Prompt**



Networking Basics

Checking the IP Address in Windows XP/2000

Type **Command**



Type **ipconfig /all** at the prompt. All the configuration settings are displayed as shown below.

```
Command Prompt
F:\Documents and Settings\lab4>ipconfig /all

Windows IP Configuration

Host Name . . . . . : iqc4
Primary Dns Suffix . . . . . :
Node Type . . . . . : Unknown
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Ethernet adapter Wireless Network Connection:

Connection-specific DNS Suffix . :
Description . . . . . : D-Link Air DWL-650 Wireless Cardbus Adap
Adapter
Physical Address. . . . . : 00-06-25-53-85-31
Dhcp Enabled. . . . . : No
IP Address. . . . . : 192.168.0.23
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.0.1
DNS Servers . . . . . : 10.10.10.40
                        192.152.81.1

F:\Documents and Settings\lab4>
```

Type **ipconfig /renew** at the prompt to get a new IP Address, shown below.

```
Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

F:\Documents and Settings\lab4>ipconfig /renew_

Adapter
Physical Address. . . . . : 00-06-25-53-85-31
Dhcp Enabled. . . . . : No
IP Address. . . . . : 192.168.0.23
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.0.1
DNS Servers . . . . . : 10.10.10.40
                        192.152.81.1
```

(Windows 98SE/Me users: go to **Start > Run**. Type **Command**. Type **winipcfg** at the prompt. Click **Release and Renew** to obtain a new IP Address.)

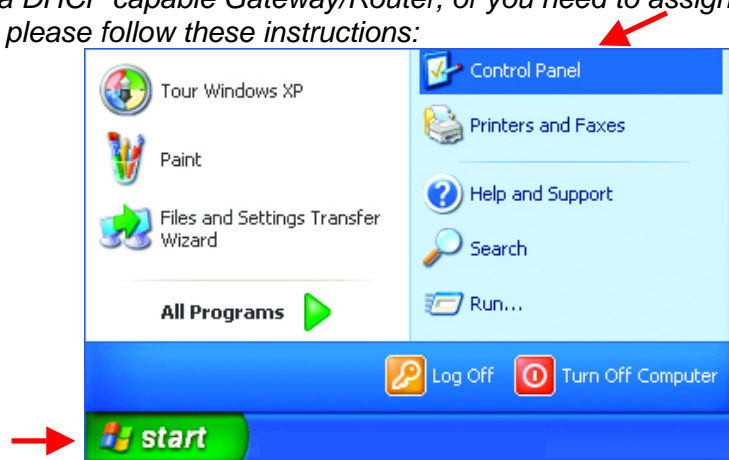
Networking Basics

Assigning a Static IP Address

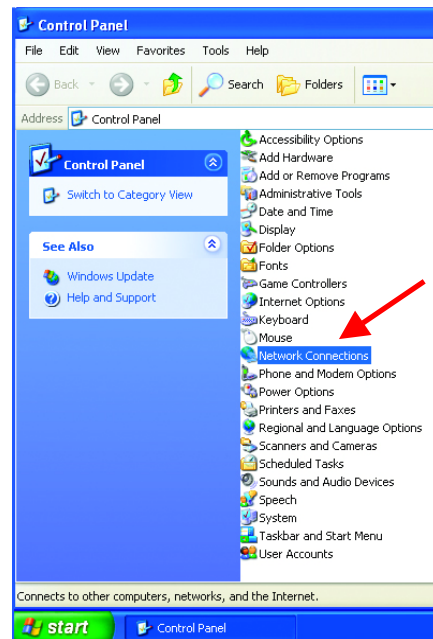
Note: Residential Gateways/Broadband Routers will automatically assign IP Addresses to the computers on the network, using DHCP (Dynamic Host Configuration Protocol) technology. If you are using a DHCP-capable Gateway/Router you will not need to assign Static IP Addresses.

