D-Link *Air* Xpert™ DWL-AG520

Tri-mode Dualband Wireless PCI Adapter

Manual

D-Link

Building Networks for People

Contents

Package Contents

Contents of Package:

- **D-Link Air Xpert™ DWL-AG520**
  Tri-mode Dualband Wireless PCI Adapter
- Manual, Warranty and Driver on CD
- Printed Quick Installation Guide

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

System Requirements of Configuration:

- A desktop computer with an available 32-bit PCI 2.2 solt , with an operating voltage of 5V.
- Windows XP, Windows 2000, Windows ME, or Windows 98SE
- At least 128 MB of memory and a 500MHz processor
- An 802.11a, 802.11b or 802.11g Access Point (for infrastructure Mode) or another 802.11a, 802.11b, or 802.11g wireless adapter (for Ad-Hoc; peer-to-peer networking mode).

Introduction

The D-Link *Air X*pert™ DWL-AG520 Tri-Mode Dualband Wireless PCI Adapter, when installed into your desktop PC, provides you a versatile way to wirelessly connect to any one of three available wireless networks - 802.11b and the newer, faster 802.11g and 802.11a that operate in two discrete, non-interfering frequency bands, 2.4GHz and 5GHz.

The versatile 802.11a/b/g compatible DWL-AG520 gives you an immediate way to expand to your existing 802.11b network and protect your overall wireless network investment. When you add an 802.11a/b/g access point (D-Link Air Xpert DWL-7000AP) or router (D-Link Air Xpert DI-774), your network will be capable of handling up to four times the user load of your current 802.11b network.

Along with compatibility to earlier 802.11b networks, the DWL-AG520 also offers the robust speed (up to 54Mbps) of the newer 802.11g and 802.11a standards, so that everyone can work faster and more efficiently. Additionally, the 802.11a 5GHz band offers a way to quickly transfer data in a frequency range that does not experience interference or interruptions from cordless phones, microwave ovens and other devices that use the 2.4GHz frequency band.

In addition to offering faster data transfer speeds when used with other 802.11a or 802.11g products, the DWL-AG520 has the newest, most advanced security features available today, using the draft 802.11i security standard. These additional security features are optional. You may choose to continue using the familiar WEP security, or you may not wish to utilize security features at all. However, if you do choose to use the DWL-AG520's powerful security features with other WPA (WiFi Protected Access) and 802.1x compatible products in a network with a RADIUS server, the security features will include:

WPA*: A new security feature, **Wi-Fi Protected Access** authorizes and identifies users based on a secret key that changes automatically at a regular interval. **WPA** uses **TKIP** (**Temporal Key Integrity Protocol**) to change the temporal key every 10,000 packets (a packet is a kind of message transmitted over a network). This ensures much greater security than the standard WEP security. (By contrast, the older WEP encryption required the keys to be changed manually).

802.1x: Authentication is a first line of defense against intrusion. In the Authentication process the server verifies the identity of the client attempting to connect to the network. Unfamiliar clients would be denied access.

Users that choose not to incorporate a RADIUS server in their network may also use the optional enhanced security features, or they may wish to continue using the standard WEP security, or they may choose to use no security at all. However, if you do wish to experience the enhanced security of the DWL-AG520 in conjunction with other draft 802.11i compatible products, without a RADIUS server, the **Pre Shared Key mode** of WPA will assign a new security key every time the DWL-AG520 connects to the draft 802.11i Access Point. If you choose to enable the enhanced security features of the DWL-AG520, you need only to input your encryption information once in the configuration menu. No longer will you have to manually change the WEP key to ensure security - with the DWL-AG520, you will automatically receive a new key every time you connect, vastly increasing the safety of your communications.

*WPA will be available Q3 2003 as a driver download

Features

- **Dualband versatility -** With the DWL-AG520, you have the option of using one of two frequencies. If the 2.4GHz frequency band is experiencing interruptions and interference from cordless phones, and microwave ovens, you have the option of using the 5GHz band with 802.11a enabled devices.

