

D-Link *AirPlusXtreme G*™
DWL-2000AP
High-Speed 2.4 GHz Wireless Access Point

Manual

D-Link

Building Networks for People

Contents

Package Contents	3
Introduction	4
Wireless Basics	8
Getting Started	12
Using the Configuration Menu	14
Networking Basics	25
Troubleshooting	40
Technical Specifications	47
Contacting Technical Support	50
Warranty and Registration	51

Package Contents



Contents of Package:

- **D-Link AirPlusXTREME G™ DWL-2000AP**
High-Speed 2.4GHz Wireless Access Point
- Power Adapter-DC 5V, 2.0A
- Manual and Warranty on CD
- Quick Installation Guide
- Ethernet Cable

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

Note: Using a power supply with a different voltage rating than the one included with the DWL-2000AP will cause damage and void the warranty for this product.

System Requirements for Configuration:

- Computers with Windows, Macintosh, or Linux-based operating systems with an installed Ethernet adapter
- Internet Explorer Version 6.0 or Netscape Navigator Version 6.0 and Above

Introduction

The D-Link AirPlusXtreme G™ DWL-2000AP High-Speed Wireless Access Point is a draft 802.11g high-performance, wireless access point that supports high-speed wireless networking at home, at work or in public places.

The DWL-2000AP is capable of operating in one of 4 different modes to meet your wireless networking needs. The DWL-2000AP can operate as an Access Point; in Access Point-to-Access Point Bridging mode; Access Point-to-Multipoint Bridging mode; or Wireless Client mode.

The DWL-2000AP is an ideal solution for quickly creating and extending a wireless local area network (WLAN) in offices or other workplaces, trade shows and special events.

Unlike most access points, the DWL-2000AP provides data transfers at up to 54 Mbps (compared to the standard 11 Mbps) when used with other D-Link AirPlusXtremeG products. The 802.11g standard is backwards compatible with 802.11b products. This means that you do not need to change your entire network to maintain connectivity. You may sacrifice some of 802.11g's speed when you mix 802.11b and 802.11g devices, but you will not lose the ability to communicate when you incorporate the 802.11g standard into your 802.11b network. You may choose to slowly change your network by gradually replacing the 802.11b devices with 802.11g devices .

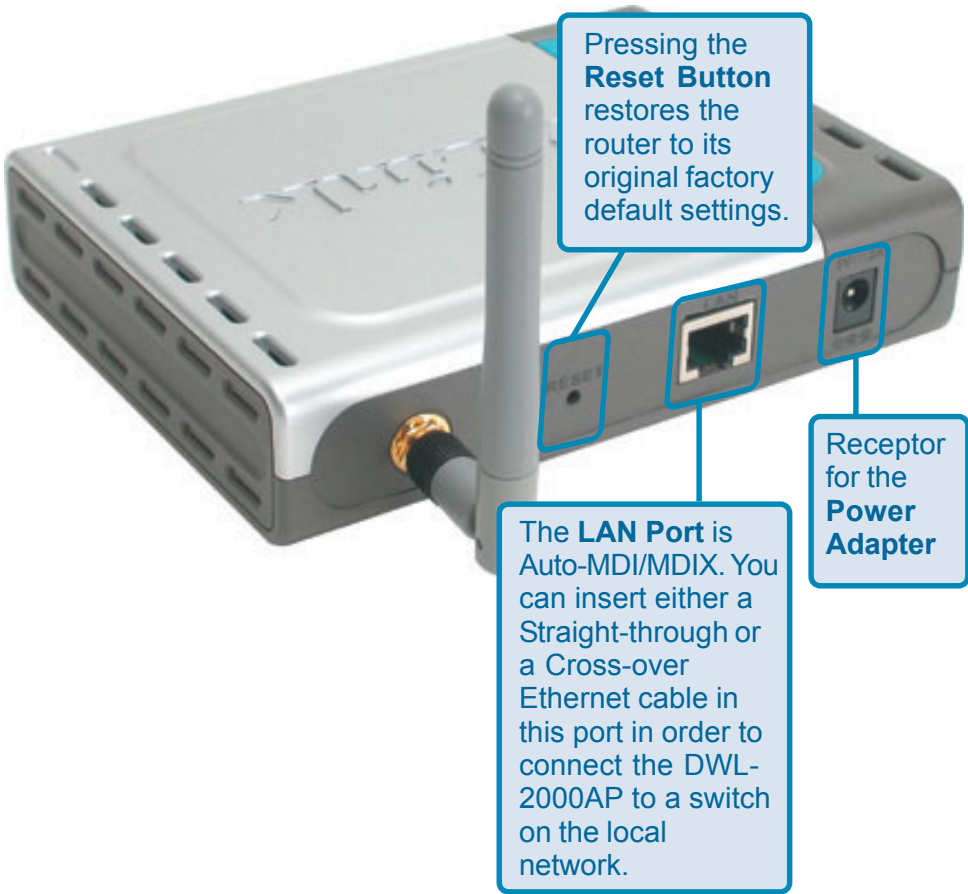
In addition to offering faster data transfer speeds when used with other 802.11g products, the DWL-2000AP has the newest, strongest, most advanced security features available today. When used with other 802.11g WPA (WiFi Protected Access) and 802.1x compatible products in a network with a RADIUS SERVER, the security features 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 insures 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.