If you are not using a DHCP capable Gateway/Router, or you need to assign a Static IP Address, please follow these instructions:

- Go to **Start**
- Double-click on **Control Panel**



- Double-click on **Network Connections**

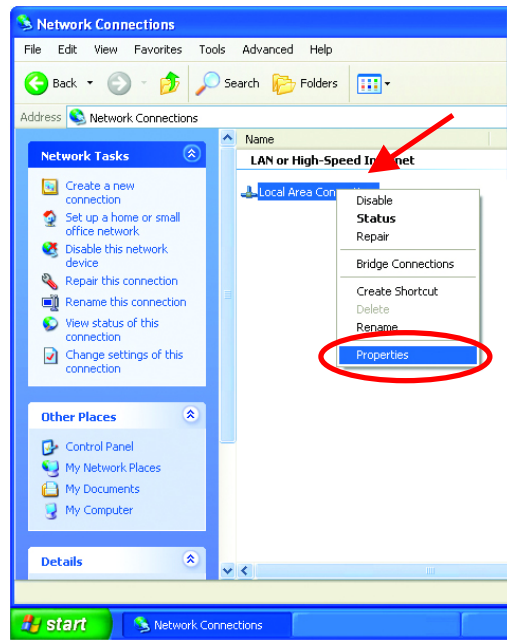


Networking Basics

Assigning a Static IP Address

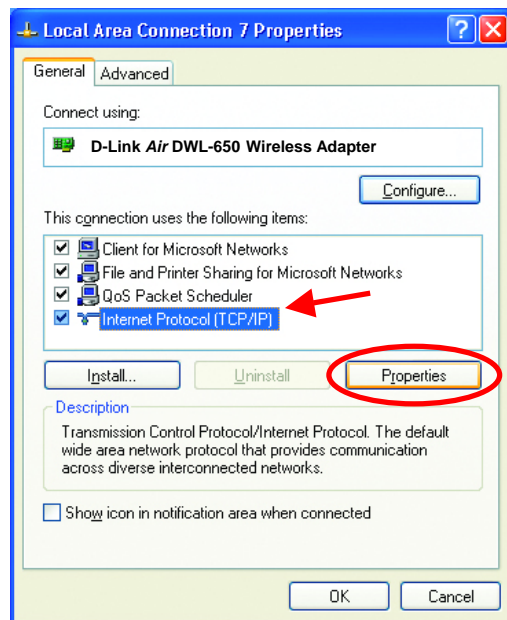
- Right-click on **Local Area Connections**.

- Click **Properties**



- Highlight **Internet Protocol (TCP/IP)**

- Click **Properties**

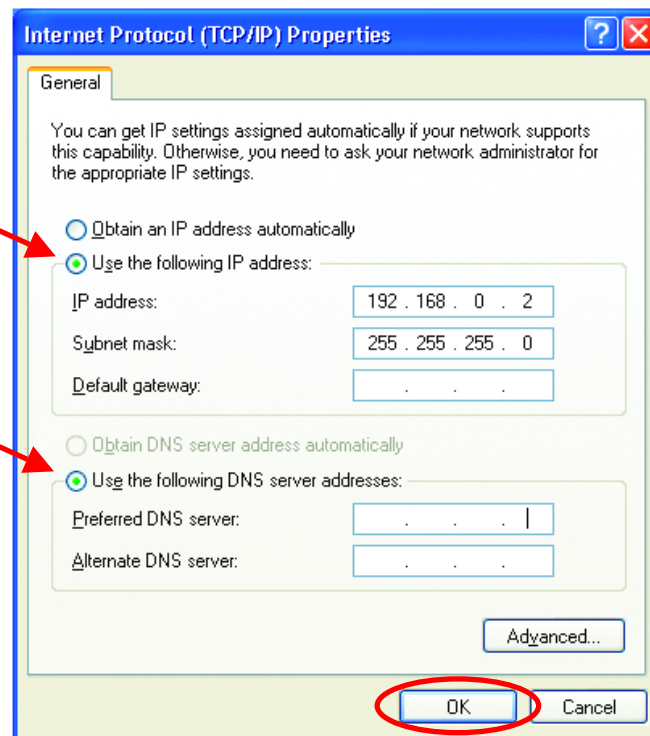


Networking Basics

Assigning a Static IP Address

- **Select Use the following IP address** in the **Internet Protocol (TCP/IP) Properties** window,
- **Input your IP address and subnet mask.** (The IP Addresses on your network must be within the same range. For example, if one computer has an IP Address of 192.168.0.2, the other computers should have IP Addresses that are between 192.168.0.3 and 192.168.0.254. No two computers can have the same IP Address. The subnet mask must be the same for all the computers on the network.)
- Input your **DNS server address only if you plan to use the Internet.** (Note: If you are entering a DNS server address, you must also enter the IP Address of the Default Gateway.)