- **Compatible with 802.11a, 802.11b and 802.11g Devices -** Fully compatible with the IEEE 802.11a, 802.11b and 802.11g standards, the DWL-AG520 can connect with existing 802.11b routers, access points and cards. That means you can still communicate with colleagues and friends while you have the ability to link to even more wireless networks.

- **Better Security with 802.1x and WPA* -**With the DWL-AG520 in your desktop PC you can securely connect to a wireless network using 802.1x for wireless authentication, as well as WPA (Wi-Fi Protected Access) providing you a much higher level of security for your data and communications than has previously been available. To use the DWL-AG520's 802.1x security features, your Operating System and all the devices in your network must support it. Windows XP supports 802.1x and a free 802.1x upgrade is available for Windows 2000. Check the manufacturer's website for available 802.1x upgrades for other operating systems.

- **32-bit PCI Performance/Plug & Play Connectivity -**The DWL-AG520 is a powerful 32-bit PCI adapter that installs quickly and easily into desktop PCs, and when used with other D-Link*Air*Xpert   ABG products will automatically connect to the network out of the box.

- **User-friendly configuration and diagnostic utilities**

LEDs

LED stands for **L**ight-**E**mitting **D**iode. The **DWL-AG520** has the following LEDs:

LED	LED Activity
Activity	A blinking light indicates data is being transmitted
Power	A steady light indicates a connection to an Access Point

*WPA will be available Q3 2003 as a driver download   5

Wireless Basics

D-Link 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 you 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 WLAN is a cellular computer network that transmits and receives data with radio signals instead of wires. WLANs 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.

Wireless Basics *(continued)*

People use WLAN 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 the 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. Wireless technology allows the network to go where wires cannot go - even outside the home or office.

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

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.

The DWL-AG520 is compatible with the following wireless products:

- **D-Link Air Xpert DWL-AG650, *D-Link Air*Pro *DWL-A650, D-Link Air*Plus *DWL-650+, D-Link Air*Plus *Xtreme G DWL-G650, D-Link Air*Pro *DWL-AB650***
  Wireless Cardbus Adapters used with laptop computers

- ***D-Link Air*Pro *DWL-A520* and *D-Link Air*Plus *DWL-520+, D-Link Air*Plus Xtreme G DWL-G520, *another D-Link Air Xpert* DWL-AG520, and D-Link AirPro DWL-AB520**
  Wireless PCI cards used with desktop computers

- ***D-Link Air*Plus *DWL-900AP+, D-Link Air*Plus Xtreme G *DWL-2000AP* and D-Link Air Xpert DWL-7000AP**
  Wireless Access Points

- ***D-Link Air*Plus *DI-614+, D-Link Air*Plus Xtreme G *DI-624* and *D-Link Air Xpert DI-774***
  Wireless Broadband Routers

Standards-Based Technology

The DWL-AG520 Wireless Cardbus Adapter utilizes the **802.11a, 802.11b** and **802.11g** standard.

The IEEE **802.11g** standard is an extension of the **802.11b** standard. It increases the data rate up to 54 Mbps within the 2.4GHz band. The **802.11a** standard also increases the data rate up to 54 Mbps, but within the 5GHz band. Both 802.11a and 802.11g utilize **OFDM** technology.

This means that in most environments, within the specified range of this device, you will be able to transfer large files quickly or even watch a movie in MPEG format over your network without noticeable delays. This technology works by transmitting high-speed digital data over a radio wave utilizing **OFDM** (**O**rthogonal **F**requency **D**ivision **M**ultiplexing) technology. **OFDM** works by splitting the radio signal into multiple smaller sub-signals that are then transmitted simultaneously at different frequencies to the receiver. **OFDM** reduces the amount of **crosstalk** (interference) in signal transmissions. The D-Link *DWL-AG520* will automatically sense the best possible connection speed to ensure the greatest speed and range possible.

The DWL-AG520 offers the most advanced network security features available today, including: *WPA[2] and 802.1x*.

In addition to its compatibility with 802.11g and 802.11a devices, the DWL-AG520 is compatible with 802.11b devices. This means that if you have an existing 802.11b network, or a network with a mixture of 802.11g, 802.11a and 802.11b, the devices in that network will be compatible with the DWL-AG520.

