ZyAIR G-220

802.11g Wireless USB Adapter

User's Guide

Version 1.01
May 2004

ZyXEL
Unleash Networking Power

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Caution

Users should not attempt to make such connections themselves, but should contact the appropriate electrical inspection authority, or electrician, as appropriate.

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This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the radio interference regulations of Industry.

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The device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operations.

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 commercial environment. 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 communications.

If this equipment does cause harmful interference to radio/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:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and the receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

Notice 1

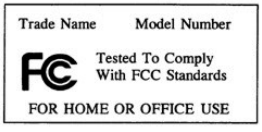
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Caution

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Certifications

Refer to the product page at www.zyxel.com.



[1] Refer to the *Quick Installation Guide* for model specific FCC statement(s) and the procedure to view the product's certification(s).

Customer Support

When contacting your Customer Support Representative, please have the following information ready:

- Product model and serial number.
- Warranty Information.
- Date you received your product.
- Brief description of the problem and the steps you took to solve it.

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WORLDWIDE	support@zyxel.com.tw sales@zyxel.com.tw	+886-3-578-3942 +886-3-578-2439	www.zyxel.com www.europe.zyxel.com ftp.zyxel.com ftp.europe.zyxel.com	ZyXEL Communications Corp. 6 Innovation Road II Science Park Hsinchu 300 Taiwan
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[2] "+" is the (prefix) number you enter to make an international telephone call.

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FINLAND	support@zyxel.fi	+358-9-4780-8411	www.zyxel.fi	ZyXEL Communications Oy Malminkaari 10 00700 Helsinki Finland

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Preface

Congratulations on the purchase of your new ZyAIR!

About This User's Guide

This manual provides information about the ZyAIR Wireless LAN Utility.

Syntax Conventions

- "Type" or "Enter" means for you to type one or more characters. "Select" or "Choose" means for you to use one of the predefined choices.
- Mouse action sequences are denoted using a comma. For example, "click the Apple icon, **Control Panels** and then **Modem**" means first click the Apple icon, then point your mouse pointer to **Control Panels** and then click **Modem**.
- Window and command choices are in **Bold Times New Roman** font. Predefined field choices are in **Bold Arial** font.
- The ZyXEL ZyAIR G-220 802.11g Wireless USB Adapter is referred to as the ZyAIR in this guide.
- The ZyAIR Wireless LAN Utility may be referred to as the ZyAIR WLAN Utility or, simply, as the ZyAIR Utility in this guide.

Related Documentation

- Support Disk

  Refer to the included CD for support documents and device drivers.
- Quick Installation Guide

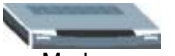
  Our Quick Installation Guide is designed to help you get your ZyAIR up and running right away. It contains a detailed easy-to-follow connection diagram and information on installing your ZyAIR.
- ZyXEL Glossary and Web Site

  Please refer to www.zyxel.com for an online glossary of networking terms and additional support documentation.

User Guide Feedback

Help us help you. E-mail all User's Guide-related comments, questions or suggestions for improvement to techwriters@zyxel.com.tw or send regular mail to The Technical Writing Team, ZyXEL Communications Corp., 6 Innovation Road II, Science-Based Industrial Park, Hsinchu, 300, Taiwan. Thank you.

Graphics Icons Key

Wireless Access Point	Computer	Notebook computer
Server	 Modem	Wireless Signal
Telephone	Switch	Router

Chapter 1
Getting Started

This chapter introduces the ZyAIR and prepares you to use the ZyAIR Utility.

1.1 About Your ZyAIR

The ZyAIR is an IEEE 802.11g compliant wireless LAN adapter. With the ZyAIR, you can enjoy the wireless mobility within the coverage area.

The following lists the main features of your ZyAIR.

- Your ZyAIR can communicate with other IEEE 802.11b/g/Wi-Fi compliant wireless devices.
- Automatic rate selection.
- Offers 64-bit, 128-bit and 256-bit WEP (Wired Equivalent Privacy) data encryption for network security.
- Proprietary SoftAP feature turns your ZyAIR into an access point (AP).
- Low CPU utilization allowing more computer system resources for other programs.
- A built-in antenna
- Driver support for Windows XP/2000/Me/98 SE

1.2 ZyAIR Hardware and Utility Installation

Follow the instructions in the *Quick Installation Guide* to install the ZyAIR utility and make hardware connections.

1.3 Disable Windows XP Wireless LAN Configuration Tool

Windows XP includes a configuration tool for wireless devices.

DO NOT use the Windows XP configuration tool and the ZyAIR Utility at the same time. It is recommended that you use the ZyAIR Utility to configure the ZyAIR.

Follow the steps below to disable the configuration tool in Windows XP after you install the ZyAIR Utility.

Step 1. Double-click the network icon for wireless connections in the system tray. If the icon is not present, proceed to *Step 2*. Otherwise skip to *Step 5*.

Figure 1-1 Windows XP: System Tray Icon

Step 2. If the icon for the wireless network connection is not in the system tray, click **Start**, **Control Panel** and double-click **Network Connections**.

Step 3. Double-click on the icon for wireless network connection to display a status window as shown next.

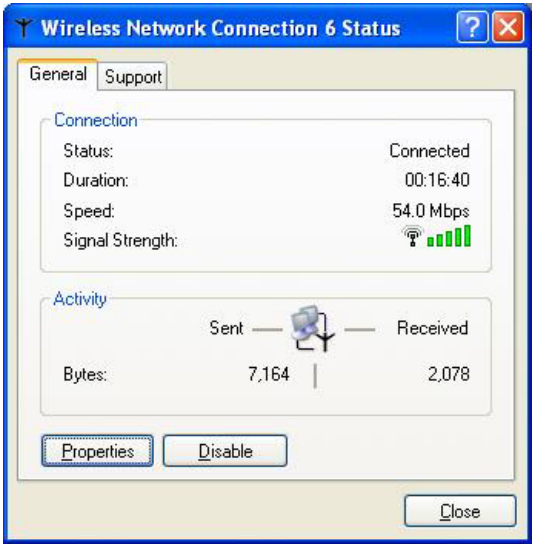


Figure 1-2 Windows XP: Wireless Network Connection Status

Step 4. Click **Properties** and click the **Wireless Networks** tab. Then skip to *Step 6*.

Step 5. When a **Wireless Network Connection** window displays, click **Advanced…**.

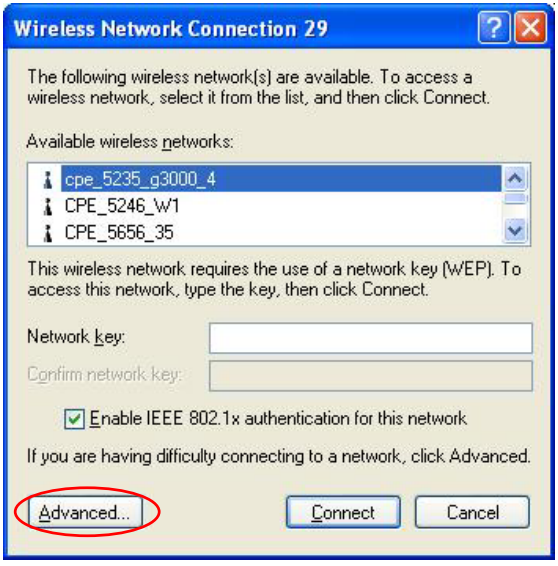


Figure 1-3 Windows XP: Connect to Wireless Network

Step 6. In the **Wireless Network Connection Properties** window, make sure the **Use Windows to configure my wireless network settings** check box is *not* selected. Click **OK**.

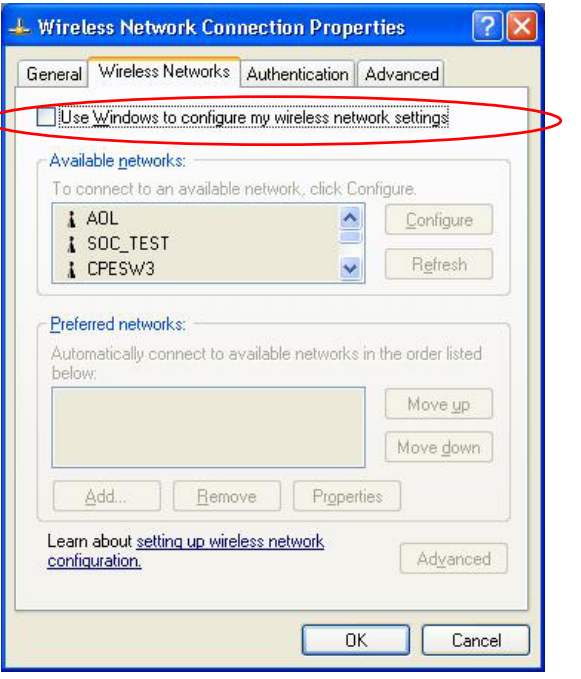


Figure 1-4 Windows XP: Wireless Network Connection Properties

1.4 Accessing the ZyAIR Utility

After you install and start the ZyAIR Utility, an icon for the ZyAIR Utility appears in the system tray.

When the ZyAIR Utility system tray icon displays, the ZyAIR is installed properly.

Figure 1-5 ZyAIR Utility: System Tray Icon

The color of the ZyAIR Utility system tray icon indicates the status of the ZyAIR. Refer to the following table for details.

Table 1-1 ZyAIR Utility: System Tray Icon

COLOR	DESCRIPTION
Red	The ZyAIR is operating in wireless station mode but is not connected to a wireless network.
Green	The ZyAIR is operating in wireless station mode and connected to a wireless network.
Pale Blue	The ZyAIR is operating in access point mode.

Double click on the ZyAIR Wireless LAN Utility icon in the system tray to open the ZyAIR Utility. The ZyAIR Utility screens are similar in all Microsoft Windows versions. Screens for Windows XP are shown.

1.5 ZyAIR Modes

You can set your ZyAIR to operate in either wireless station or access point (AP) modes.

In wireless station mode, your ZyAIR must connect to a peer wireless station or an AP to take part in your wireless network.

In access point mode, your ZyAIR functions as an access point. This allows you to set up your wireless network without using a dedicated AP device. Up to 16 wireless stations can associate to the ZyAIR to form a wireless network. Refer to *Section 4.1* for more information.

1.5.1 Change ZyAIR Modes

To change between the modes, select either the **Station** or **Access Point** option in the **ZyAIR G-220 Utility** screen.

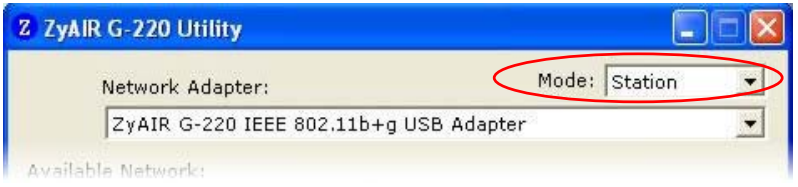


Figure 1-6 ZyAIR G-220 Utility: Mode

Wait for about five seconds for the ZyAIR Utility to complete the mode change.