The DNS server information will be provided by your ISP (Internet Service Provider.)



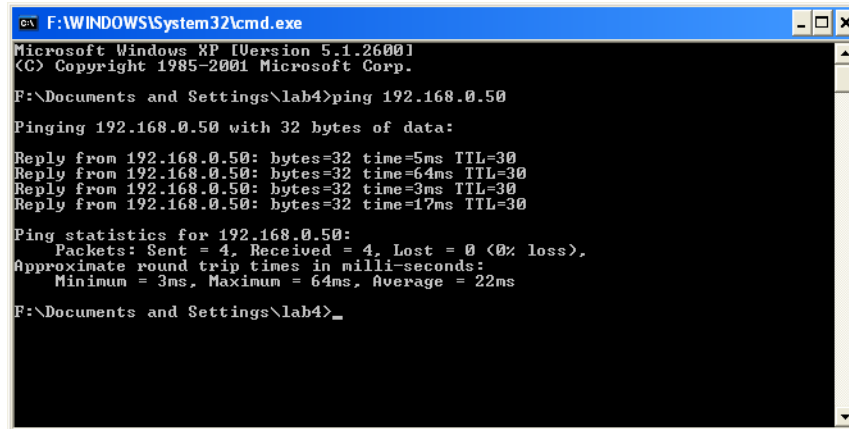
- Click **OK**

You have completed the assignment of a Static IP Address. (You do not need to assign a Static IP Address if you have a DHCP-capable Gateway/Router.)

Networking Basics

Checking the Wireless Connection by Pinging

For Windows XP and 2000:



```
ca F:\WINDOWS\System32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

F:\Documents and Settings\lab4>ping 192.168.0.50

Pinging 192.168.0.50 with 32 bytes of data:

Reply from 192.168.0.50: bytes=32 time=5ms TTL=30
Reply from 192.168.0.50: bytes=32 time=64ms TTL=30
Reply from 192.168.0.50: bytes=32 time=3ms TTL=30
Reply from 192.168.0.50: bytes=32 time=17ms TTL=30

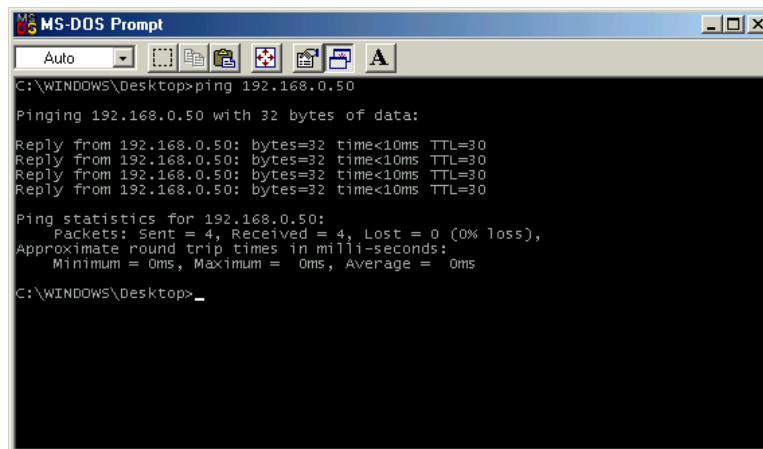
Ping statistics for 192.168.0.50:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 64ms, Average = 22ms

F:\Documents and Settings\lab4>_
```

Go to **Start > Run > type cmd**. A window similar to this will appear. Type **ping xxx.xxx.xxx.xxx**, where **xxx** is the **IP address** of the Wireless Router or Access Point.