* Available Spring 2003 as a free download

Connections



LEDs

LED stands for Light-Emitting Diode. The DWL-2000AP Wireless Access Point has 3 LEDs as shown below:



Power: Solid green light indicates connection

LAN: Blinking green light indicates activity on the Ethernet Port; solid green light indicates connection

WLAN: Blinking green light indicates wireless activity; solid green light indicates connection

Features

- **4 Different Operation modes** - Capable of operating in one of four different operation modes to meet your wireless networking requirements: Access Point; AP-to-AP Bridging; AP-to-Multipoint Bridging; and Wireless Client.
- **Faster wireless networking** with the draft 802.11g standard to provide a wireless data rate of up to 54Mbps
- **Compatible with the 802.11b standard** to provide a wireless data rate of up to 11Mbps - that means you can migrate your system to the 802.11g standard on your own schedule without sacrificing connectivity.
- **Better security with WPA* and 802.1x***
 - **WPA*** (Wi Fi Protected Access) authorizes and identifies users based on a secret key that changes automatically at a regular interval
 - **TKIP** (Temporal Key Integrity Protocol), in conjunction with a RADIUS SERVER, changes the temporal key every 10,000 packets, ensuring greater security
 - **Pre Shared Key** mode means that the home user, without a RADIUS SERVER, will obtain a new security key every time he or she connects to the network, vastly improving the safety of communications on the network.
 - **802.1x* Authentication** in conjunction with the RADIUS SERVER verifies the identity of would be clients
- Utilizes **OFDM** technology (**O**rthogonal **F**requency **D**ivision **M**ultiplexing)
- Operates in the 2.4GHz frequency range
- **Easy Installation** with the Setup Wizard
- **Web-based interface** for Managing and Configuring

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 wherever a wireless network is available. 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 wireless local area network (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.

Under many circumstances, it may be desirable for mobile network devices to link to a conventional Ethernet LAN in order to use servers, printers or an Internet connection supplied through the wired LAN. A Wireless Access Point is a device that can be used to provide this link.

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, both physically and logically, can benefit from a WLAN's 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. Wireless technology allows the network to go where wires cannot go—even outside the home or office.

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.

The DWL-2000AP is compatible with the following wireless products:

- **D-Link AirPlus DWL-650+, D-Link AirPlus XtremeG DWL-G650**
Wireless Cardbus Adapters used with laptop computers
- **D-Link AirPlus DWL-520+, D-Link AirPlus XtremeG DWL-G520**
Wireless PCI cards used with desktop computers

Wireless Basics (*continued*)

Standards-Based Technology

The DWL-2000AP Wireless Access Point utilizes the new **802.11g¹** 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, utilizing **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 (Orthogonal Frequency Division Multiplexing)** 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-2000AP* will automatically sense the best possible connection speed to ensure the greatest speed and range possible.

802.11g offers the most advanced network security features available today, including: *WPA², 802.1x,³ TKIP, AES and Pre-Shared Key mode*. These security features are explained in more detail in the *Introduction* and the *Features* section of this manual.

The DWL-2000AP is backwards compatible with 802.11b devices. This means that if you have an existing 802.11b network, the devices in that network will be compatible with 802.11g devices at speeds of up to 11Mbps in the 2.4GHz range.

¹ 802.11g standard is scheduled for ratification by IEEE Summer 2003

² WPA will be available Spring 2003 as a free download

³ 802.1x will be available Spring 2003 as a free download

Wireless Basics (continued)

Installation Considerations

The D-Link *AirPlus Xtreme G* DWL-2000AP 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-2000AP and your receiving device (e.g., the DWL-G650 or the DWL-650+) 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 receiving devices so that the number of walls or ceilings is minimized.
2. Be aware of the direct line between routers and computers. 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 generate RF noise.

Getting Started

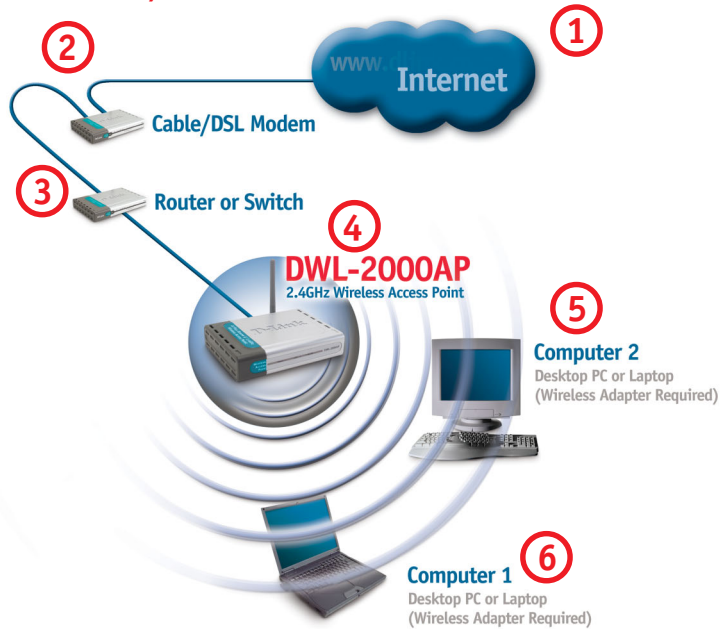
On the following pages we will show you an example of an **Infrastructure Network** incorporating the DWL-2000AP.

