

# Wireless LAN Card

## User Guide

Before operating the unit, please read this manual and retain it for future Reference

Wireless LAN Card



The user guide is fit for both Wireless LAN Card and Long Range Wireless LAN Card

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# Chapter 1 Introduction

This chapter describes the package contents, PC Card description, system requirements, features & benefits, applications and network configurations of our wireless LAN products.

## 1-1 Package Contents

The PC Card package contains the following items

1. One Wireless LAN Cardbus Adapter
2. One Quick Installation Guide
3. One Installation CD

## 1-2 PC Card Description

The PC Card is a standard PC Card that fits into any PCMCIA Card Type II slot. The PC Card has a LED indicator and two built-in diversity antennas.

1. Integrated, with built-in diversity Antenna
2. Link LED
  - 802.11 AdHoc mode – Blinking, no matter the wireless is connected or not
  - Infrastructure – Solid GREEN when the wireless is connected
  - Off – No wireless activity

## 1-3 System Requirements

Installation of the PC Card requires:

Laptop PC containing:

- 32-bit CardBus slot (or Desktop PC with PC Card-PCI adapter)
- 32 MB memory or greater
- 300 MHz processor or higher

Microsoft Windows 2000/Windows Millennium Edition/Windows 98

Second Edition/Windows XP/Windows NT 4.0 (with Service Pack 6)

## 1-4 Features and Benefits

2.4/5GHz IEEE802.11a/b/g (draft) standard and 5GHz IEEE802.11a standard compliant	Fully interoperable with IEEE802.11a/b/g (draft) compliant products.
Up to 54Mbps and 108Mbps (turbo mode) high-speed data rates	Capable of handling heavy data payloads such as MPEG video streaming
Up to 152-bit WEP Data Encryption with TKIP	Powerful data security
IEEE802.1x Client support (Optional)	Enhances authentication and security.
Dynamic Frequency Selection (DFS) support	Provides flexible selection of the best frequency to allow mobility among all existing IEEE802.11a/b/g networks
Transmission Power Control (TPC) support	Offers flexibility to adjust RF output power
Multi-country Roaming (802.11d) support	Automatically adjusts regulatory domain to operate in different countries.

## 1-5 Applications

The wireless LAN products are easy to install and highly efficient. The following list describes some of the many applications made possible through the power and flexibility of wireless LANs:

### 1. Difficult-to-wire environments

There are many situations where wires can not or not easily be laid. Historic buildings, older buildings, open areas and across busy streets make the installation of LANs either impossible or very expensive.

### 2. Temporary workgroups

Consider situations in parks, athletic arenas, exhibitions, disaster-recovery, temporary office and construction sites where one wants a temporary WLAN established and removed.

### 3. The ability to access real-time information

Doctors/nurses, point-of-sale employees, and warehouse workers can access real-time information while dealing with patients, serving customers and processing information.

### 4. Frequently changed environments

Show rooms, meeting rooms, retail stores, and manufacturing sites where frequently rearrange the workplace.

### 5. Small Office and Home Office (SOHO) networks

SOHO users need a cost-effective, easy and quick installation of a small network.

### 6. Wireless extensions to Ethernet networks

Network managers in dynamic environments can minimize the overhead caused by moves, extensions to

networks, and other changes with wireless LANs.

## 7. Wired LAN backup

Network managers implement wireless LANs to provide backup for mission-critical applications running on wired networks.

## 8. Training/Educational Facilities

Training sites at corporations and students at universities use wireless connectivity to ease access to information, information exchanges, and learning.

# 1-6 Network Configurations

To better understand how the wireless LAN products work together to create a wireless network, it might be helpful to depict a few of the possible wireless LAN PC card network configurations. The wireless LAN products can be configured as:

1. Ad-hoc (or peer-to-peer) for departmental or SOHO LANs.
2. Infrastructure for enterprise LANs.
3. IP Sharing for 56K/ISDN TA/Cable/DSL Modem – Connect Internet and your SOHO network.

### Ad-hoc (peer-to-peer) Mode

This is the simplest network configuration that several computers equipped with the PC Cards that form a wireless network whenever they are within range of one another (**Figure 1-1**). In ad-hoc mode, each client, is peer-to-peer, would only have access to the resources of the other client and requires no the access point. This is the easiest and least expensive way for the SOHO to set up a wireless network.