When you use the Windows XP configuration tool and the ZyAIR Utility to configure the ZyAIR at the same time, the ZyAIR Utility icon does not display or is grayed out.

Chapter 2
Wireless LAN Network

This chapter provides background information on wireless LAN network.

2.1 Overview

This section describes the wireless LAN network terms and applications.

2.1.1 SSID

The SSID (Service Set Identity) is a unique name shared among all wireless devices in a wireless network. Wireless devices must have the same SSID to communicate with each other.

2.1.2 Channel

A radio frequency used by a wireless device is called a channel.

2.1.3 Transmission Rate (Tx Rate)

The ZyAIR provides various transmission (data) rate options for you to select. Options include **Auto**, **1 Mbps**, **2 Mbps**, **5.5 Mbps**, **11 Mbps**, **6 Mbps**, **9 Mbps**, **12 Mbps**, **18 Mbps**, **24 Mbps**, **36 Mbps**, **48 Mbps**, and **54 Mbps**. In most networking scenarios, the factory default **Auto** setting proves the most efficient. This setting allows your ZyAIR to operate at the maximum transmission (data) rate. When the communication quality drops below a certain level, the ZyAIR automatically switches to a lower transmission (data) rate. Transmission at lower data speeds is usually more reliable. However, when the communication quality improves again, the ZyAIR gradually increases the transmission (data) rate again until it reaches the highest available transmission rate.

You can select any of the above options. If you wish to balance speed versus reliability, select **48 Mbps** or **54 Mbps** in a networking environment where you are certain that all wireless devices can communicate at the highest transmission (data) rate. **1 Mbps** or **2 Mbps** are used often in networking environments where the range of the wireless connection is more important than speed.

2.1.4 Wireless Network Application

Wireless LAN works in either of the two modes: ad-hoc and infrastructure.

To connect to a wired network within a coverage area using Access Points (APs), set the ZyAIR operation mode to **Infrastructure (BSS)**. An AP acts as a bridge between the wireless stations and the wired network. In case you do not wish to connect to a wired network, but prefer to set up a small independent wireless workgroup without an AP, use the **Ad-hoc (IBSS)** (Independent Basic Service Set) mode.

Ad-Hoc (IBSS)

Ad-hoc mode does not require an AP or a wired network. Two or more wireless stations communicate directly to each other. An ad-hoc network may sometimes be referred to as an Independent Basic Service Set (IBSS).

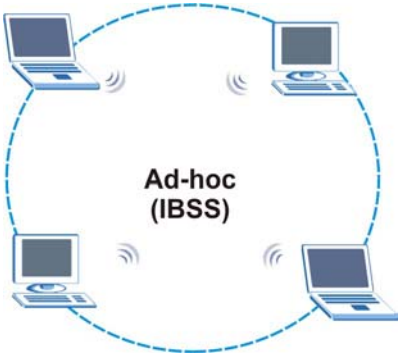


Figure 2-1 IBSS Example

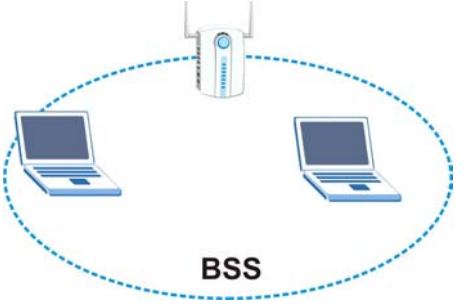


Figure 2-2 BSS Example

A series of overlapping BSS and a network medium, such as an Ethernet forms an Extended Service Set (ESS) or infrastructure network. All communication is done through the AP, which relays data packets to other wireless stations or devices connected to the wired network. Wireless stations can then access resource, such as the printer, on the wired network.

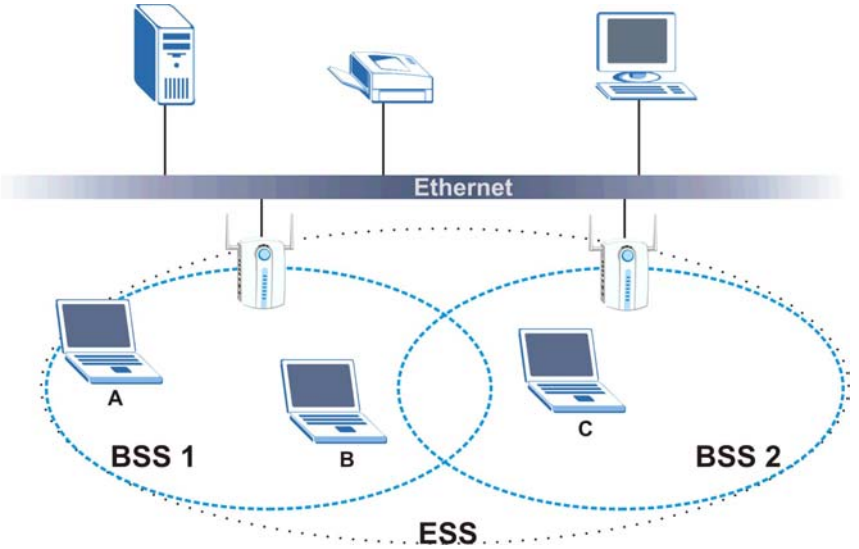


Figure 2-3 Infrastructure Network Example

Access Point Mode

The following figure depicts a network example in which you set the ZyAIR in access point mode.

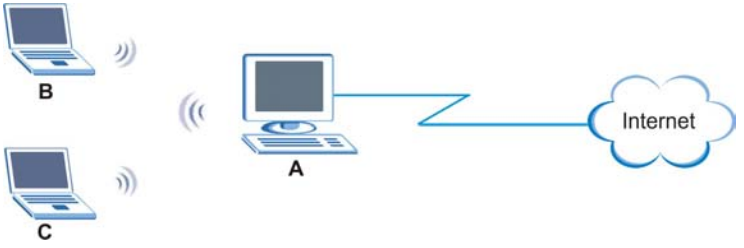


Figure 2-4 ZyAIR as an Access Point Example

In the example, the ZyAIR is installed on computer **A** and set to operate in access point mode. Computer **A** shares Internet connection to the wireless LAN, so wireless stations **B** and **C** can access the Internet.

2.1.5 Roaming

In an infrastructure network, wireless stations are able to switch from one BSS to another as they move between the coverage areas. During this period, the wireless stations maintain uninterrupted connection to the network. This is roaming. As the wireless station moves from place to place, it is responsible for choosing the most appropriate AP depending on the signal strength, network utilization or other factors.

The following figure depicts a roaming example. When wireless station **B** moves to position **X**, the ZyAIR in wireless station **B** automatically switches the channel to the one used by access point **2** in order to stay connected to the network.

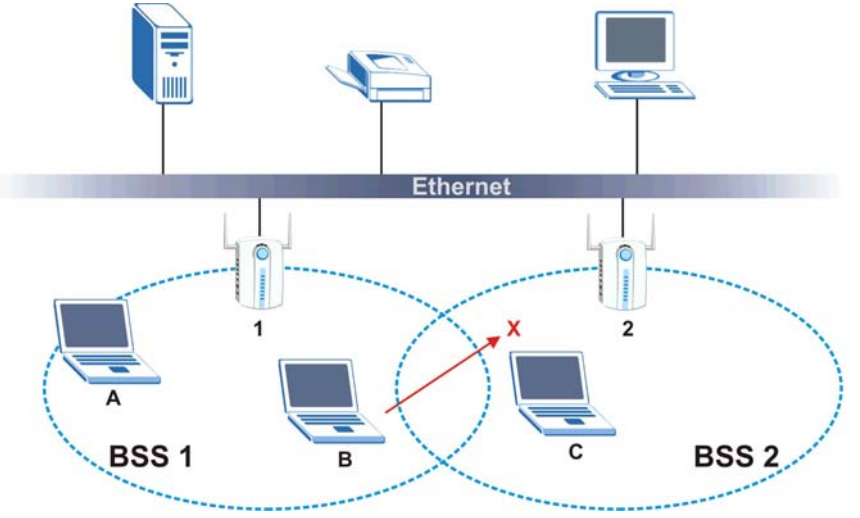


Figure 2-5 Roaming Example

2.2 Wireless LAN Security

Wireless LAN security is vital to your network to protect wireless communications.

Configure the wireless LAN security using the **More Setting…** screen. If you do not enable any wireless security on your ZyAIR, the ZyAIR's wireless communications are accessible to any wireless networking device that is in the coverage area.

2.2.1 Data Encryption with WEP

WEP (Wired Equivalent Privacy) encryption scrambles all data packets transmitted between the ZyAIR and the AP or other wireless stations to keep network communications private. Both the wireless stations and the access points must use the same WEP key for data encryption and decryption.

Your ZyAIR allows you to configure up to four 64-bit, 128-bit or 256-bit WEP keys but only one key can be used at any one time.

2.3 Fragmentation Threshold

A **Fragmentation Threshold** is the maximum data fragment size (between 256 and 2432 bytes) that can be sent in the wireless network before the ZyAIR will fragment the packet into smaller data frames.

A large **Fragmentation Threshold** is recommended for networks not prone to interference while you should set a smaller threshold for busy networks or networks that are prone to interference.

If the **Fragmentation Threshold** value is smaller than the **RTS/CTS Threshold** value (see previously) you set then the RTS (Request To Send)/CTS (Clear to Send) handshake will never occur as data frames will be fragmented before they reach **RTS/CTS Threshold** size.

2.4 RTS/CTS Threshold

A hidden node occurs when two stations are within range of the same access point, but are not within range of each other. The following figure illustrates a hidden node. Both stations are within range of the access point (AP) or wireless gateway, but out-of-range of each other, so they cannot "hear" each other, that is they do not know if the channel is currently being used. Therefore, they are considered hidden from each other.

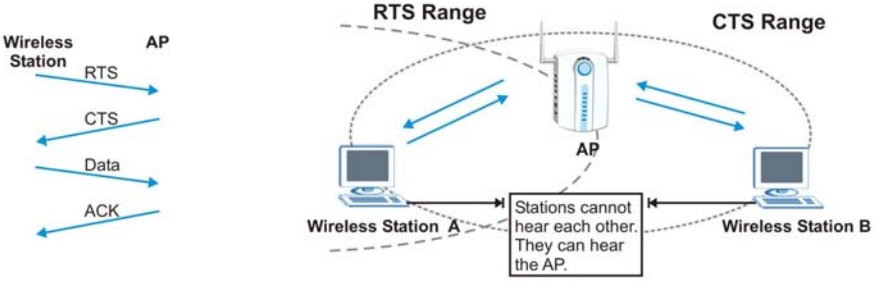


Figure 2-6 RTS Threshold

When station **A** sends data to the AP, it might not know that the station **B** is already using the channel. If these two stations send data at the same time, collisions may occur when both sets of data arrive at the AP at the same time, resulting in a loss of messages for both stations.