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1 *WPA will be available Q3 2003 as a driver or firmware download*

Wireless Basics *(continued)*

Installation Considerations

The D-Link *Air* Xpert™ DWL-AG520 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-AG520 and other network devices to a minimum - each wall or ceiling can reduce your D-Link 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.

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 may generate extreme RF noise.

Getting Started

There are basically two modes of networking:

- **Infrastructure** – using an Access Point or Wireless Router, such as the DWL-7000AP or DI-774.

- **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-AG520 wireless network PCI 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 or a Wireless Router. The **Infrastructure Network** example shown on the following page contains the following D-Link network devices (your existing network may be comprised of other devices):

- A wireless Router - **D-Link *Air* Xpert DI-774**

- A laptop computer with a wireless adapter -
  D-Link *Air* Xpert DWL-AG650, D-Link *Air*Plus *Xtreme G* DWL-G650, D-Link *Air*Pro DWL-AB650,or **D-Link AirPlus DWL-650+**

- A desktop computer with a wireless adapter -
  D-Link *Air* Xpert DWL-AG520

- A Cable modem - **D-Link DCM-200** or **DCM-201**

Getting Started
Setting up a Wireless Infrastructure Network
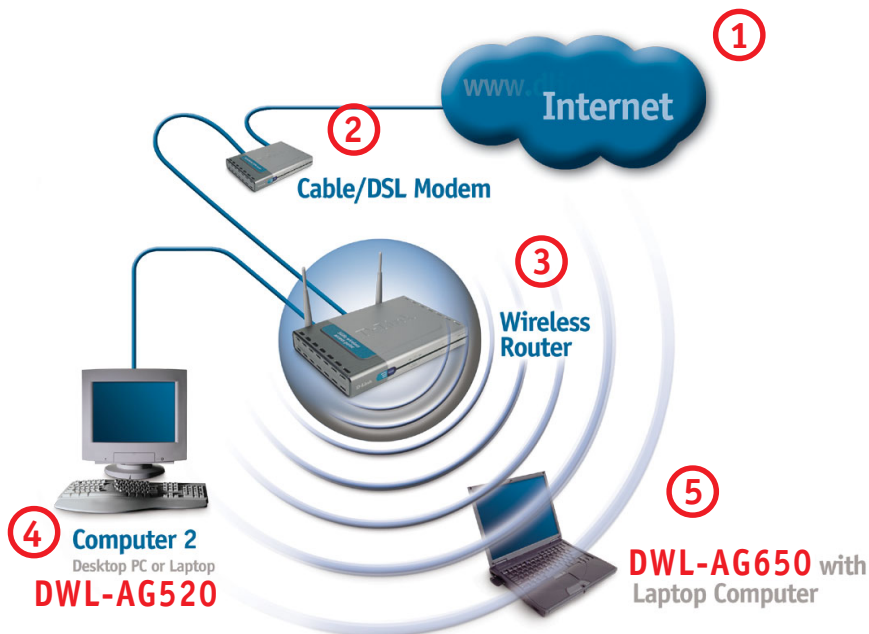
For a typical wireless setup at home (as shown above), please do the following:

1 You will need broadband Internet access (a Cable or DSL-subscriber line into your home or office)

2 Consult with your Cable or DSL provider for proper installation of the modem

3 Connect the Cable or DSL modem to your broadband router (*see the **Quick Installation Guide** included with your router*).

4 Install the D-Link *Air Xpert* DWL-AG520 wireless PCI adapter into an available PCI slot on your desktop computer.
*(See the **Quick Installation Guide** included with the network adapter).*

5 If you are connecting a laptop computer to your network, you can install the drivers for the D-Link DWL-AG650 wireless Cardbus adapter into a laptop computer. You may also install the DWL-A650, DWL-G650, DWL-AB650 or other compatible D-Link wireless Cardbus adapter.
(*See the **Quick Installation Guide** included with the wireless Cardbus adapter*).

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Getting Started
Setting up a Wireless Ad-Hoc Network

Install the **D-Link DWL-AG520** Wireless PCI adapter into a desktop computer. *(See the **Quick Installation Guide** included with the product for installation instructions*).