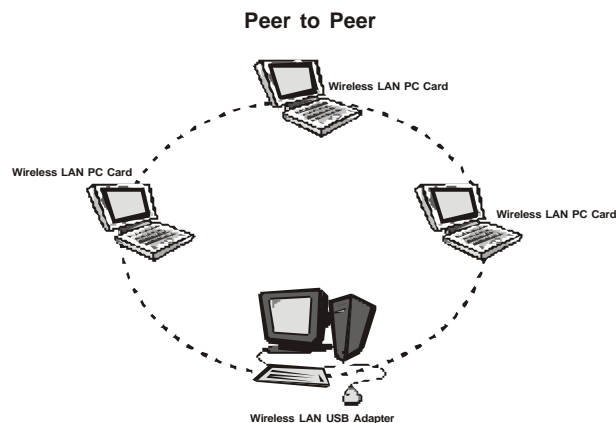


Figure 1-1 A wireless Ad-hoc network

### Infrastructure Mode

The infrastructure mode requires the use of an access point (AP). In this mode, all wireless communications between two computers have to be via the AP no matter the AP is wired to Ethernet network or stand-alone. If used in stand-alone, the AP can extend the range of independent wireless LANs by acting a repeater, which effectively doubling the distance between wireless stations as shown in **Figure 1-2**.

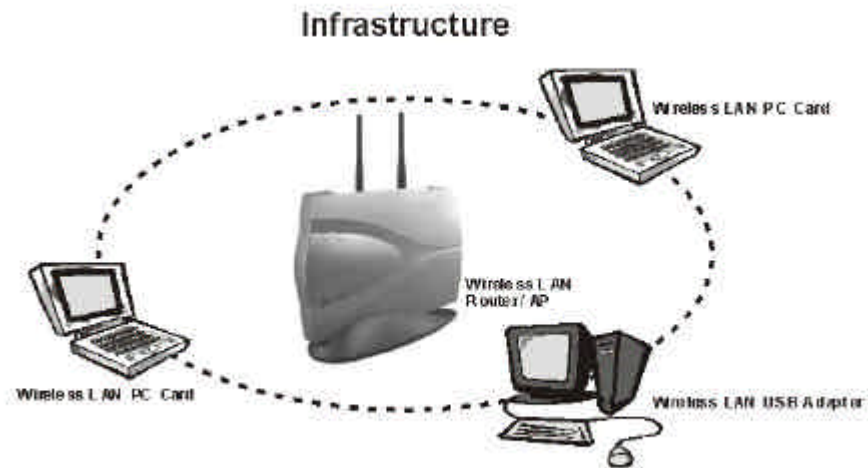


Figure 1-2

### Extended-range independent WLAN using AP as repeater

If wired to an Ethernet network as shown in **Figure 1-3**, the AP serves as a bridge and provides the link between the server and the wireless clients. The wireless clients can move freely throughout the coverage area of the AP while remaining connected to the server. Since the ap is connected to the wired network, each client would have access to server resources as well as to other clients.

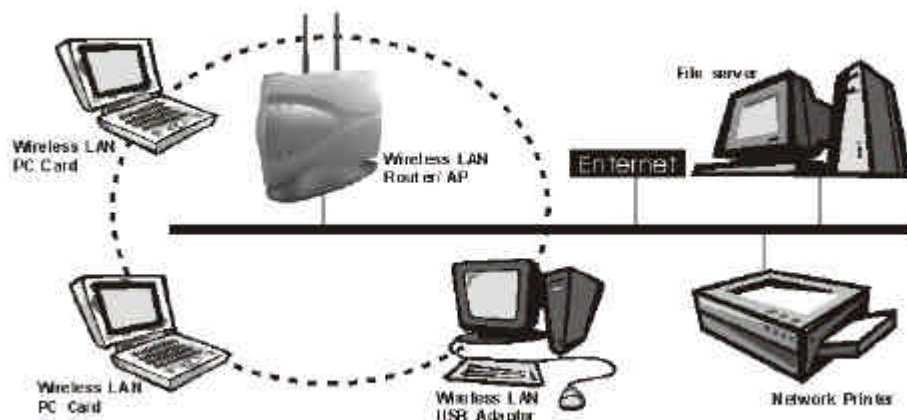


Figure 1-3 Single AP bridge

Access points have a finite range, on the order of 50 meters indoor and 100 meters outdoors. In a very large facility such as an enterprise, a warehouse, or on a college campus, it will probably be necessary to

install more than one access point to cover an entire building or campus, as shown in **Figure 1-4**. In this scenario, access points hand the client off from one to another in a way that is invisible to the client, ensuring roken connectivity. Wireless clients can roam seamlessly between different coverage areas and remain connected to the network.