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 Access Point - **D-Link *AirPlusXtreme G* DWL-2000AP**
- A 4-port Ethernet Broadband Router - **D-Link *DI*-604**
- A laptop computer with a wireless adapter - **D-Link *AirPro* DWL-G650**
- A desktop computer with a wireless adapter - **D-Link *AirPlusXtremeG* DWL-G520, D-Link *Air* DWL-520, or D-Link *AirPlus* DWL-520+**
(**D-Link *Air*** devices have speeds up to 11Mbps)
- A Cable modem - **D-Link *DCM*-200**

Getting Started (continued)

Setting up a Wireless Infrastructure Network



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

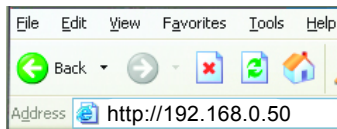
For a typical wireless setup at home (as shown above), please do the following:

- 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 the DI-604 Ethernet Broadband Router (see the printed Quick Installation Guide included with your router.)
- 4** Connect the Ethernet Broadband Router to the DWL-2000AP (See the printed Quick Installation Guide included with the DWL-2000AP.)
- 5** If you are connecting a desktop computer to your network, install the D-Link AirPlus XtremeG DWL-G520 wireless PCI adapter into an available PCI slot on your desktop computer. You may also install the DWL-520+.
(See the printed Quick Installation Guide included with the network adapter.)
- 6** Install the drivers for the D-Link DWL-G650 wireless Cardbus adapter into a laptop computer.
(See the printed Quick Installation Guide included with the DWL-G650.)

Using the Configuration Menu

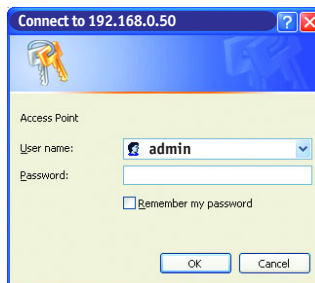
After you have completed the *Setup Wizard* (please see the *Quick Installation Guide* that came with the product) you can access the *Configuration* menu at any time by opening the web browser and typing in the IP Address of the DWL-2000AP. The DWL-2000AP default IP Address is shown below:

- Open the web browser
- Type in the **IP Address** of the Router



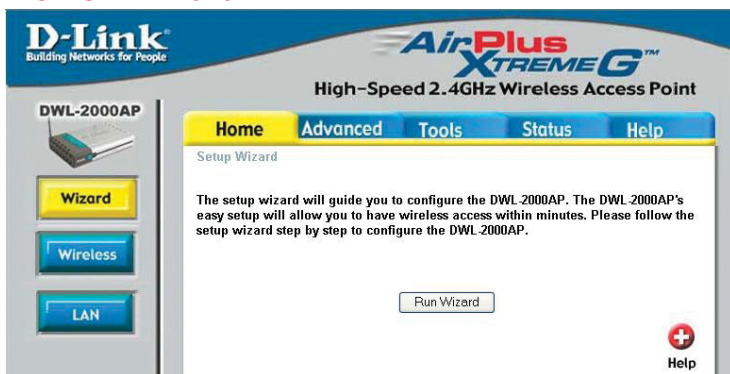
Note: if you have changed the default IP Address assigned to the DWL-2000AP, make sure to enter the correct IP Address.

- Type **admin** in the **User Name** field
- Leave the **Password** blank.
(However, if you have changed the password, please enter the correct password.)
- Click **OK**



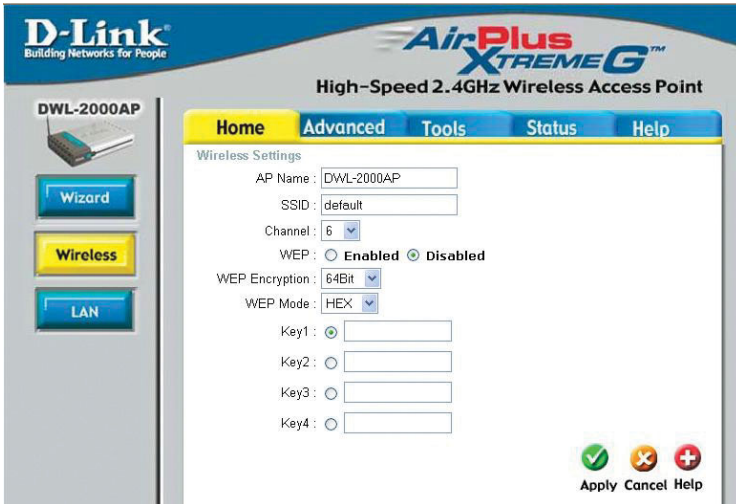
Home > Wizard

The **Home>Wizard** screen will appear. Please refer to the *Quick Installation Guide* for more information regarding the Setup Wizard.