Install a **DWL-AG650** into a laptop computer, or you can install another DWL-AG520 wireless PCI adapter into a desktop computer. *(See the **Quick Installation Guide** included with the product).*

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

When assigning 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.

Using the Configuration Utility

If you wish to change the default settings or optimize the performance of the DWL-AG520, D-Link has included a configuration utility for this purpose. However, in Windows XP, you can use either the Zero Configuration Utility or you can use the D-Link Configuration utility.

To use the D-Link configuration utility with XP, click on the Zero Configuration Utility icon in the taskbar in the lower corner of your computer screen and 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.

Before you use the configuration utility for the DWL-AG520, you must install the drivers and the configuration utility from the CD-ROM that came with the DWL-AG520. (Please see the *Quick Installation Guide* that came with the product.) After you have completed this installation and restarted your computer, you can access the *Configuration Utility* at any time by clicking on this icon that will appear on your desktop.

After double-clicking the icon on the desktop (shown at right), the Link Info window shown on the next page will appear:

Configuration Utility
Link Info

Status: Displays the MAC Address of the Access Point that is associated with the DWL-AG520.

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

Frequency: The DWL-AG520 is a tri-mode, dualband wireless PCI adapter. In this instance 802.11b indicates that the DWL-AG520 is communicating in the 2.4GHz band.

Wireless Mode: Either Infrastructure or Ad-Hoc will be displayed here.

Encryption: You can see if WEP is enabled or disabled here

TxRate: The default setting is **Auto**; TxRate settings are automatically determined by the DWL-AG520 depending on the distance from the access point at this default setting.

Channel: Displays the channel information. By default, the channel is set to **Auto** and selection is automatically determined by the DWL-AG520.

Signal Strength: The Signal Strength represents the wireless signal between the access point and the DWL-AG520. The percentage coincides with the graphical bar.

Packet Count: Displays the statistics of data packets transmitted and received.
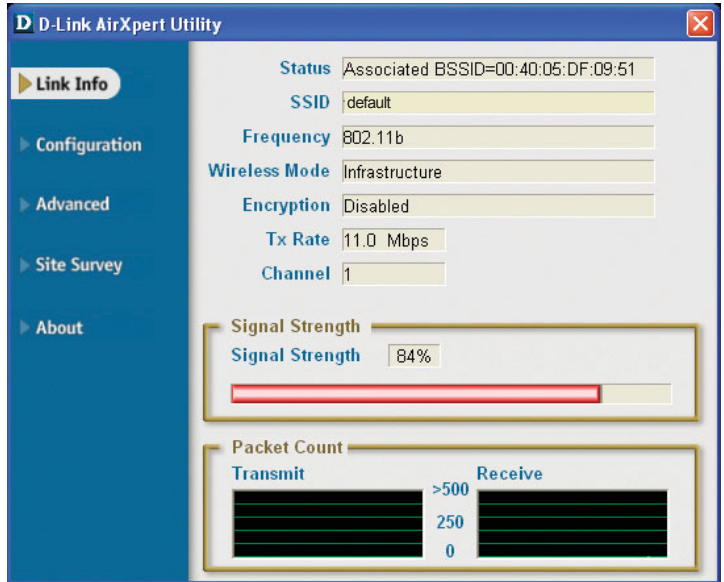
Configuration Utility

Configuration

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.(The **default** setting).

> **Ad-Hoc –** wireless mode used when connecting directly to a computer equipped with a wireless adapter in a peer-to-peer environment.

Data Encryption – select Enabled or Disabled

Authentication – choose one of the following modes:

> **Open Authentication** – the DWL-AG520 is visible to all devices on 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 access point or router

IP Settings

Key Length – select the key length and either ASCII (e.g., a word) or hexadecimal format.

Keys 1-4 - select the default key

> *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*

IP Settings - Click IP Settings and the screen above will appear. You can configure the IP Settings in this window.