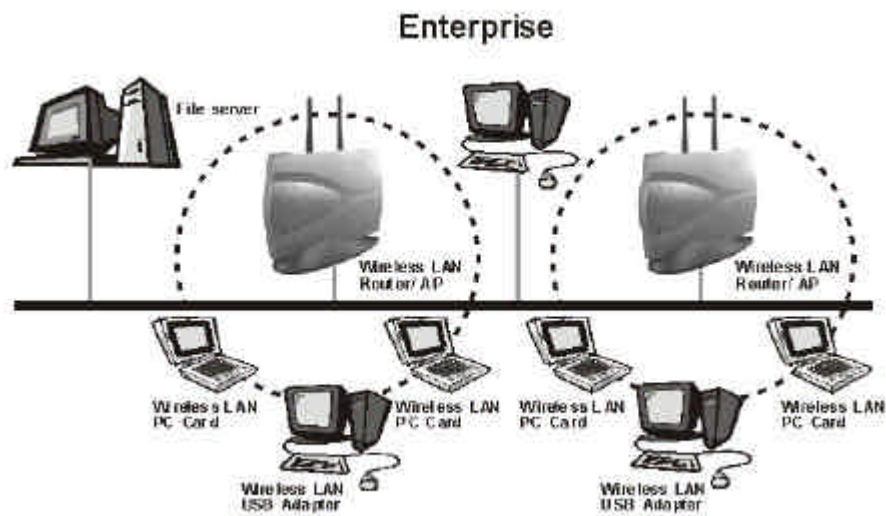


Figure 1-4 Multiple-AP and roaming

### Wireless Router and IP Sharing

In infrastructure mode, in addition to acting as a bridge between an Ethernet and wireless network, the AP can be configured as a wireless router and IP sharing device for Internet access as shown in **Figure 1-5**. You don't have to buy an expensive router. Nor you have to buy several modems and setup phone lines. Just share one AP, one Modem, single dial-up account, and one phone line, dozens of network users can go surfing the Internet concurrently.

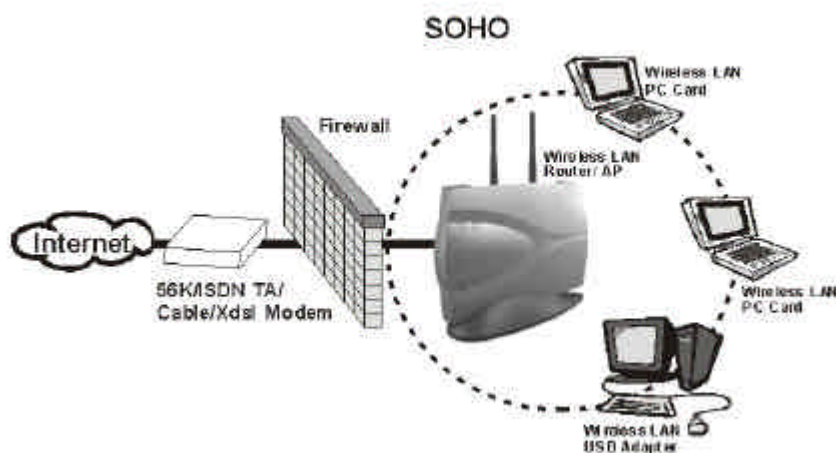


Figure 1-5 Wireless router and IP Sharing

## Chapter 2 Installing Drivers & Client Utility

This chapter describes how to install the PC Card drivers and client utility under Windows 95/98/ME/2000/XP.

### 2-1 Installation for Windows 98SE/ME/2000/XP

This section describes the first-time installation for the driver installation under Windows 98SE/ME/2000.

For a previously installed driver, we provides the InstallShield Wizard, which includes an application for upgrading the present driver and the Utility.

#### Installation Procedure:

1. Turn on your computer.
2. Be sure that there is no PCMCIA adapter inserted yet.
3. Insert the **Wireless LAN Installation** CD into your CD-ROM drive. Then execute Setup.exe by selecting file from the CD-ROM drive.
4. When the Setup.exe program starting, it will pop up an window as shown in **Figure 2-1.**, click on the **Next** button to continue the installation.



Figure 2-1



5. After finishing all installation steps, click **Finish** to complete the installation as **Figure 2-2**.

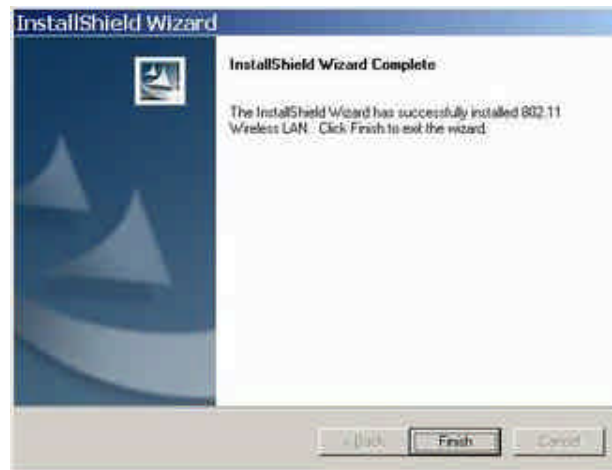


Figure 2-2

6. Insert the PC Card into the PCMCIA slot of your computer and wait for the Found New Hardware Wizard dialog box to display.
7. During the installation, the driver and utility will both been installed into the system, so please select **Install the software automatically (Recommended)** as shown in **Figure 2-3** and click **Next** to search the driver installation file.