Using the Configuration Menu (continued)

Home > Wireless



SSID- Service Set Identifier (SSID) is the name designated for a specific wireless local area network (WLAN). The SSID's factory default setting is **default**. The SSID can be easily changed to connect to an existing wireless network or to establish a new wireless network.

Channel- **6** is the default channel. All devices on the network must share the same channel.

WEP- Wired Equivalent Privacy (WEP) is a wireless security protocol for Wireless Local Area Networks (WLAN). WEP provides security by encrypting the data that is sent over the WLAN. Select **Enabled** or **Disabled**. **Disabled** is the default setting. *(Note: If you enable encryption on the DWL-2000AP make sure to also enable encryption on all the wireless clients or wireless connection will not be established.)*

WEP Encryption- Select the level of encryption desired: 64-bit, or 128-bit

Key Type- Select **HEX** or **ASCII**

Hexadecimal digits consist of the numbers 0-9 and the letters A-F

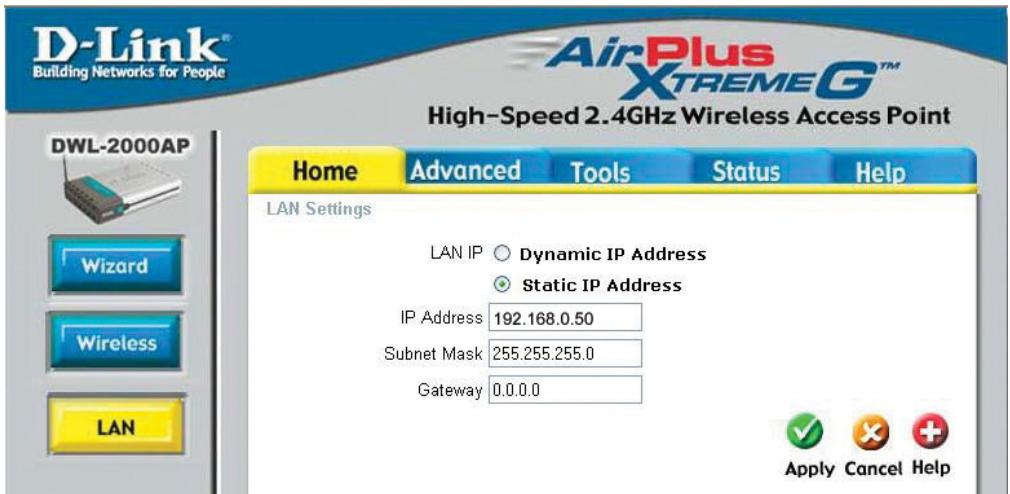
ASCII (American Standard Code for Information Interchange) is a code for representing English letters as numbers from 0-127

Keys 1-4- Input up to 4 WEP keys; select the one you wish to use.

Apply- Click **Apply** to save the changes.

Using the Configuration Menu (continued)

Home > LAN



LAN is short for Local Area Network. This is considered your internal network. These are the IP settings of the LAN interface for the DWL-2000AP. These settings may be referred to as Private settings. You may change the LAN IP address if needed. The LAN IP address is private to your internal network and cannot be seen on the Internet.

IP Address- The IP address of the LAN interface. The default IP address is: **192.168.0.50**

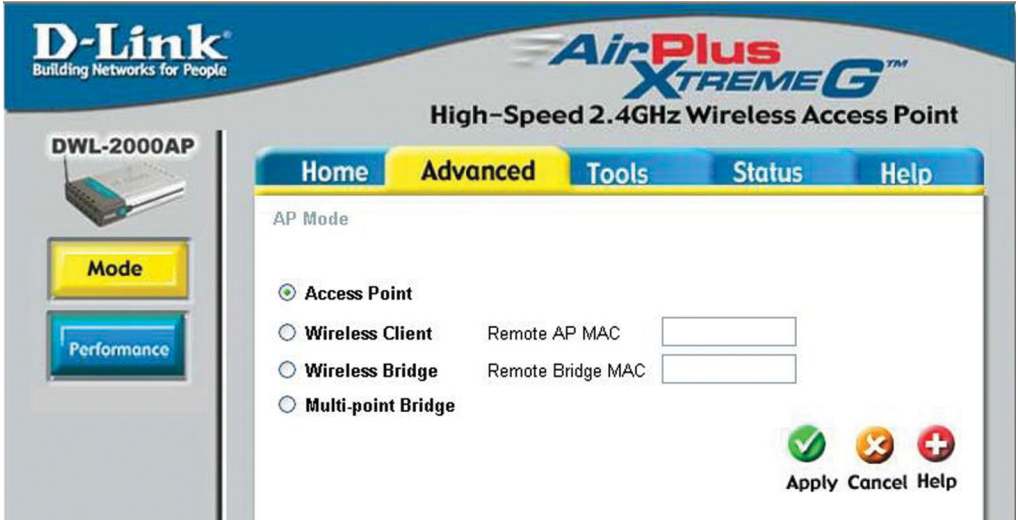
Subnet Mask- The subnet mask of the LAN interface. The default subnet mask is **255.255.255.0**

Gateway- This field is optional. Enter in the IP address of the router on your network.