A good wireless connection will show four replies from the wireless router or access point, as shown.

For Windows Me and 98SE:



```
MS-DOS Prompt
Auto
C:\WINDOWS\Desktop>ping 192.168.0.50

Pinging 192.168.0.50 with 32 bytes of data:

Reply from 192.168.0.50: bytes=32 time<10ms TTL=30
Reply from 192.168.0.50: bytes=32 time<10ms TTL=30
Reply from 192.168.0.50: bytes=32 time<10ms TTL=30
Reply from 192.168.0.50: bytes=32 time<10ms TTL=30

Ping statistics for 192.168.0.50:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\WINDOWS\Desktop>_
```

Go to **Start > Run > type command**. A window similar to this will appear. Type **ping xxx.xxx.xxx.xxx**, where **xxx** is the **IP address** of the Wireless Router or Access Point. A good wireless connection will show four replies from the wireless router or access point, as shown.

8. Technical Specifications

Standards:

- IEEE 802.11b

Adapter Type:

- PC Cardbus slot

System Requirements:

- Laptop with Cardbus Controller

Supported Operating Systems:

- Windows XP
- Windows 2000
- Windows Me
- Windows 98SE

Data Security:

- 64/128-bit WEP (Wired Equivalent Privacy) Encryption

Data Rate:* Mbps/channel

- 11 : CCK/PBCC
- 5.5 : CCK/PBCC
- 2 : QPSK
- 1 : BPSK

Key Management:

- Automatic Dynamic Key Allocation (ADKA) through public key

Range*:

- Indoors – up to 328 feet (100 meters)
- Outdoors – up to 1,312 feet (400 meters)

Diagnostic LED:

- Power – solid green light indicates power connection
- Link/Activity – green solid/blinking light indicates Link/Activity

Power Specifications:

- Operating Voltage: 3.3V

**Environmental factors may adversely affect range.*

Network Architecture:

- Supports Ad-Hoc Mode (Peer-to-Peer without Access Point) or Infrastructure Mode (Communications to wired networks via Access Points with Roaming)

Antenna:

- Internal patch antenna supporting diversity
- Mobility: Seamless roaming across cell boundaries within access point range

Frequency Range:

- 2.4 – 2.4835 GHz, Direct Sequence Spread Spectrum (DSSS)

Operating Channels:

- 1-11 United States (FCC)

Physical Dimensions:

- L = 4.50 inches (114 mm)
- W = 2.25 inches (54 mm)
- H = .25 inches (6 mm)

Transmit Output Power:

- 15dBm (32mW) \pm 2dB

Temperature:

- Operating Temperature: 14°F to 131°F (-10°C to 55°C)
- Storage Temperature: -4°F to 167°F (-20°C to 75°C)

Humidity:

- Maximum up to 95% Non-condensing

Emissions:

- FCC
- CE

Safety: UL

*Maximum wireless signal rate based on IEEE Standard 802.11b specifications. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead lower actual data throughput rate.

9. Contacting Technical Support

Technical Support

You can find software updates and user documentation on the D-Link website.

D-Link provides free technical support for customers within the United States and within Canada for the duration of the warranty period on this product.

U.S. and Canadian customers can contact D-Link Technical Support through our website, or by phone.

Tech Support for customers within the United States:

D-Link Technical Support over the Telephone:

(877) 453-5465
24 hours a day, seven days a week.

D-Link Technical Support over the Internet:

<http://support.dlink.com>
email: support@dlink.com

Tech Support for customers within Canada:

D-Link Technical Support over the Telephone:

(800) 361-5265
Monday to Friday 8:30am to 9:00pm EST

D-Link Technical Support over the Internet:

<http://support.dlink.ca>
email: support@dlink.ca

10. Warranty and Registration



Limited Warranty (USA Only)

Subject to the terms and conditions set forth herein, D-Link Systems, Inc. ("D-Link") provides this Limited warranty for its product only to the person or entity that originally purchased the product from:

- D-Link or its authorized reseller or distributor and
- Products purchased and delivered within the fifty states of the United States, the District of Columbia, U.S. Possessions or Protectorates, U.S. Military Installations, addresses with an APO or FPO.