RTS/CTS Threshold is designed to prevent collisions due to hidden nodes. An **RTS/CTS Threshold** defines the biggest size data frame you can send before an RTS (Request To Send)/CTS (Clear to Send) handshake is invoked.

When a data frame exceeds the **RTS/CTS Threshold** value you set (between 0 to 2432 bytes), the station that wants to transmit this frame must first send an RTS (Request To Send) message to the AP for permission to send it. The AP then responds with a CTS (Clear to Send) message to all other stations within its range to notify them to defer their transmission. It also reserves and confirms with the requesting station the time frame for the requested transmission.

Stations can send frames smaller than the specified **RTS/CTS Threshold** directly to the AP without the RTS (Request To Send)/CTS (Clear to Send) handshake.

You should only configure **RTS/CTS Threshold** if the possibility of hidden nodes exists on your network and the "cost" of resending large frames is more than the extra network overhead involved in the RTS (Request To Send)/CTS (Clear to Send) handshake.

If the **RTS/CTS Threshold** value is greater than the **Fragmentation Threshold** value (see next), then the RTS (Request To Send)/CTS (Clear to Send) handshake will never occur as data frames will be fragmented before they reach **RTS/CTS Threshold** size.

Enabling the RTS Threshold causes redundant network overhead that could negatively affect the throughput performance.

2.5 Authentication Type

The IEEE 802.11b standard describes a simple authentication method between the wireless stations and AP. Three authentication modes are defined: Auto, Open and Shared.

Open authentication mode is implemented for ease-of-use and when security is not an issue. The wireless station and the AP do *not* share a secret key. Thus the wireless stations can associate with any AP and listen to any data transmitted plaintext.

Shared authentication mode involves a shared secret key to authenticate the wireless station to the AP. This requires you to enable the WEP encryption and specify a WEP key on both the wireless station and the AP.

Auto authentication mode allows the ZyAIR to switch between the open and shared key authentication modes automatically. Use the auto mode if you do not know the authentication mode of the other wireless stations.

2.6 Preamble Type

A preamble is used to synchronize the transmission timing in your wireless network. There are two preamble modes: **Long Preamble** and **Short Preamble**.

Short preamble takes less time to process and minimizes overhead, so it should be used in a good wireless network environment when all wireless stations support it.

Select **Long Preamble** if you have a 'noisy' network or are unsure of what preamble mode the access point or the other wireless stations support as all IEEE 802.11b compliant wireless adapters must support long preamble. However, not all wireless adapters support short preamble. Use long preamble if you are unsure what preamble mode the wireless adapters support, to ensure interpretability between the ZyAIR and the access point/wireless stations and to provide more reliable communication in 'noisy' networks.

Select **Auto** to have the ZyAIR automatically use short preamble when all access point/wireless stations support it, otherwise the ZyAIR uses long preamble.

The ZyAIR and the access point/wireless stations MUST use the same preamble mode in order to communicate.

Chapter 3
Wireless Station Mode Configuration

This chapter shows you how to configure your ZyAIR in wireless station mode.

3.1 Introduction

To set your ZyAIR as a wireless station, refer to *Section 1.5.1*.

3.2 The ZyAIR Utility Screen

When the ZyAIR utility starts, the **ZyAIR G-220 Utility** screen displays, showing the current configuration of your ZyAIR.

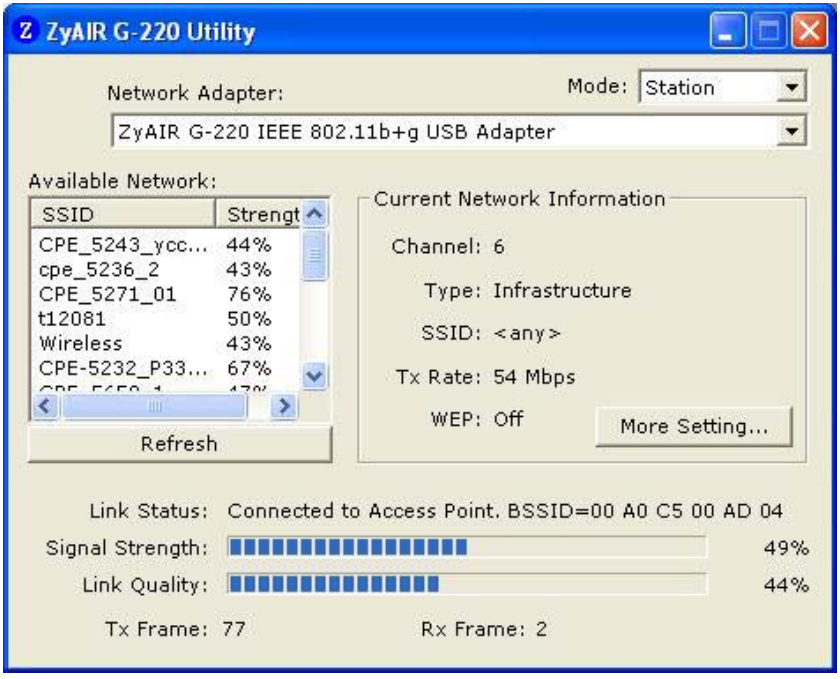


Figure 3-1 Station Mode: ZyAIR G-220 Utility

The following table describes the labels in this screen.

Table 3-1 Station Mode: ZyAIR G-220 Utility

LABEL	DESCRIPTION
Mode	Select **Station** from drop-down list box to set the ZyAIR to operate in wireless station mode. Select **Access Point** from drop-down list box to set the ZyAIR to operate in access point mode. Refer to *Section1.5* for more information.
Network Adapter	This field displays the model name of your ZyAIR. Select from the drop-down list menu if you have more than one wireless LAN adapter in your computer.
Available Network:	
SSID	The SSID identifies the Service Set to which a wireless station is associated
Strength	This field displays the signal strength of each wireless device.
Refresh	Click **Refresh** to scan for available wireless device within transmission range.
Current Network Information	
Channel	This field displays the radio channel the ZyAIR is currently using.
Type	This field displays the network type (**Infrastructure** or **Ad Hoc**) of the ZyAIR.
SSID	This field displays the name of the wireless device to which the ZyAIR is associated.
Tx Rate	This field displays the current transmission rate of the ZyAIR in megabits per second (Mbps).
WEP	This field displays whether WEP data encryption is activated (**on**) or inactive (**off**).
More Setting…/ Connect this site	Click **More setting…** to configure connection, wireless security and profile settings, or click **Connect this site** to join a network when you select a wireless network in the **Available Network** table.
Link Status	This field displays the MAC address of the wireless device to which the ZyAIR is associated.
Signal Strength	The status bar and the percentage number show the strength of the signal.
Link Quality	The status bar and the percentage number show the quality of the signal.
Tx Frame	This field displays the number of data frames transmitted.
Rx Frame	This field displays the number of data frames received.

3.2.1 Connecting to a Network

Follow the steps below to connect to a network.

Step 1. Click **Refresh** to scan for all available wireless networks within range.

Step 2. To join a network, either click an entry in the table to select a wireless network and then click **Connect this site** or double-click an entry.

Step 3. If the **WEP** field displays **On** for the selected wireless network, the following screen displays.

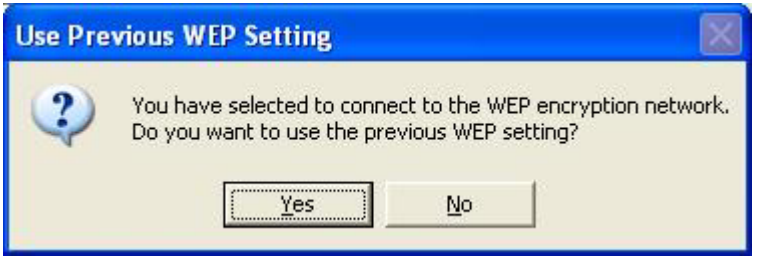


Figure 3-2 Station Mode: Use Previous WEP Setting

Step 4. Click **No** to display the **WEP Key Setting…** screen and refer to *Section 3.4* to set up WEP keys. Otherwise click **Yes** to use the previously configured WEP settings.

Step 5. To verify that you have successfully connected to the selected network, check the network information on the bottom of the **ZyAIR USB Utility** screen.

3.3 The More Setting… Screen

Click **More Setting…** in the ZyAIR Utility program to display the **More Setting…** screen as shown next.

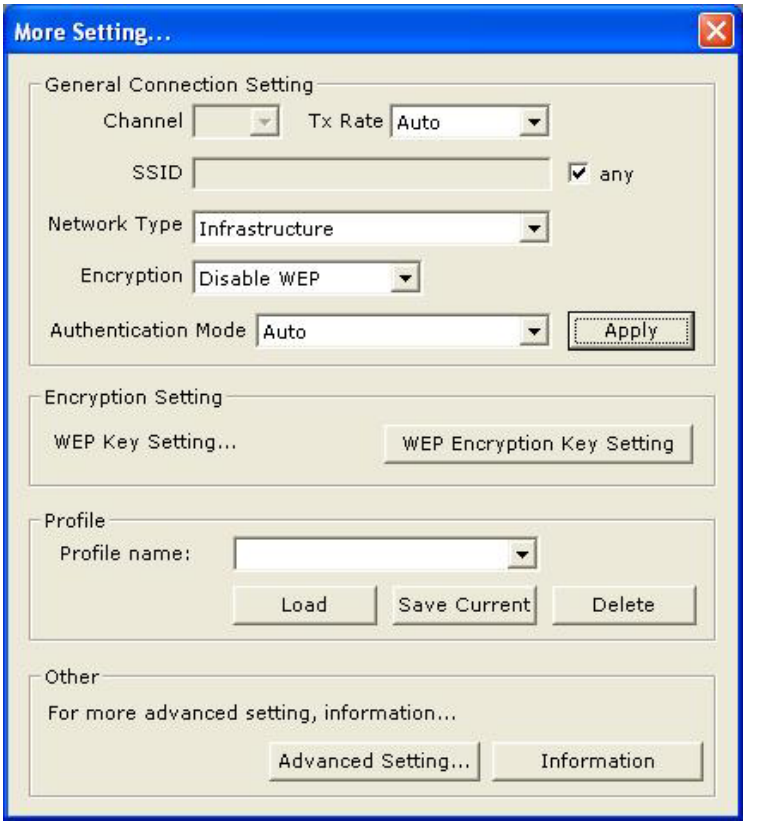


Figure 3-3 Station Mode: More Setting…

The following table describes the labels in this screen.