Apply- Click **Apply** to save the changes.

Using the Configuration Menu (continued)

Advanced > Mode



The DWL-2000AP can be configured to perform in any of four modes: a Wireless Access Point; a Wireless Client; a Wireless Bridge; or a Multi-Point Bridge.

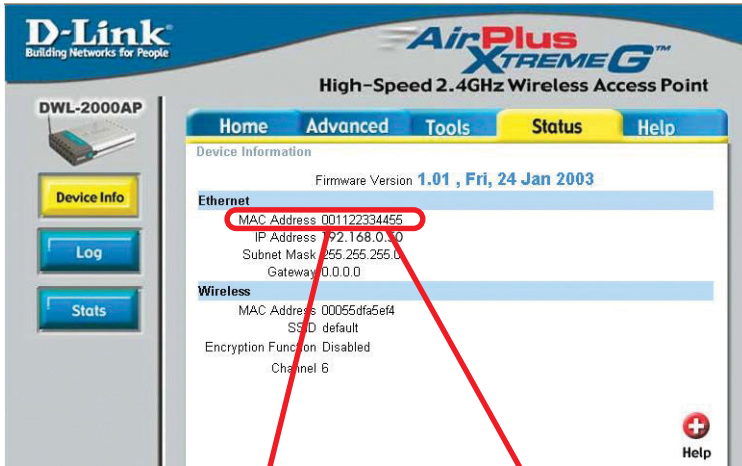
- 1 Access Point mode** is the default setting. This mode is used to create a wireless LAN.
- 2 Wireless Client mode** will transform any IEEE 802.3 Ethernet device (e.g., a computer, printer, etc.) into an 802.11b wireless client, if you are connecting to another DWL-2000AP when it is acting as an Access Point.
- 3 Wireless Bridge mode** will allow you to connect two LANs together. The wireless bridge will only work with another DWL-2000AP.
- 4 Multi-Point Bridge mode** will allow you to connect multiple wireless LANs together. Other wireless LANs must be using DWL-2000APs.

Using the Configuration Menu (continued)

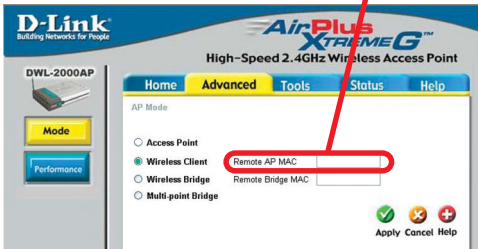
Advanced > Mode (continued)

Enter the **MAC address**

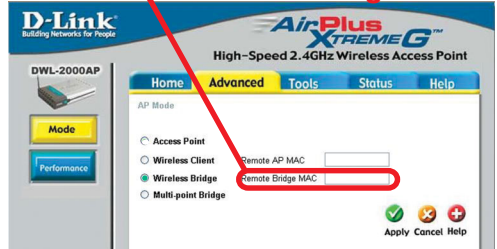
to configure the **Wireless Client** and the **Wireless Bridge** modes



Wireless Client mode



Wireless Bridge mode



When using the DWL-2000AP in **Wireless Client** mode, you will enter the MAC address of the Remote AP.

When using the DWL-2000AP in **Wireless Bridge** mode, you will enter the MAC address of the Remote Bridge.

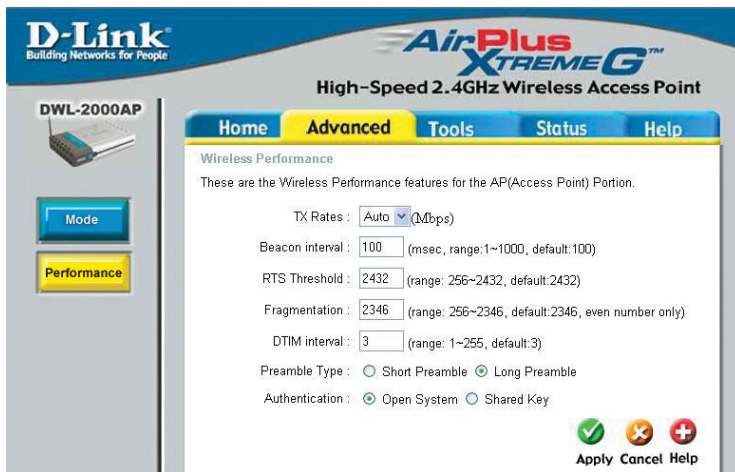
Find the **MAC address** of the DWL-2000AP that is acting as a **Remote Access Point** or a **Remote Bridge**, by going to **Status > Device Info** in the configuration utility of the remote DWL-2000AP. There you will find the MAC address as shown above.