Click **Apply** to save the changes.
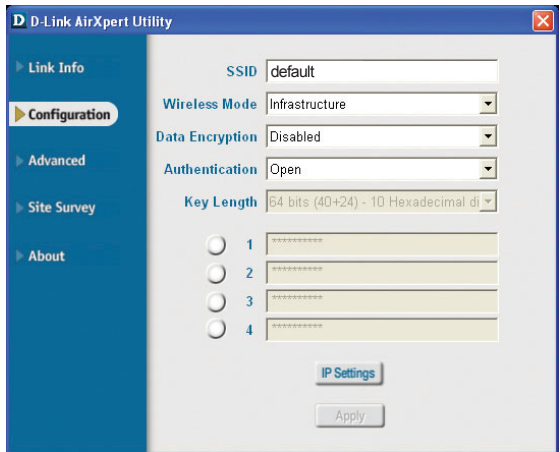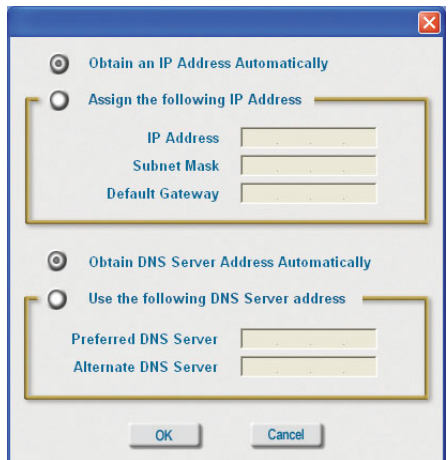
Configuration Utility

Advanced
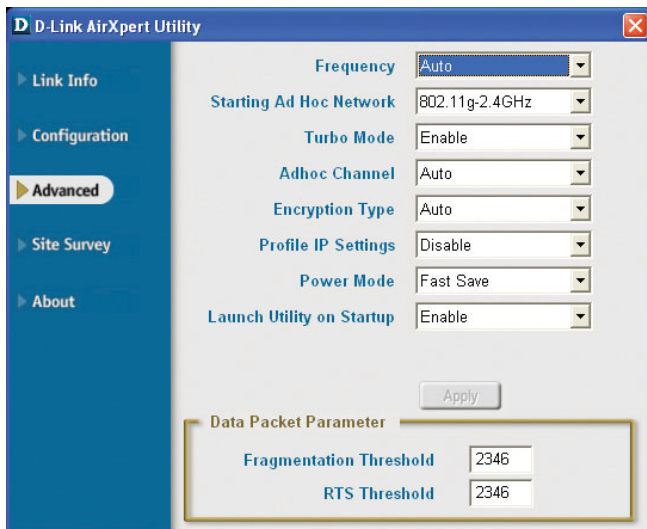
Frequency - Select the Frequency here. Auto is the default setting.

Starting Ad-Hoc Network – Each wireless adapter communicating in Ad-Hoc mode must have the same setting here.

Turbo Mode - To enable Turbo mode, all devices must have the same setting

Ad-Hoc Channel - All devices in the Ad-Hoc network must have the same channel

Encryption Type– Select the Encryption type

Profile IP Settings -You can **Enable** or **Disable** the *IP Settings* portion of your profile here. If you select Disable you will need to configure the IP Address information each time you connect to a network. If you select Enable you will maintain the same IP Address information that you have configured each time you connect to a network.

Launch Utility on Startup– Select Enable or Disable

Data Packet Parameter - Select the parameters here

Fragmentation Threshold - This value should remain at its default setting of 2346. If you experience a high packet error rate, you may slightly increase your Fragmentation Threshold within the value range of 256 to 2,346. Setting the Fragmentation Threshold too low may result in poor performance.

RTS Threshold - This value should remain at its default setting of 2346. If inconsistent data flow is a problem, only a minor modification should be made.