Table 3-2 Station Mode: More Setting…

LABEL	DESCRIPTION
General Connection Setting	
Channel	Select the channel number from the drop-down list box. To associate to an ad-hoc network, you must use the same channel as the peer computer. The number of channels varies depending on the setting in the **Advanced Setting** screen. This field is not applicable when you select **Infrastructure** in the **Network Type** field.

Table 3-2 Station Mode: More Setting…

LABEL	DESCRIPTION
Tx Rate	Select a transmission speed from the drop-down list box. Choose from **Auto** (default), **1 Mbps**, **2 Mbps**, **5.5 Mbps**, **11 Mbps**, **6 Mbps**, **9 Mbps**, **12 Mbps**, **18 Mbps**, **24 Mbps**, **36 Mbps**, **48 Mbps**, and **54 Mbps**.
SSID	Enter the SSID of the wireless network to which you want to associate. To associate to an ad-hoc network, you must enter the same SSID as the peer computer. Otherwise, select **Any** check box to associate to or roam between any infrastructure wireless networks.
Network Type	Select **Infrastructure** or **Ad-Hoc** from the drop-down list box. Select **Infrastructure** to associate to an AP. Select **Ad-Hoc** to associate to a peer computer.
Encryption	Select **Disable WEP** to deactivate the WEP encryption. Select **Enable WEP** to activate the WEP encryption and click **WEP Encryption Key Setting** to configure the WEP keys. Refer to *Section 3.4* for more information.
Authentication Mode	Select an authentication method. Choices are **Auto**, **Shared Key** and **Open System**. Refer to *Section 2.5* for more information.
Apply/Change	Click **Apply** to save the changes back to the ZyAIR, or click **Change** to start configuring the fields.
Encryption Setting	
WEP Key Setting…	Click **WEP Encryption Key Setting** to display the screen and configure WEP key settings.
Profile The Profile function allows you to save the wireless network settings in this screen, or use one of the pre-configured network profiles.	
Profile name	Enter a descriptive name in this field or select a pre-configured network profiles from the drop-down list.
Load	To use a previously saved network profile, select the profile file name from the drop-down list box and click **Load**.
Save Current	Enter a descriptive name in the **Profile name** field and click **Save Current** to save the current settings in this screen to a new profile. This also activates the new profile at the same time.
Delete	To delete an existing wireless network configuration, select a profile from the drop-down list box and click **Delete**.

Table 3-2 Station Mode: More Setting…

LABEL	DESCRIPTION
Others	
Advanced Settings…	Click **Advanced Settings…** to set the advanced features on the ZyAIR.
Information	Click **Information** to displays related version numbers of the ZyAIR.

3.4 The WEP Key Setting… Screen

Click the **WEP Encryption Key Setting** button in the **More Setting…** screen to display the **WEP Key Setting…** screen as shown next.

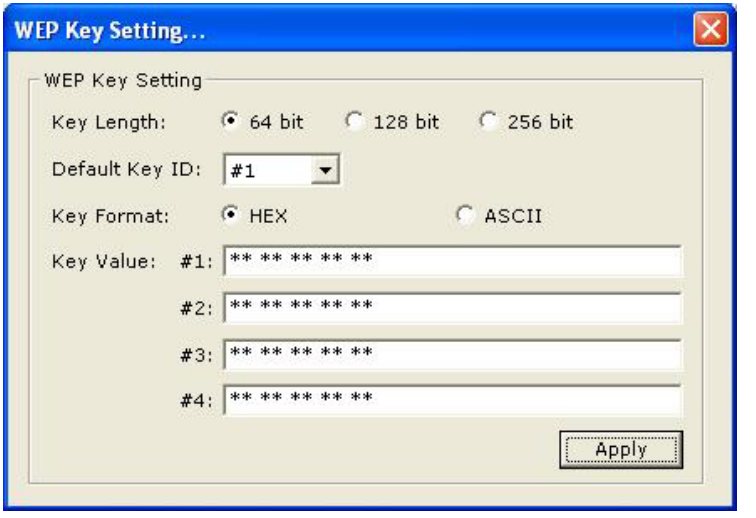


Figure 3-4 Station Mode: WEP Key Setting…

The following table describes the labels in this screen.

Table 3-3 Station Mode: WEP Key Setting…

LABEL	DESCRIPTION
WEP Key Setting The WEP keys are used to encrypt data before transmitting. The values for the keys must be set up exactly the same on the APs or other peer wireless computers as they are on the ZyAIR.	

Table 3-3 Station Mode: WEP Key Setting…

LABEL	DESCRIPTION
Key Length	Select **64 bit**, **128 bit** or **256 bit** and then fill in the related fields.
Default Key ID	Select a default WEP key to use for data encryption.
Key Format	Select either the **HEX** or **ASCII** WEP key type.
Key Value #1 … 4	Enter the WEP keys in the fields provided. If you select **64 bit** in the **Key Length** field. ◆ Enter either 10 hexadecimal digits in the range of "A-F", "a-f" and "0-9" (for example, 11AA22BB33) for HEX key type or ◆ Enter 5 ASCII characters (case sensitive) ranging from "a-z", "A-Z" and "0-9" (for example, MyKey) for ASCII key type. If you select **128 bit** in the **Key Length** field, ◆ Enter either 26 hexadecimal digits in the range of "A-F", "a-f" and "0-9" (for example, 00112233445566778899AABBCC) for HEX key type or ◆ Enter 13 ASCII characters (case sensitive) ranging from "a-z", "A-Z" and "0-9" (for example, MyKey12345678) for ASCII key type. If you select **256 bit** in the **Key Length** field, ◆ Enter either 58 hexadecimal digits in the range of "A-F", "a-f" and "0-9" (for example, 00112233445566778899AABBCC) for HEX key type or ◆ Enter 29 ASCII characters (case sensitive) ranging from "a-z", "A-Z" and "0-9" (for example, MyKey12345678) for ASCII key type. **You *must* configure all four WEP keys the first time you use the ZyAIR.** **The values for the WEP keys must be set up exactly the same on all wireless devices in the same wireless LAN.** **ASCII WEP keys are case sensitive.**
Apply/Change	Click **Apply** to save the changes back to ZyAIR, or click **Change** to start configuring the fields.

3.5 The Advanced Setting… Screen

To set the advanced features on the ZyAIR, click the **Advanced Setting…** button in the **More Setting…** screen.

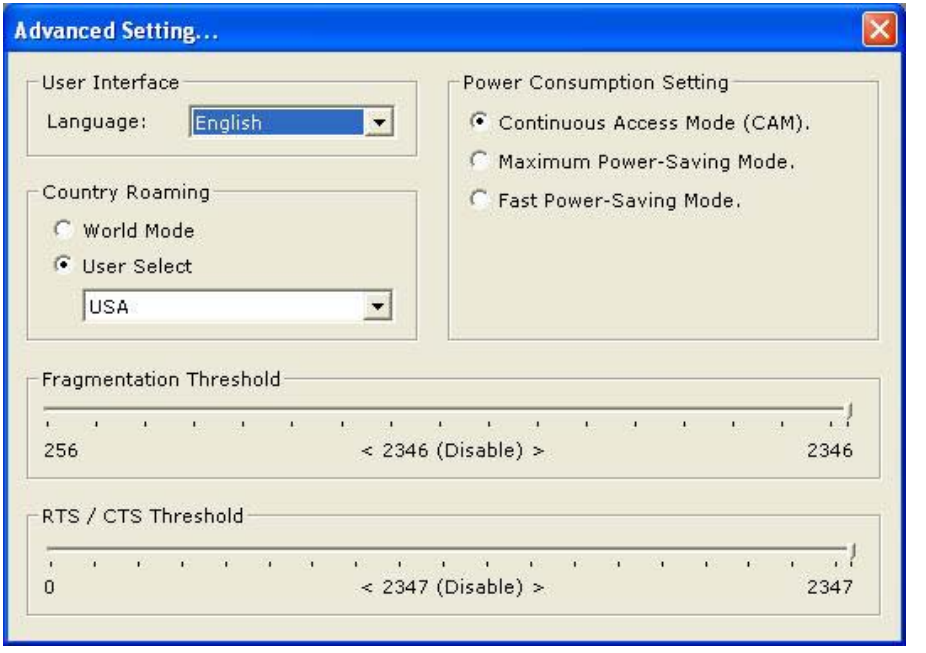


Figure 3-5 Station Mode: Advanced Setting…

The following table describes the labels in this screen

Table 3-4 Station Mode: Advanced Setting…

LABEL	DESCRIPTION
User Interface	
Language	Select a language from the **Language** drop-down list box.
Country Roaming	

Table 3-4 Station Mode: Advanced Setting…

LABEL	DESCRIPTION
World Wide	Select this radio button to have the ZyAIR display 14 channels in the **Channel** field in the **More Setting** screen.
User Select	Select this radio button and select a country from the drop down list to have the ZyAIR display the channel numbers for the selected country in the **Channel** field in the **More Setting** screen.
Power Consumption Setting	
Continuous Access Mode (CAM)	Select this radio button to disable power saving and the ZyAIR will never go to sleep mode.
Maximum Power-Saving Mode	Select this radio button to save power (especially for notebook computers). This forces the ZyAIR to go to sleep mode periodically.
Fast Power-Saving Mode	Select this radio button to have the ZyAIR switch between CAM and maximum power-saving mode depending on the amount of traffic to transmit.
Fragmentation Threshold	The threshold (number of bytes) for the fragmentation boundary for directed messages. It is the maximum data fragment size that can be sent. Move the slider to set the fragmentation threshold.
RTS/CTS Threshold	Data with its frame size larger than this value will perform the RTS/CTS handshake. Setting this attribute to be larger than the maximum MSDU (MAC service data unit) size turns off the RTS/CTS handshake. Setting this attribute to zero turns on the RTS/CTS handshake.

Chapter 4
Access Point Mode Configuration

This chapter shows you how to configure your ZyAIR in access point mode.

4.1 Introduction

To set your ZyAIR as an Access Point (AP), refer to *Section 1.5.1*.

In access point mode, your ZyAIR functions as an access point. This allows you to set up your wireless networks without using a dedicated AP device. Up to 16 wireless stations can associate to the ZyAIR.

4.1.1 Additional Setup Requirements

To bridge your wired and wireless network using the ZyAIR, the following requirements must be met:

1. The ZyAIR must be installed on a computer connected to the wired network.
2. Either configure network sharing (refer to the appendix for an example) or bridge the two interfaces (wireless and wired) on the computer.
3. Set the wireless station's IP address to be in the same subnet as the computer in which the ZyAIR is installed. Refer to the *Setting Up Your Computer's IP Address* appendix.