MAC Address - Media Access Control Address

A unique hardware address that identifies a device on a network. It is assigned at the factory and cannot be changed. Usually you will find this address on a sticker on the device or packaging.

Using the Configuration Menu (continued)

Advanced > Performance



TX Rates-

The DWL-2000AP will automatically sense the best possible speed when you select **Auto** (the default setting), or you can choose the data transfer rate: 54Mbps, 48Mbps, 36Mbps, 24Mbps, 18Mbps, 12Mbps, 11Mbps, 9Mbps, 6Mbps, 5.5Mbps, 2Mbps, 1Mbps.

Beacon Interval-

Beacons are packets sent by an Access Point to synchronize a wireless network. Specify a value. 100 is the default setting and is recommended.

RTS Threshold-

This value should remain at its default setting of 2432. If inconsistent data flow is a problem, only a minor modification should be made.

Fragmentation-

The fragmentation threshold, which is specified in bytes, determines whether packets will be fragmented. Packets exceeding the 2346 byte setting will be fragmented before transmission. 2346 is the default setting.

DTIM interval-

(*Delivery Traffic Indication Message*)- **3** is the default setting. DTIM is a countdown informing clients of the next window for listening to broadcast and multicast messages.

Preamble Type-

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

Authentication-

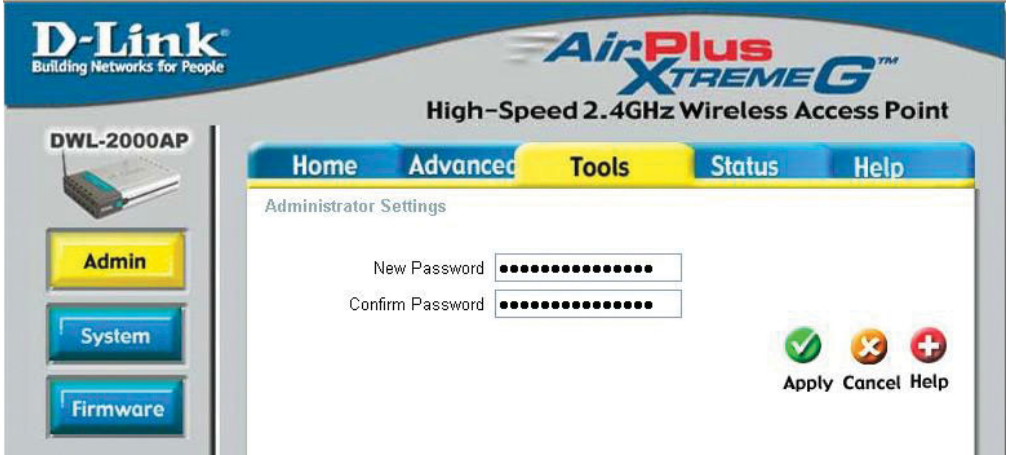
Open System - communicates the key across the network
Shared Key - devices must have identical WEP settings to communicate

Apply-

Click **Apply** to save changes

Using the Configuration Menu (continued)

Tools > Admin



At this page, the DWL-2000AP administrator can change the system password.

Password- Enter the password and enter again to confirm

Apply- Click **Apply** to save the changes

Using the Configuration Menu (continued)

Tools > System

The screenshot shows the configuration interface for a D-Link DWL-2000AP. The page has a blue header with the D-Link logo and 'AirPlus Xtreme G High-Speed 2.4GHz Wireless Access Point'. A navigation bar at the top contains 'Home', 'Advanced', 'Tools' (highlighted in yellow), 'Status', and 'Help'. On the left, there are three buttons: 'Admin', 'System' (highlighted in yellow), and 'Firmware'. The main content area is titled 'System Settings' and contains three sections: 'Save Settings to Local Hard Drive' with a 'Save' button; 'Load Settings From Local Hard Drive' with a text input field, a 'Browse...' button, and a 'Load' button; and 'Restore to Factory Default Settings' with a 'Restore' button. A 'Help' icon is located in the bottom right corner of the main content area.

The current system settings can be saved as a file onto the local hard drive. The saved file or any other saved setting file can be loaded back on the DWL-2000AP. To reload a system settings file, click on **Browse** to browse the local hard drive and locate the system file to be used. You may also reset the *Wireless Access Point* back to factory settings by clicking on **Restore**.