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Configuration Utility

Site Survey
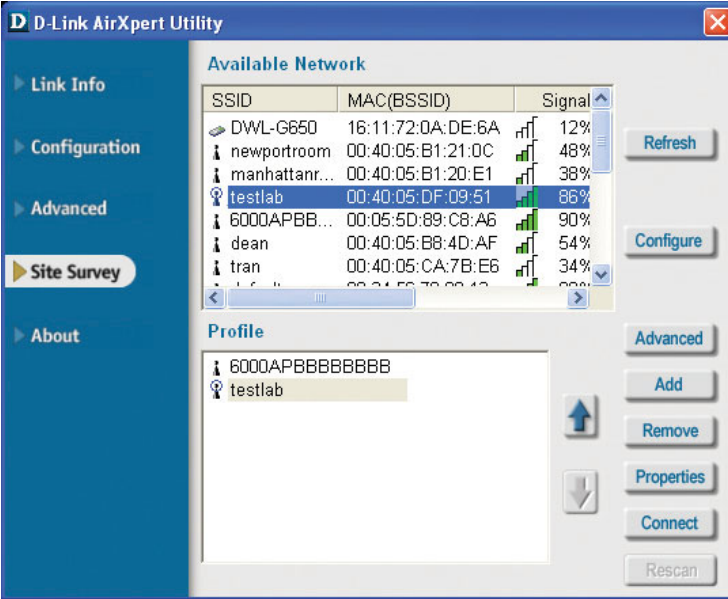
Available Network

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.

Profile

In the lower half of the screen, you can manage the profiles that you have
created. 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.

Advanced

When you click Advanced, this screen will
appear. Make the appropriate selections
for your network and click OK.

Rescan

Reorders profiles, with most accessible
listed first.
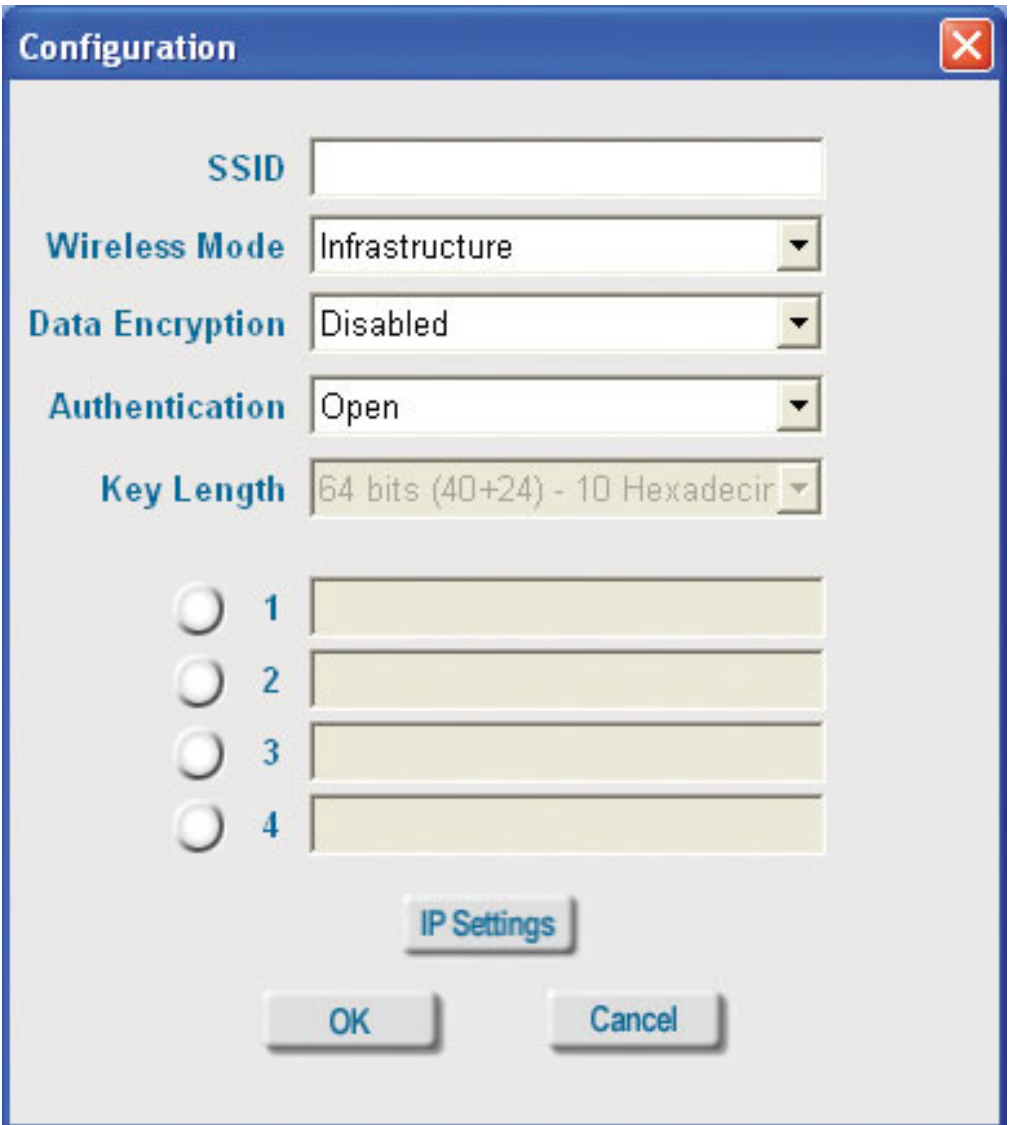
Add