4.2 The ZyAIR Utility Screen

Select **Access Point** in the **Mode** field to display the screen as shown.

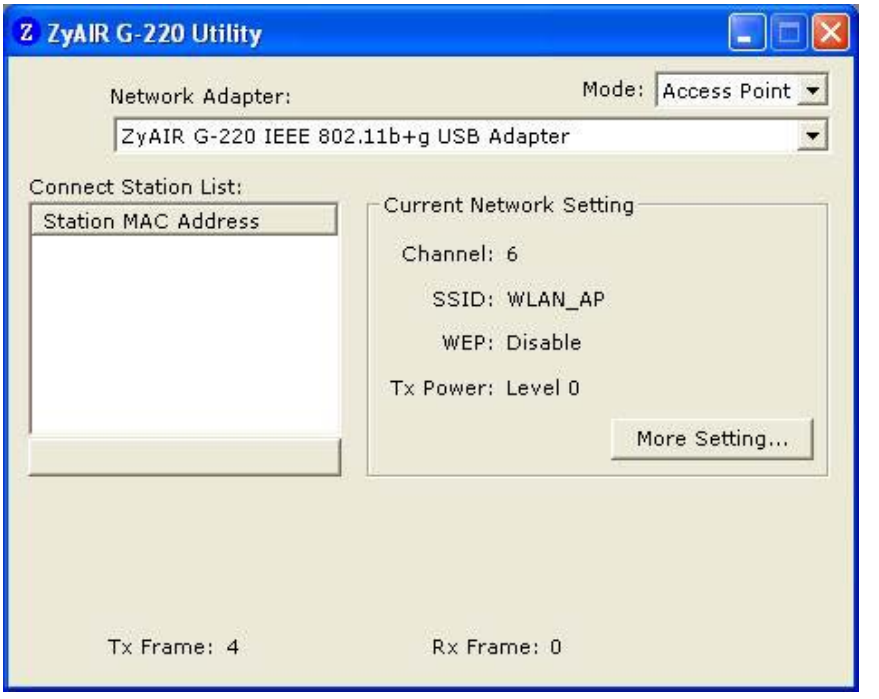


Figure 4-1 Access Point Mode: ZyAIR G-220 Utility

The following table describes the labels in this screen.

Table 4-1 Access Point Mode: ZyAIR G-220 Utility

LABEL	DESCRIPTION
Mode	Select **Station** from drop-down list box to set the ZyAIR to operate in wireless station mode. Select **Access Point** from drop-down list box to set the ZyAIR to operate in access point mode. Refer to *Section 1.5* for more information.
Network Adapter	This field displays the model name of your ZyAIR. Select from the drop-down list menu if you have more than one wireless LAN adapter in your computer.
Connect Station List:	
Station MAC Address	This field displays the MAC addresses of up to 16 wireless stations that are connected to the ZyAIR.

Table 4-1 Access Point Mode: ZyAIR G-220 Utility

LABEL	DESCRIPTION
Current Network Setting	
Channel	This field displays the radio channel the ZyAIR is currently using.
SSID	This field displays the name of the ZyAIR.
WEP	This field displays whether WEP data encryption is activated (**on**) or inactive (**off**).
Tx Power	This field displays the current transmission rate of the ZyAIR in megabits per second (Mbps).
More Setting…	Click **More setting…** to configure connection and wireless security settings.
Tx Frame	This field displays the number of data frames transmitted.
Rx Frame	This field displays the number of data frames received.

4.3 The Access Point Setting Screen

Click **More Setting…** in the **ZyAIR G-220 Utility** screen to display the screen as shown.

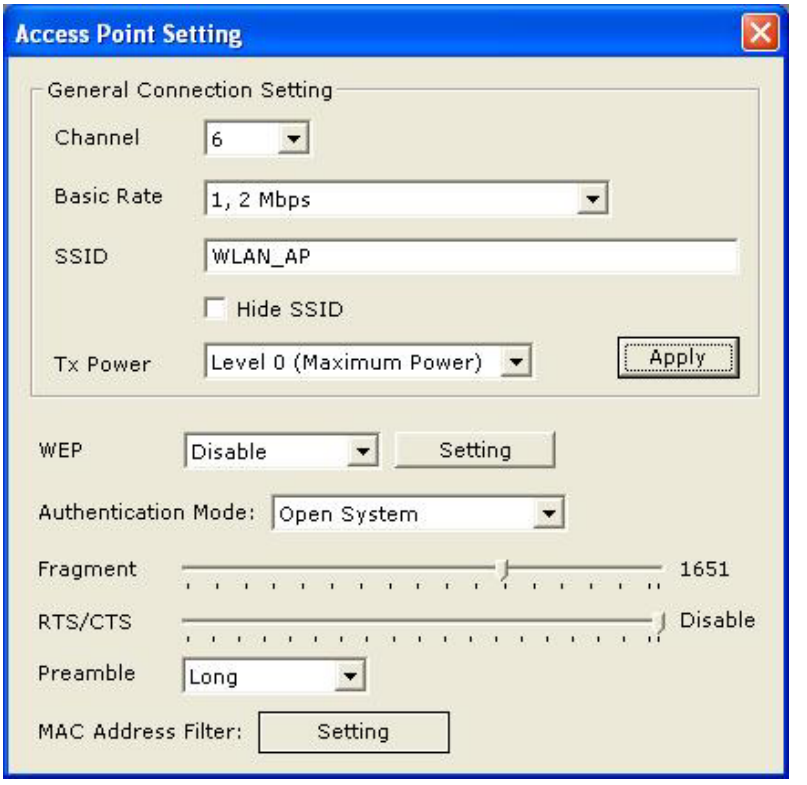


Figure 4-2 Access Point Mode: Access Point Setting

The following table describes the labels in this screen.

Table 4-2 Access Point Mode: Access Point Setting

LABEL	DESCRIPTION
General Connection Setting	
Channel	Set the operating frequency/channel depending on your geographical region.
Basic Rate	Select the rate(s) at which the ZyAIR can transmit data in the wireless LAN network. Make sure the wireless stations in the same wireless network are set to use the rate(s) for data transmission.
SSID	The SSID identifies the Service Set to which a wireless station is associated. Wireless stations associating to the access point (the ZyAIR) must have the same SSID. Enter a descriptive name (up to 32 printable 7-bit ASCII characters) for the wireless LAN.

Table 4-2 Access Point Mode: Access Point Setting

LABEL	DESCRIPTION
Hide ESSID	Select this check box to hide the ESSID in the outgoing beacon frame so a station cannot obtain the ESSID through passive scanning using a site survey tool.
Tx Power	Set this field if you need to conserve power consumption (especially for notebook computers). This control changes the strength of the ZyAIR's antenna gain or transmission power. Antenna gain, measured in dBm (decibel relative units compared to milliwatts), is the increase in coverage. Higher antenna gain improves the range of the signal for better communications. Select **Level 0 (Maximum Power)** to set the ZyAIR's antenna to transmit at 17-dBm. Select **Level 1** to set the ZyAIR's antenna to transmit at 15-dBm. Select **Level 2** to set the ZyAIR's antenna to transmit at 13-dBm. Select **Level 3 (Minimum Power)** to set the ZyAIR's antenna to transmit at 11-dBm. This allows for the least power consumption.
Apply	Click **Apply** to save the changes back to the ZyAIR, or click **Change** to start configuring the fields.
WEP	Select **Disable** to deactivate the WEP encryption. Select **Enable** to activate the WEP encryption.
Setting	Click **Setting** to display the screen and configure WEP key settings.
Authentication Mode	Select an authentication method. Choices are **Shared Key** and **Open System**. Refer to *Section 2.5* for more information.
Fragmentation Threshold	The threshold (number of bytes) for the fragmentation boundary for directed messages. It is the maximum data fragment size that can be sent. Refer to *Section 2.3* for more information.
RTS/CTS Threshold	Data with its frame size larger than this value will perform the RTS/CTS handshake. Setting this attribute to be larger than the maximum MSDU (MAC service data unit) size turns off the RTS/CTS handshake. Refer to *Section 2.4* for more information. Setting this attribute to zero turns on the RTS/CTS handshake.
Preamble	Select a preamble type. Choices are **Long** and **Short**. Refer to *Section 2.6* for more information.
MAC Address Filter	Click **Setting** to display the **MAC Address Filter** screen and change your ZyAIR's MAC filter settings.

4.4 The WEP Key Setting… Screen

To set up wireless LAN security, click **Setting** next to the **WEP** field in the **Access Point Setting** screen to display the screen as shown.

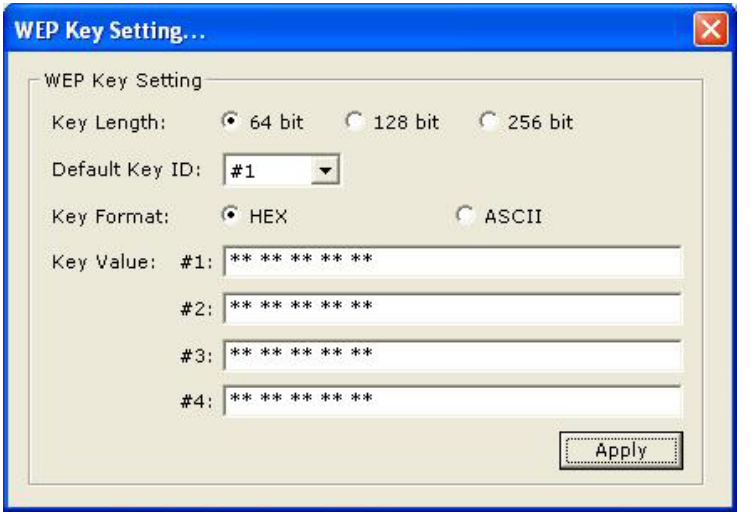


Figure 4-3 Access Point Mode: Security

Refer to *Table 3-3* for field descriptions.

4.5 The MAC Address Filter Screen

The **MAC Address Filter** screen allows you to configure the ZyAIR to give exclusive access to (Accept) devices or exclude devices from (Reject) connecting to the ZyAIR. Every Ethernet device has a unique MAC (Media Access Control) address. The MAC address is assigned at the factory and consists of six pairs of hexadecimal characters, for example, 00:A0:C5:00:00:02. You need to know the MAC address of the device(s) to configure this screen.