Limited Warranty: D-Link warrants that the hardware portion of the D-Link products described below will be free from material defects in workmanship and materials from the date of original retail purchase of the product, for the period set forth below applicable to the product type ("Warranty Period"), except as otherwise stated herein.

1-Year Limited Warranty for the Product(s) is defined as follows:

- Hardware (excluding power supplies and fans) One (1) Year
- Power Supplies and Fans One (1) Year
- Spare parts and spare kits Ninety (90) days

D-Link's sole obligation shall be to repair or replace the defective Hardware during the Warranty Period at no charge to the original owner or to refund at D-Link's sole discretion. Such repair or replacement will be rendered by D-Link at an Authorized D-Link Service Office. The replacement Hardware need not be new or have an identical make, model or part. D-Link may in its sole discretion replace the defective Hardware (or any part thereof) with any reconditioned product that D-Link reasonably determines is substantially equivalent (or superior) in all material respects to the defective Hardware. Repaired or replacement Hardware will be warranted for the remainder of the original Warranty Period from the date of original retail purchase. If a material defect is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to repair or replace the defective Hardware, the price paid by the original purchaser for the defective Hardware will be refunded by D-Link upon return to D-Link of the defective Hardware. All Hardware (or part thereof) that is replaced by D-Link, or for which the purchase price is refunded, shall become the property of D-Link upon replacement or refund.

Limited Software Warranty: D-Link warrants that the software portion of the product ("Software") will substantially conform to D-Link's then current functional specifications for the Software, as set forth in the applicable documentation, from the date of original retail purchase of the Software for a period of ninety (90) days ("Warranty Period"), provided that the Software is properly installed on approved hardware and operated as contemplated in its documentation. D-Link further warrants that, during the Warranty Period, the magnetic media on which D-Link delivers the Software will be free of physical defects. D-Link's sole obligation shall be to replace the non-conforming Software (or defective media) with software that substantially conforms to D-Link's functional specifications for the Software or to refund at D-Link's sole discretion. Except as otherwise agreed by D-Link in writing, the replacement Software is provided only to the original licensee, and is subject to the terms and conditions of the license granted by D-Link for the Software. Software will be warranted for the remainder of the original Warranty Period from the date of original retail purchase. If a material non-conformance is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to replace the non-conforming Software, the price paid by the original licensee for the non-conforming Software will be refunded by D-Link; provided that the non-conforming Software (and all copies thereof) is first returned to D-Link. The license granted respecting any Software for which a refund is given automatically terminates.

Non-Applicability of Warranty: The Limited Warranty provided hereunder for hardware and software of D-Link's products will not be applied to and does not cover any refurbished product and any product purchased through the inventory clearance or liquidation sale or other sales in which D-Link, the sellers, or the liquidators expressly disclaim their warranty obligation pertaining to the product and in that case, the product is being sold "As-Is" without any warranty whatsoever including, without limitation, the Limited Warranty as described herein, notwithstanding anything stated herein to the contrary.

Submitting A Claim: The customer shall return the product to the original purchase point based on its return policy. In case the return policy period has expired and the product is within warranty, the customer shall submit a claim to D-Link as outlined below:

- The customer must submit with the product as part of the claim a written description of the Hardware defect or Software nonconformance in sufficient detail to allow D-Link to confirm the same.
- The original product owner must obtain a Return Material Authorization (“RMA”) number from the Authorized D-Link Service Office and, if requested, provide written proof of purchase of the product (such as a copy of the dated purchase invoice for the product) before the warranty service is provided.
- After an RMA number is issued, the defective product must be packaged securely in the original or other suitable shipping package to ensure that it will not be damaged in transit, and the RMA number must be prominently marked on the outside of the package. Do not include any manuals or accessories in the shipping package. D-Link will only replace the defective portion of the Product and will not ship back any accessories.
- The customer is responsible for all in-bound shipping charges to D-Link. No Cash on Delivery (“COD”) is allowed. Products sent COD will either be rejected by D-Link or become the property of D-Link. Products shall be fully insured by the customer. D-Link will not be held responsible for any packages that are lost in transit to D-Link. The repaired or replaced packages will be shipped to the customer via UPS Ground or any common carrier selected by D-Link, with shipping charges prepaid. Expedited shipping is available if shipping charges are prepaid by the customer and upon request.
- Return Merchandise Ship-To Address
USA: 53 Discovery Drive, Irvine, CA 92618
Canada: 2180 Winston Park Drive, Oakville, ON, L6H 5W1 (Visit <http://www.dlink.ca> for detailed warranty information within Canada)