Click on **Add** and the screen on the next page will appear.   17

Add New Profile

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 MAC Address and the **Utility** and **Driver Versions** and **Support Frequency** of the DWL-AG520.

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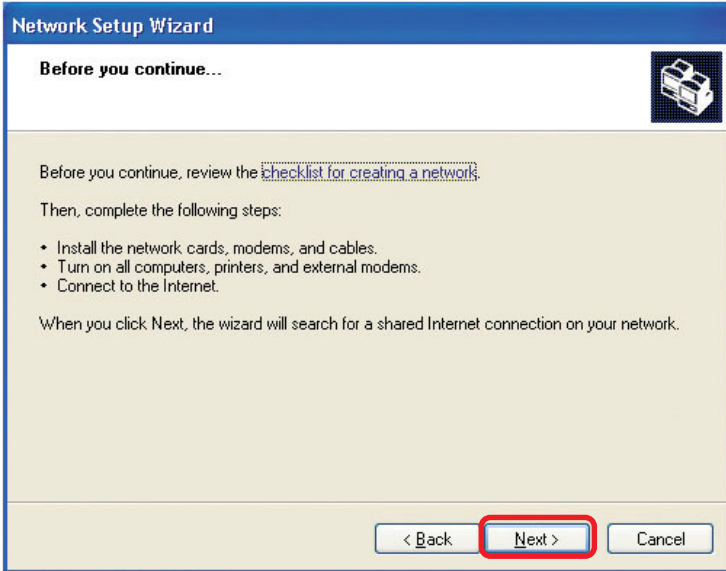
Go to **Start>Control Panel>Network Connections**
Select **Set up a home or small office network**

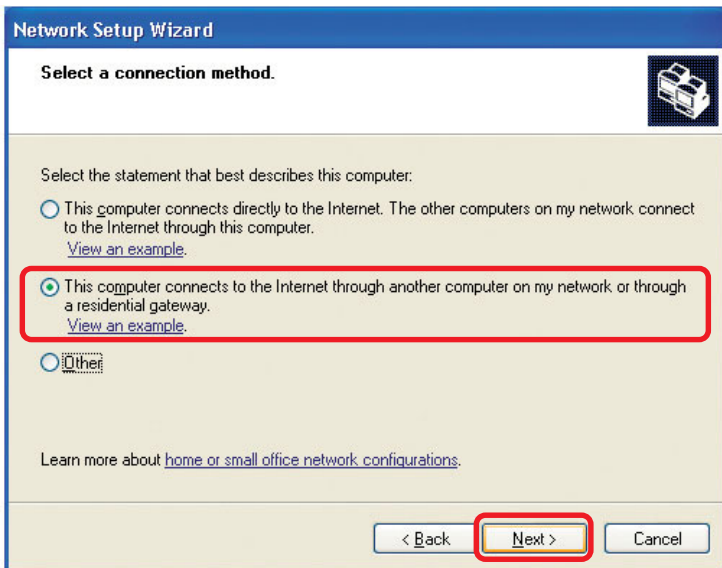When this screen appears, click **Next.**

Networking Basics

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**