Save Settings to Local Hard Drive- Click **Save** to save the current settings to the local Hard Drive

Load Settings from Local Hard Drive- Click **Browse** to find the settings, then click **Load**

Restore to Factory Default Settings- Click **Restore** to restore the factory default settings

Using the Configuration Menu (continued)

Tools > Firmware

The screenshot shows the D-Link configuration interface for an AirPlus Xtreme G High-Speed 2.4GHz Wireless Access Point. The top navigation bar includes 'Home', 'Advanced', 'Tools' (highlighted), 'Status', and 'Help'. On the left, there are three buttons: 'Admin', 'System', and 'Firmware' (highlighted). The main content area is titled 'Firmware Upgrade' and contains a link to check for the latest firmware, instructions on how to upgrade, and the current firmware version (1.01) and date (Fri, 24 Jan 2003). There is a text input field and a 'Browse...' button. At the bottom right, there are three icons: a green checkmark for 'Apply', an orange 'X' for 'Cancel', and a red plus sign for 'Help'.

You can upgrade the firmware of the Access Point here. Make sure the firmware you want to use is on the local hard drive of the computer. Click on **Browse** to browse the local hard drive and locate the firmware to be used for the update. Please check the D-Link support site for firmware updates at <http://support.dlink.com>. You can download firmware upgrades to your hard drive from the D-Link support site.

Firmware Upgrade- Click on the link in this screen to find out if there is an updated firmware; if so, download the new firmware to your hard drive.

Browse- After you have downloaded the new firmware, click **Browse** in this window to locate the firmware update on your hard drive. Click **Apply** to complete the firmware upgrade.

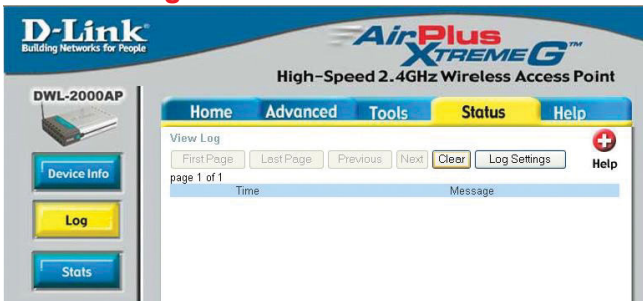
Using the Configuration Menu (continued)

Status > Device Info



This page displays the current information about the DWL-2000AP, such as the assigned IP Address and the wireless settings.

Status > Log



The Log keeps a running log of events and activities occurring on the Access Point. If the device is rebooted, the logs are automatically cleared. You may save the log files under Log Settings.

View Log-

First Page - The first page of the log

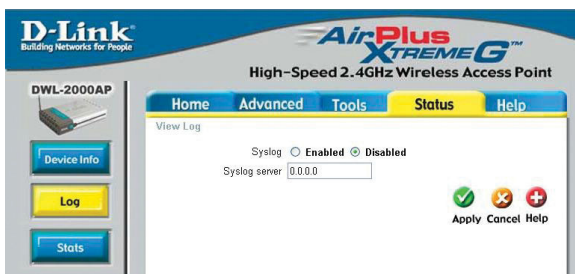
Last Page - The last page of the log

Previous - Moves back one log page

Next - Moves forward one log page

Clear - Clears the logs completely

Log Settings - Brings up the page to configure the log



When you click on **Log Settings** in the previous window, the window at left appears. Select **Enabled** to save the log. In the **Syslog Server** field, input the IP Address of the computer on the network to which you wish to save the log settings. Click **Apply** to save the changes.

Using the Configuration Menu (continued)

Status > Stats

The screenshot shows the D-Link configuration interface for the DWL-2000AP. The top navigation bar includes Home, Advanced, Tools, Status, and Help. The Status tab is selected, and the Stats sub-tab is active. The main content area displays Traffic Statistics, which are reset upon device reboot. The statistics are categorized into Ethernet and Wireless, each with Send and Recv sub-categories, showing Good and Dropped Packets.

Traffic Statistics			
Traffic Statistics display Receive and Transmit Packets Passing through the DWL-2000AP			
Ethernet			
Send	Good Packets	0	
	Dropped Packets	0	
Recv	Good Packets	937	
	Dropped Packets	0	
Wireless			
Send	Good Packets	106	
	Dropped Packets	0	
Recv	Good Packets	81	
	Dropped Packets	0	

The screen above displays the Traffic Statistics. Here you can view the amount of packets that pass through the DWL-2000AP. The traffic counter will reset if the device is rebooted.

Help

The screenshot shows the D-Link configuration interface for the DWL-2000AP. The top navigation bar includes Home, Advanced, Tools, Status, and Help. The Help tab is selected, and the Home sub-tab is active. The main content area displays a list of help files organized into four categories: Home, Advanced, Tools, and Status.

- Home**
 - [Setup Wizard](#)
 - [Wireless Settings](#)
 - [LAN Settings](#)
- Advanced**
 - [Performance](#)
- Tools**
 - [Administrator Settings](#)
 - [System Settings](#)
 - [Firmware Upgrade](#)
- Status**
 - [Device Information](#)
 - [Log](#)
 - [Stats](#)

At the **Help** screen you can select from **Help** files displayed above.