D-Link may reject or return any product that is not packaged and shipped in strict compliance with the foregoing requirements, or for which an RMA number is not visible from the outside of the package. The product owner agrees to pay D-Link’s reasonable handling and return shipping charges for any product that is not packaged and shipped in accordance with the foregoing requirements, or that is determined by D-Link not to be defective or non-conforming.

What Is Not Covered: This limited warranty provided by D-Link does not cover: Products, if in D-Link’s judgment, have been subjected to abuse, accident, alteration, modification, tampering, negligence, misuse, faulty installation, lack of reasonable care, repair or service in any way that is not contemplated in the documentation for the product, or if the model or serial number has been altered, tampered with, defaced or removed; Initial installation, installation and removal of the product for repair, and shipping costs; Operational adjustments covered in the operating manual for the product, and normal maintenance; Damage that occurs in shipment, due to act of God, failures due to power surge, and cosmetic damage; Any hardware, software, firmware or other products or services provided by anyone other than D-Link; Products that have been purchased from inventory clearance or liquidation sales or other sales in which D-Link, the sellers, or the liquidators expressly disclaim their warranty obligation pertaining to the product. Repair by anyone other than D-Link or an Authorized D-Link Service Office will void this Warranty.

Disclaimer of Other Warranties: EXCEPT FOR THE LIMITED WARRANTY SPECIFIED HEREIN, THE PRODUCT IS PROVIDED “AS-IS” WITHOUT ANY WARRANTY OF ANY KIND WHATSOEVER INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT. IF ANY IMPLIED WARRANTY CANNOT BE DISCLAIMED IN ANY TERRITORY WHERE A PRODUCT IS SOLD, THE DURATION OF SUCH IMPLIED WARRANTY SHALL BE LIMITED TO NINETY (90) DAYS. EXCEPT AS EXPRESSLY COVERED UNDER THE LIMITED WARRANTY PROVIDED HEREIN, THE ENTIRE RISK AS TO THE QUALITY, SELECTION AND PERFORMANCE OF THE PRODUCT IS WITH THE PURCHASER OF THE PRODUCT.

Limitation of Liability: TO THE MAXIMUM EXTENT PERMITTED BY LAW, D-LINK IS NOT LIABLE UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY FOR ANY LOSS OF USE OF THE PRODUCT, INCONVENIENCE OR DAMAGES OF ANY CHARACTER, WHETHER DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL (INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF GOODWILL, LOSS OF REVENUE OR PROFIT, WORK STOPPAGE, COMPUTER FAILURE OR MALFUNCTION, FAILURE OF OTHER EQUIPMENT OR COMPUTER PROGRAMS TO WHICH D-LINK’S PRODUCT IS CONNECTED WITH, LOSS OF

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Governing Law: This Limited Warranty shall be governed by the laws of the State of California. Some states do not allow exclusion or limitation of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the foregoing limitations and exclusions may not apply. This limited warranty provides specific legal rights and the product owner may also have other rights which vary from state to state.

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CE Mark Warning: This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

FCC Statement: **This equipment has been tested and found to comply with the limits 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 in accordance with the instructions, may cause harmful interference to radio communication. 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 can be determined 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 and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment; such modifications could void the user's authority to operate the 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.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this equipment must be installed to provide a separation distance of at least eight inches (20 cm) from all persons.

For detailed warranty outside the United States, please contact corresponding local D-Link office.

Register your D-Link product online at <http://support.dlink.com/register/>

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