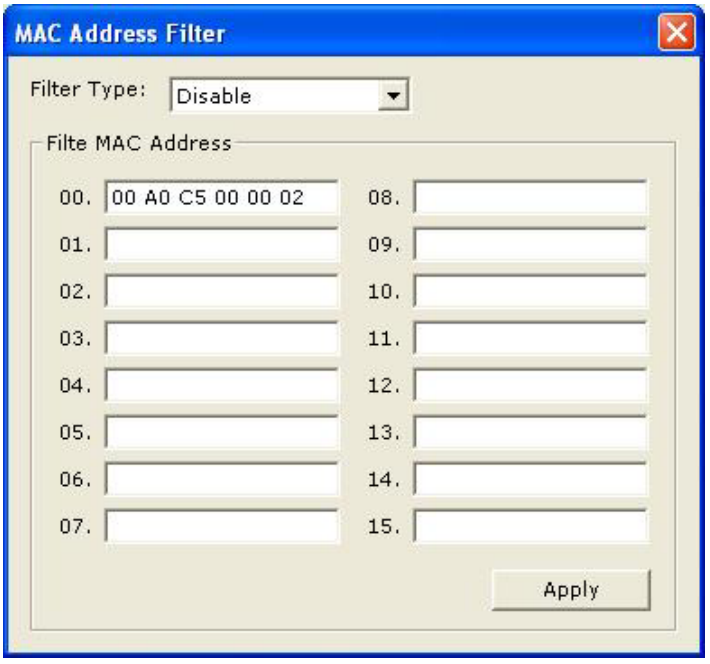


Figure 4-4 Access Point Mode: MAC Filter

The following table describes the labels in this screen.

Table 4-3 Access Point Mode: MAC Filter

LABEL	DESCRIPTION
Filter Type	Define the filter action for the list of MAC addresses in the MAC address filter table. Select **Disable** to deactivate the MAC filter feature. Select **Reject** to block access to the ZyAIR, MAC addresses not listed will be allowed to access the router. Select **Accept** to permit access to the ZyAIR, MAC addresses not listed will be denied access to the router.
Filter MAC Address	

Table 4-3 Access Point Mode: MAC Filter

LABEL	DESCRIPTION
00 .. 15	Specify the MAC address(es) of the wireless station(s) that is allowed or denied association to the ZyAIR. Enter six pairs of hexadecimal digits in the range of "A-F", "a-f" and "0-9" (for example, 00A0C5000002). Once you click **Apply** to save the values, this field displays the MAC address with spaces separating the six pairs of hexadecimal digits (for example 00 A0 C5 00 00 02). If you enter an invalid MAC address, it will not be displayed.
Apply	Click **Apply** to save the changes back to the ZyAIR.

Chapter 5
Maintenance

This chapter describes how to uninstall or upgrade the ZyAIR Utility.

5.1 The Information… Screen

The **Information…** screen displays related version numbers of the ZyAIR. To display the screen as shown next, click the **Information** button in the **More Setting…** screen when the ZyAIR is in wireless station mode.

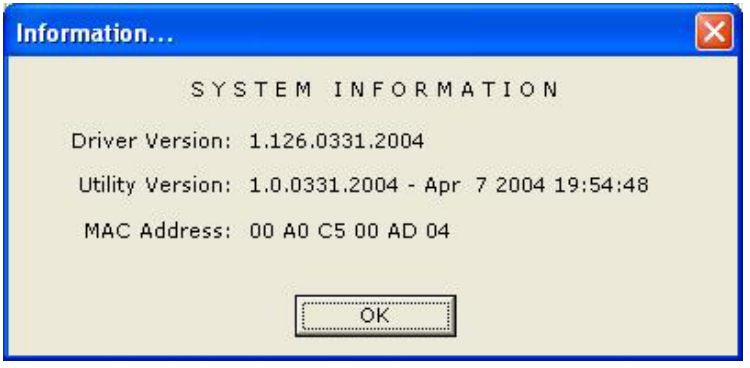


Figure 5-1 Information…

The following table describes the read-only fields in this screen.

Table 5-1 Information…

LABEL	DESCRIPTION
Driver Version	This field displays the version number of the ZyAIR driver.
Utility Version	This field displays the version number of the ZyAIR Utility.
MAC Address	This field displays the MAC address of the ZyAIR.
OK	Click **OK** to save all changes and close the ZyAIR Utility.

5.2 Unistallating the ZyAIR Utility

Follow the steps below to remove (or uninstall) the ZyAIR Utility from your computer.

Step 1. Click **Start**, **Programs**, **ZyAIR G-220 Utility**, **Uninstall ZyAIR G-220 Utility**.

Step 2. When prompted, click **OK** to remove the driver and the utility software.

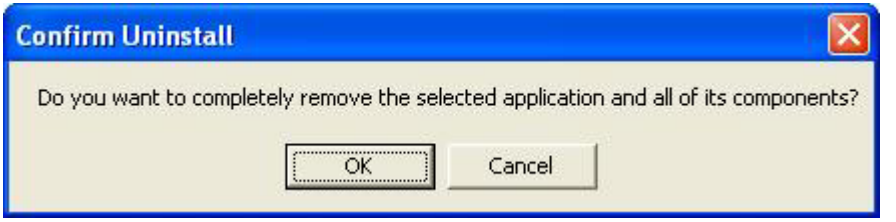


Figure 5-2 Confirm Uninstall

Step 3. Restart your computer when prompted.

5.3 Upgrading the ZyAIR Utility

Before you uninstall the ZyAIR Utility, take note of the current network configuration.

To perform the upgrade, follow the steps below.

Step 1. Download the latest version of the utility from the ZyXEL web site and save the file on your computer.

Step 2. Follow the steps in *Section 5.2* to remove the current ZyAIR Utility from your computer.

Step 3. Restart your computer when prompted.

Step 4. After restarting, refer to the procedure in the *Quick Installation Guide* to install the new utility.

Step 5. Check the version numbers in the **Information…** screen to make sure the new utility is installed properly.

Chapter 6
Troubleshooting

This chapter covers potential problems and the possible remedies. After each problem description, some instructions are provided to help you to diagnose and to solve the problem.

6.1 Problems Starting the ZyAIR Utility Program

Table 6-1 Troubleshooting Starting ZyAIR Utility Program

Cannot start the ZyAIR Wireless LAN Utility	Make sure the ZyAIR is properly inserted and the LED(s) is on. Refer to the *Quick Installation Guide* for the LED descriptions.
	Use the **Device Manager** to check for possible hardware conflicts. Click **Start**, **Settings**, **Control Panel**, **System**, **Hardware** and **Device Manager**. Verify the status of the ZyAIR under **Network Adapter**. (Steps may vary depending on the version of Windows).
	Install the ZyAIR in another computer.
	If the error persists, you may have a hardware problem. In this case, you should contact your local vendor.
The ZyAIR Utility icon does not display	When the ZyAIR Wireless LAN Utility icon does not display, you are using the Windows XP wireless configuration tool at the same time. Refer to the *Section 1.3* to disable the Windows XP wireless configuration tool.

6.2 Problem with the Link Status

Table 6-2 Troubleshooting Link Quality

PROBLEM	CORRECTIVE ACTION
The link quality and/or signal strength is poor all the time.	Search and connect to another AP with a better link quality using the **Site Survey** screen. Move your computer closer to the AP or the peer computer(s) within the transmission range. There may be too much radio interference (for example microwave or another AP using the same channel) around your wireless network. Relocate or reduce the radio interference.

6.3 Problems Communicating With Other Computers

Table 6-3 Troubleshooting Communication Problems

PROBLEM	CORRECTIVE ACTION
In wireless station mode, the computer with the ZyAIR installed cannot communicate with the other computer(s).	
A. **Infrastructure**	Make sure that the AP and the associated computers are turned on and working properly. Make sure the ZyAIR computer and the associated AP use the same SSID. Change the AP and the associated wireless clients to use another radio channel if interference is high. Make sure that the computer and the AP share the same security option and key. Verify the settings in the **Security** screen.
B. **Ad-Hoc (IBSS)**	Verify that the peer computer(s) is turned on. Make sure the ZyAIR computer and the peer computer(s) are using the same SS ID and channel. Make sure that the computer and the peer computer(s) share the same security option and key. Change the wireless clients to use another radio channel if interference is high.
In access point mode, the wireless station(s) cannot associate to the ZyAIR.	Verify that the computer with the ZyAIR installed is turned on. Make sure the wireless station(s) uses the same SSID as the ZyAIR. Make sure the wireless station(s) uses the same security option and/or WEP keys. Verify that the wireless station(s) is not blocked in the **MAC Filter** screen.

Appendix A
Setting up Your Computer's IP Address

All computers must have a 10M or 100M Ethernet adapter card and TCP/IP installed.

Windows 95/98/Me/NT/2000/XP, Macintosh OS 7 and later operating systems and all versions of UNIX/LINUX include the software components you need to install and use TCP/IP on your computer. Windows 3.1 requires the purchase of a third-party TCP/IP application package.

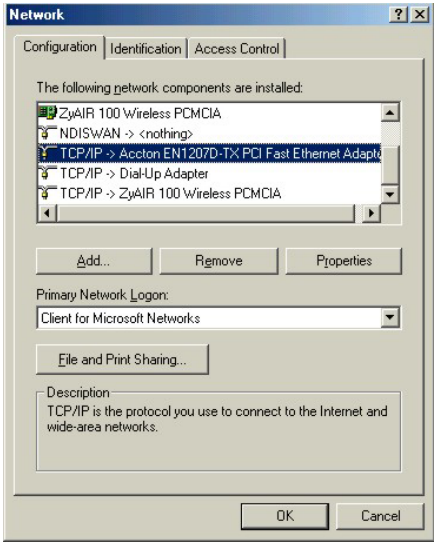
TCP/IP should already be installed on computers using Windows NT/2000/XP, Macintosh OS 7 and later operating systems.

After the appropriate TCP/IP components are installed, configure the TCP/IP settings in order to "communicate" with your network.

If you manually assign IP information instead of using dynamic assignment, make sure that your computers have IP addresses that place them in the same subnet as the ZyAIR.

Windows 95/98/Me

Click **Start**, **Settings**, **Control Panel** and double-click the **Network** icon to open the **Network** window.



The **Network** window **Configuration** tab displays a list of installed components. You need a network adapter, the TCP/IP protocol and Client for Microsoft Networks.

If you need the adapter:

a. In the **Network** window, click **Add**.

b. Select **Adapter** and then click **Add**.

c. Select the manufacturer and model of your network adapter and then click **OK**.

If you need TCP/IP:

a. In the **Network** window, click **Add**.

b. Select **Protocol** and then click **Add**.

c. Select **Microsoft** from the list of **manufacturers**.

d. Select **TCP/IP** from the list of network protocols and then click **OK**.

If you need Client for Microsoft Networks:

a. Click **Add**.

b. Select **Client** and then click **Add**.

c. Select **Microsoft** from the list of manufacturers.

d. Select **Client for Microsoft Networks** from the list of network clients and then click **OK**.