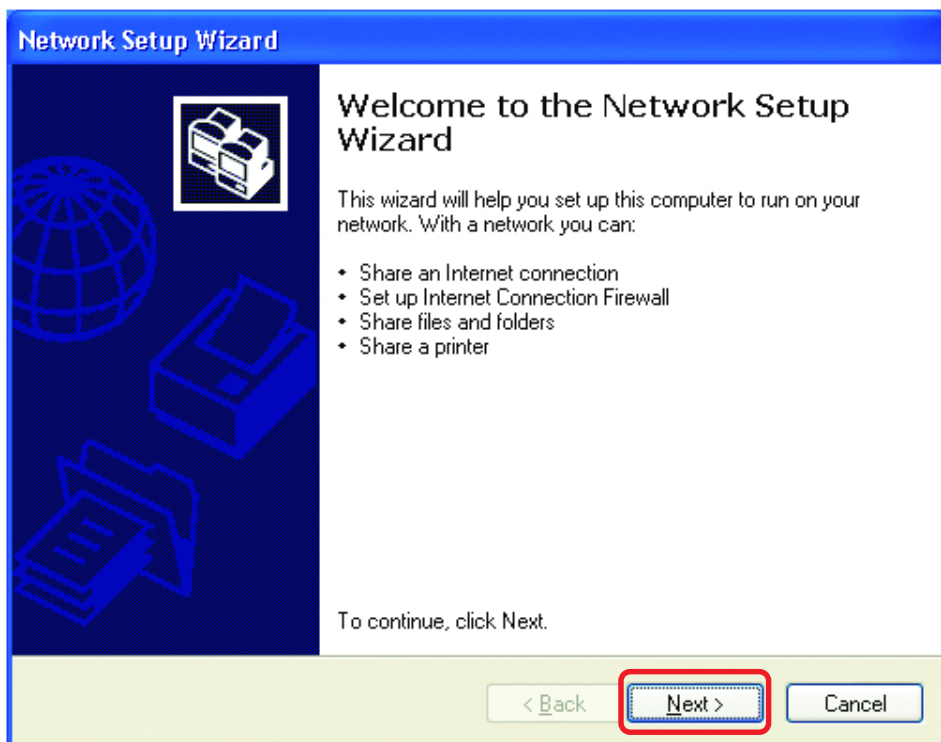
Networking Basics

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 98.

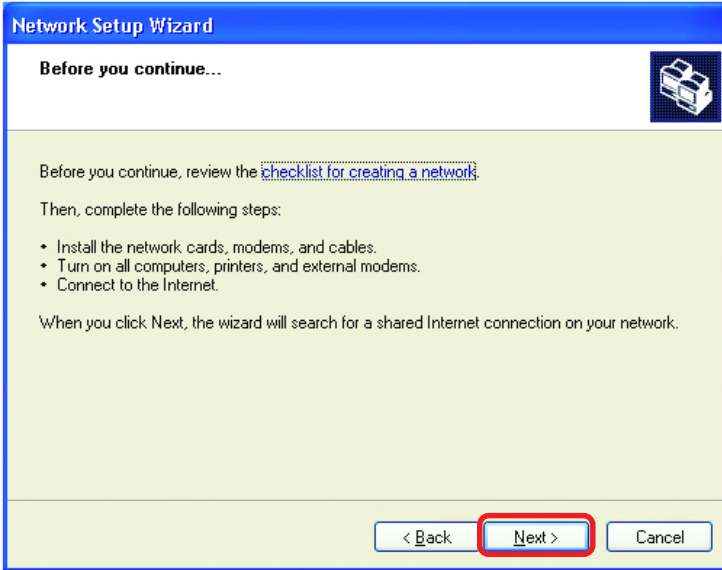
Go to **Start>Control Panel>Network Connections**
Select **Set up a home or small office network**



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

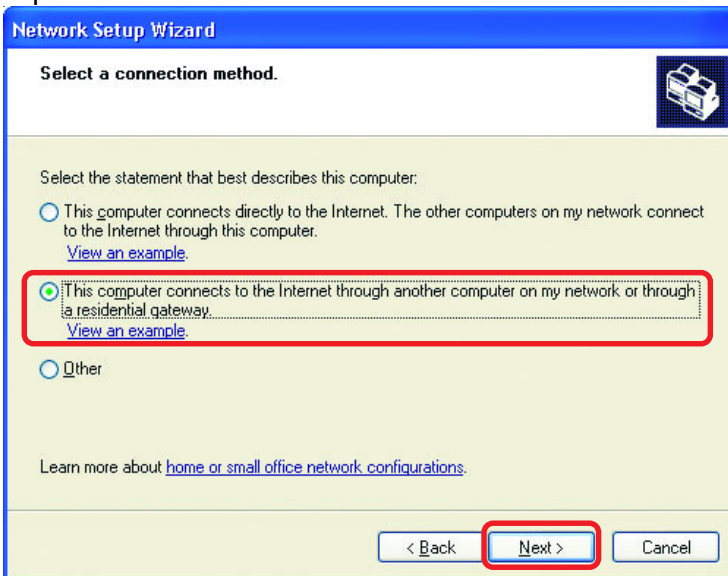
Networking Basics (continued)

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**