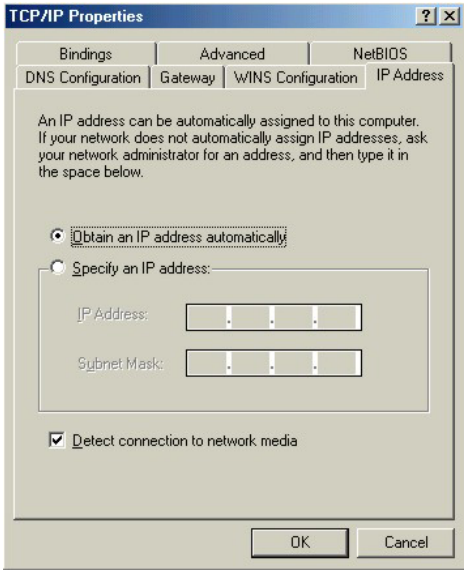
e. Restart your computer so the changes you made take effect.

In the **Network** window **Configuration** tab, select your network adapter's TCP/IP entry and click **Properties**.

1. Click the **IP Address** tab.

   -If your IP address is dynamic, select **Obtain an IP address automatically**.

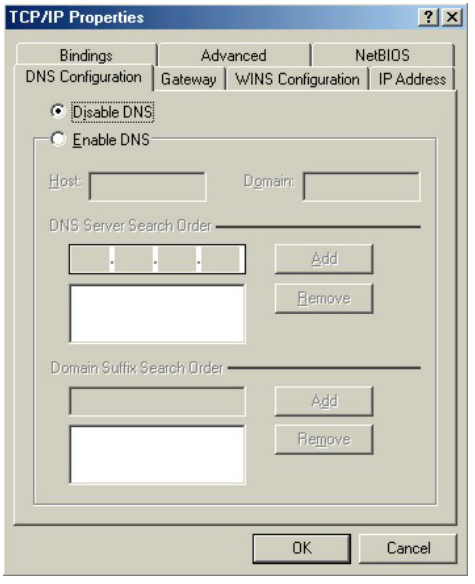
   -If you have a static IP address, select **Specify an IP address** and type your information into the **IP Address** and **Subnet Mask** fields.



2. Click the **DNS** Configuration tab.

   -If you do not know your DNS information, select **Disable DNS**.

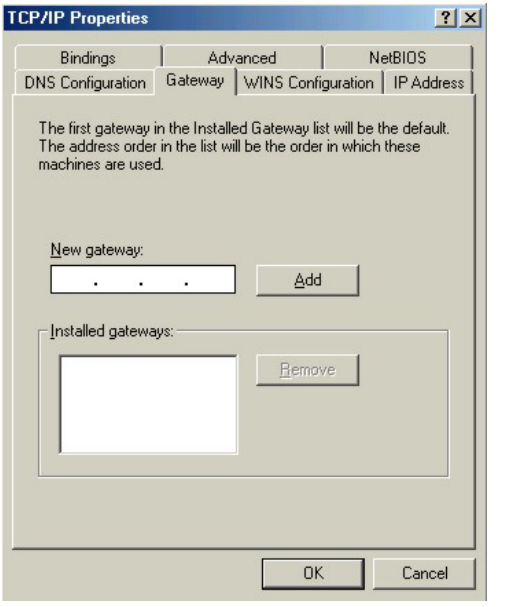
   -If you know your DNS information, select **Enable DNS** and type the information in the fields below (you may not need to fill them all in).



3. Click the **Gateway** tab.

   -If you do not know your gateway's IP address, remove previously installed gateways.

   -If you have a gateway IP address, type it in the **New gateway field** and click **Add**.



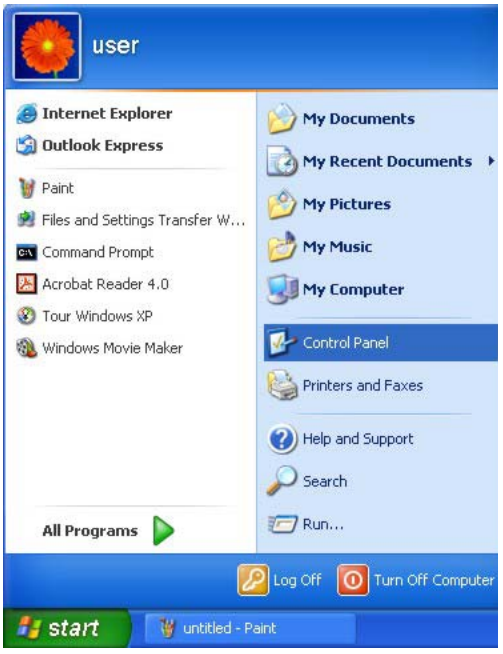
4. Click **OK** to save and close the **TCP/IP Properties** window.
5. Click **OK** to close the **Network** window. Insert the Windows CD if prompted.
6. Restart your computer when prompted.

Verifying Your Computer's IP Address

1. Click **Start** and then **Run**.
2. In the **Run** window, type "winipcfg" and then click **OK** to open the **IP Configuration** window.
3. Select your network adapter. You should see your computer's IP address, subnet mask and default gateway.

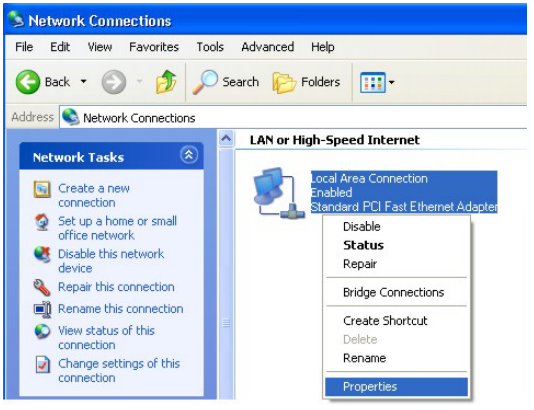
Windows 2000/NT/XP

1. For Windows XP, click **start**, **Control Panel**. In Windows 2000/NT, click **Start**, **Settings**, **Control Panel**.

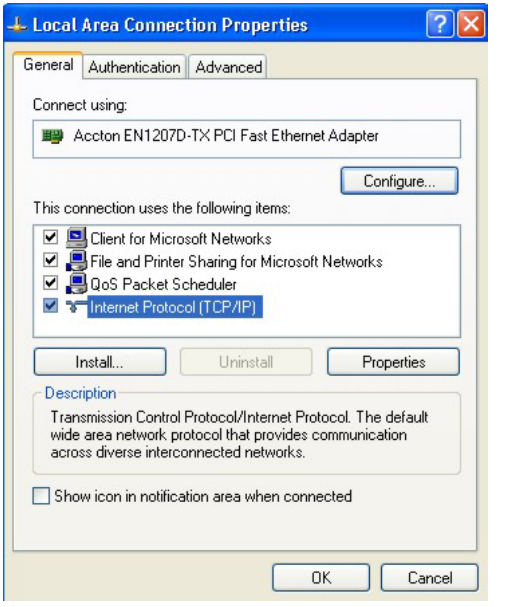


2. For Windows XP, click **Network Connections**. For Windows 2000/NT, click **Network and Dial-up Connections**.

3. Right-click **Local Area Connection** and then click **Properties**.



4. Select **Internet Protocol (TCP/IP)** (under the **General** tab in Win XP) and click **Properties**.

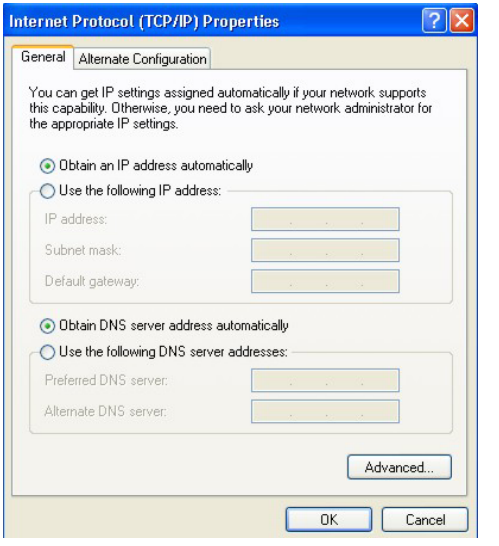


5. The **Internet Protocol TCP/IP Properties** window opens (the **General tab** in Windows XP).

   -If you have a dynamic IP address click **Obtain an IP address automatically**.

   -If you have a static IP address click **Use the following IP Address** and fill in the **IP address**, **Subnet mask**, and **Default gateway** fields.

   Click **Advanced**.



6. -If you do not know your gateway's IP address, remove any previously installed gateways in the **IP Setting**s tab and click **OK**.

   Do one or more of the following if you want to configure additional IP addresses:

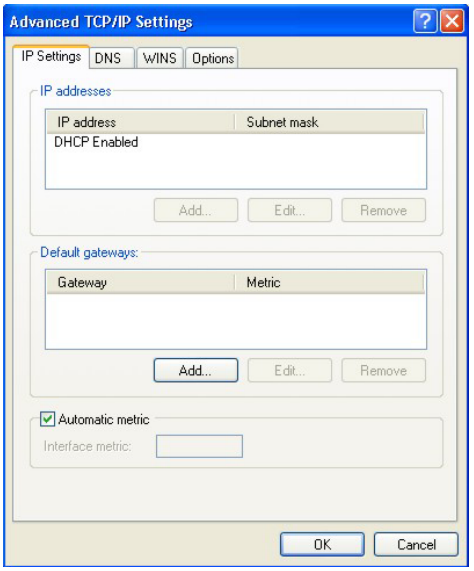
   -In the **IP Settings** tab, in IP addresses, click **Add**.

   -In **TCP/IP Address**, type an IP address in **IP address** and a subnet mask in **Subnet mask**, and then click **Add**.

   -Repeat the above two steps for each IP address you want to add.

   -Configure additional default gateways in the **IP Settings** tab by clicking **Add** in **Default gateways**.

   -In **TCP/IP Gateway Address**, type the IP address of the default gateway in **Gateway**. To manually configure a default metric (the number of transmission hops), clear the **Automatic metric** check box and type a metric in **Metric**.



   -Click **Add**.

   -Repeat the previous three steps for each default gateway you want to add.

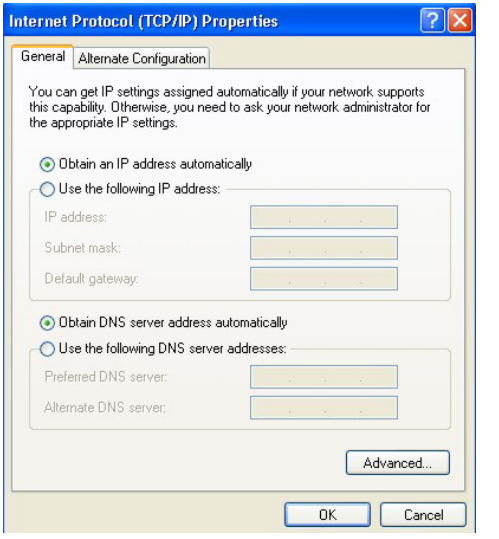
   -Click **OK** when finished.

7. In the **Internet Protocol TCP/IP Properties** window (the **General tab** in Windows XP):

   -Click **Obtain DNS server address automatically** if you do not know your DNS server IP address(es).

   -If you know your DNS server IP address(es), click **Use the following DNS server addresses**, and type them in the **Preferred DNS server** and **Alternate DNS server** fields.

   If you have previously configured DNS servers, click **Advanced** and then the **DNS** tab to order them.



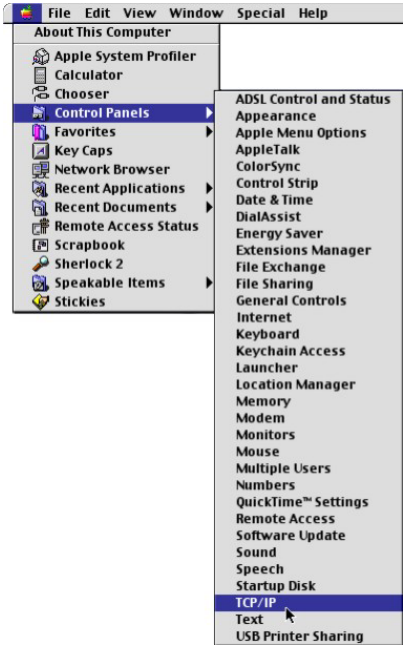
8. Click **OK** to close the **Internet Protocol (TCP/IP) Properties** window.
9. Click **OK** to close the **Local Area Connection Properties** window.
10. Restart your computer (if prompted).

Verifying Your Computer's IP Address

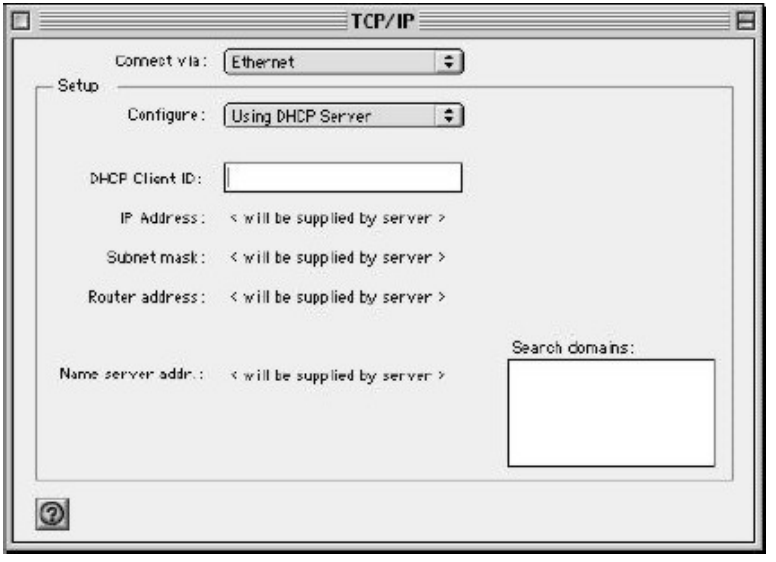
1. Click **Start**, **All Programs**, **Accessories** and then **Command Prompt**.
2. In the **Command Prompt** window, type "ipconfig" and then press [ENTER]. You can also open **Network Connections**, right-click a network connection, click **Status** and then click the **Support** tab.

Macintosh OS 8/9

1. Click the **Apple** menu, **Control Panel** and double-click **TCP/IP** to open the **TCP/IP Control Panel**.



2. Select **Ethernet** from the **Connect via** list.



3. For dynamically assigned settings, select **Using DHCP Server** from the **Configure:** list.

4. For statically assigned settings, do the following:

   -From the **Configure** box, select **Manually**.

   -Type your IP address in the **IP Address** box.

   -Type your subnet mask in the **Subnet mask** box.

   -Type the IP address of your ZyAIR in the **Router address** box.

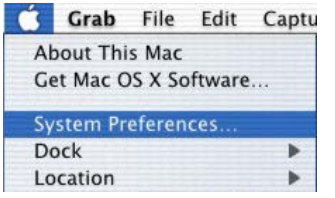
5. Close the **TCP/IP Control Panel**.
6. Click **Save** if prompted, to save changes to your configuration.
7. Restart your computer (if prompted).

Verifying Your Computer's IP Address

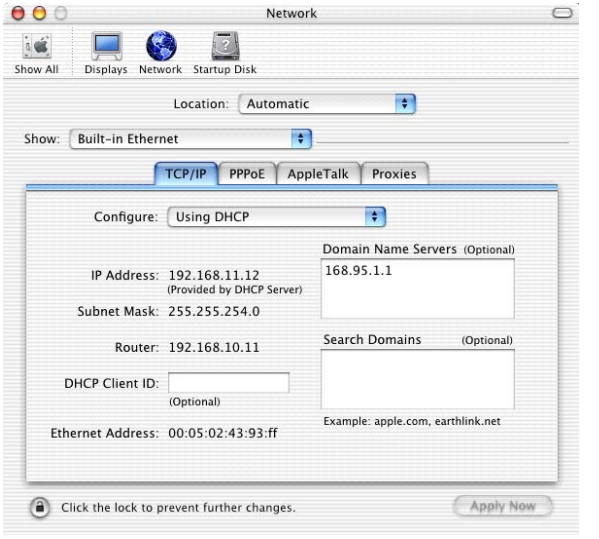
Check your TCP/IP properties in the **TCP/IP Control Panel** window.

Macintosh OS X

1. Click the **Apple** menu, and click **System Preferences** to open the **System Preferences** window.



2. Click **Network** in the icon bar.
   - Select **Automatic** from the **Location** list.
   - Select **Built-in Ethernet** from the **Show** list.
   - Click the **TCP/IP** tab.



3. For dynamically assigned settings, select **Using DHCP** from the **Configure** list.
4. For statically assigned settings, do the following:
   -From the **Configure** box, select **Manually**.
   -Type your IP address in the **IP Address** box.
   -Type your subnet mask in the **Subnet mask** box.
   -Type the IP address of your ZyAIR in the **Router address** box.
5. Click **Apply Now** and close the window.
6. Restart your computer (if prompted).

Verifying Your Computer's IP Address

Check your TCP/IP properties in the **Network** window.

Appendix B
Access Point Mode Setup Example

This example uses the network sharing feature in Windows 2000 to bridge the wired and wireless network when you set the ZyAIR in access point (AP) mode.

Refer to *Section 4.1.1* for setup methods and requirements.

Steps may vary depending on your Windows version. You may need to install additional software in Windows 98/Me.

Configuring the Computer on Which You Install the ZyAIR

Step 1. Refer to *Section 1.5.1* to set the ZyAIR to operate in AP mode.

Step 2. Click **Start**, **Settings**, **Network and Dial-up Connections** (or click **Start**, **Settings**, **Control Panel** and double-click **Network and Dial-up Connections**).

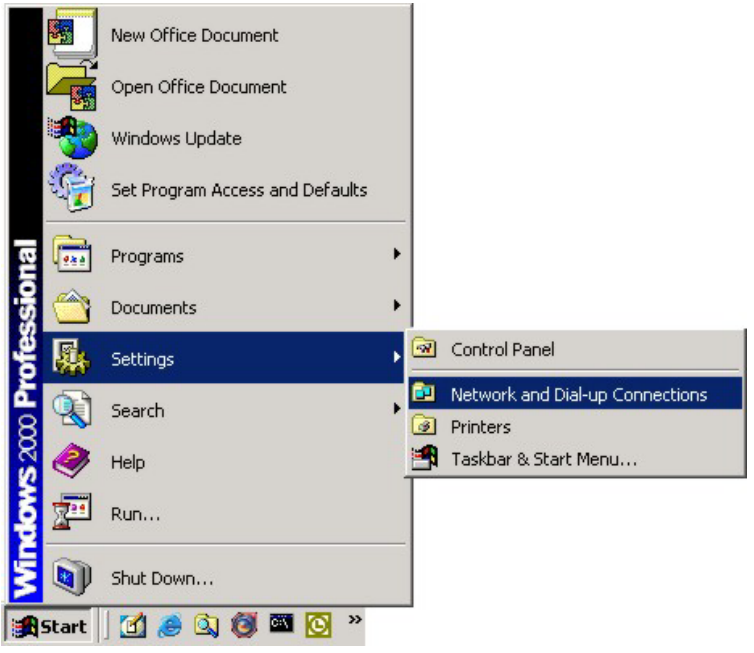


Diagram 1 Windows 2000: Start

Step 3. Right-click on the icon for your wired Ethernet adapter and click **Properties**.

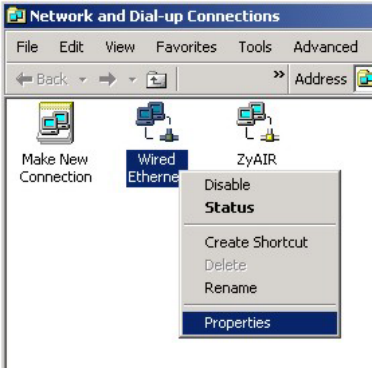


Diagram 2 Windows 2000: Network and Dial-up Connections

Step 4. A Properties screen displays. Click the **Sharing** tab and select **Enable Internet Connection Sharing for this connection**. Click **OK**.

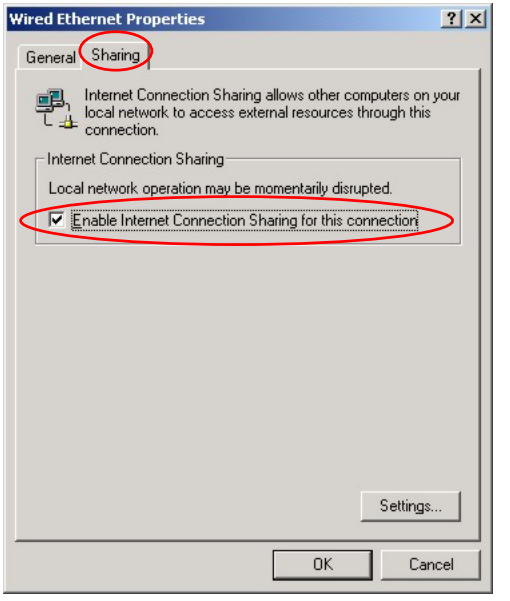


Diagram 3 Windows 2000: Network Properties

Step 5. A notice screen displays. Click **Yes**.

Diagram 4 Windows 2000: Local Network

Configuring the Wireless Station Computer

Refer to the *Setting Up Your Computer's IP Address* appendix to set up the wireless station computer(s) IP address.

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