Figure 2-3

8. Then the system will find the driver and start to install as shown in **Figure 2-4**.

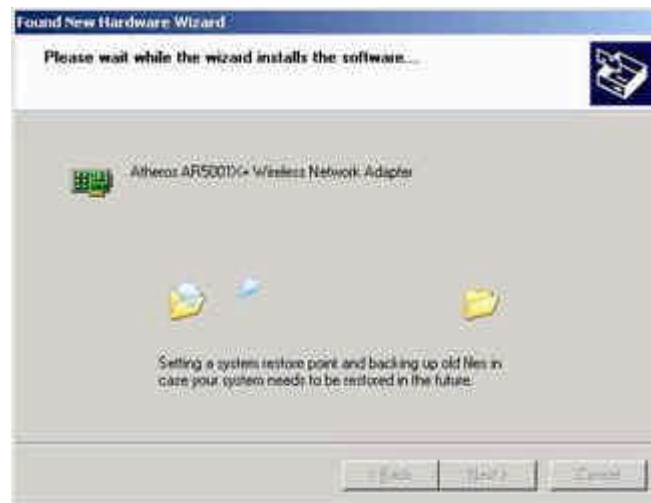


Figure 2-4

9. The driver currently does not have a digital signature from Microsoft. Therefore, Windows 2000/XP will show a warning message. Click **Yes** to proceed with driver installation.

10. Click **Finish** to complete the driver installation as shown in **Figure 2-5**.



Figure 2-5

## 2- 2 Checking after Installation

After installing the driver and utility, follow the steps below to check that the PC Card is operating correctly.

1. Click the **Start** button, select **Settings**, and then click **Control Panel**.
2. In the **Control Panel** window, double-click the **System** icon, then select the **Device Manager** tab.
3. Double-click **Network adapters**, then select **Wireless Network Adapter** as shown in **Figure 2-6**.

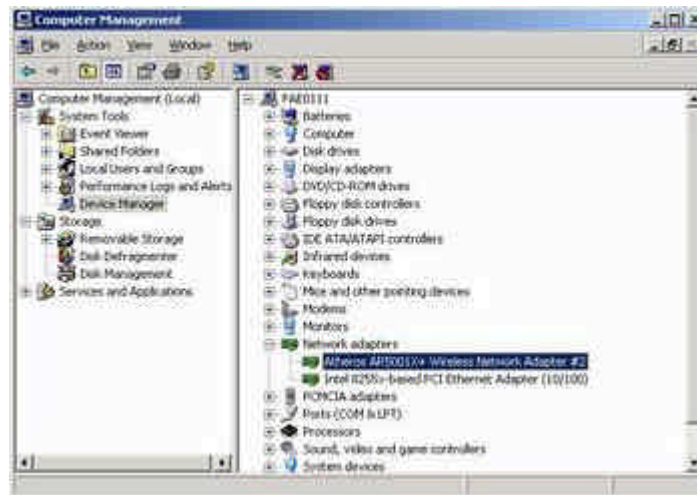


Figure 2-6

4. Right mouse and click the **Properties** button, then check the message. **This device is working properly** is displayed for Device status as shown in **Figure 2-7**.



Figure 2-7

5. If you find the Yellow (?) sign on the adapter or the above message is not displayed, it shows the installation is not successful or the wireless LAN PC Card is not operating properly. Uninstall and re-install the driver, referring to Chapter 2-4 Uninstalling Driver and Utility.

## 2- 3 IEEE 802.11 WLAN NIC Client Utility

Use the WLAN NIC Client Utility to configure the device driver. Access the Utility by clicking the Start button and choosing Programs > IEEE 802.11 > ACU. The ACU tray icon is displayed in the right side of the Toolbar. Launch the ACU by double-clicking the tray icon, or by right-clicking the tray icon and selecting **Launch Client Utility ...**

WLAN Client Utility is used to display or change the PC Card information about **Current Status, Profile Management and Diagnostics**. The client utility will be installed automatically after installing the driver and utility. After finishing installing the driver and utility, the client utility will automatically be executed and show a small icon at the right corner of **Taskbar** whenever the PC Card is inserted into the PC Card slot of your computer. You can click the tabs on the top of the windows to select various screen messages as shown in **Figure 2-8**.

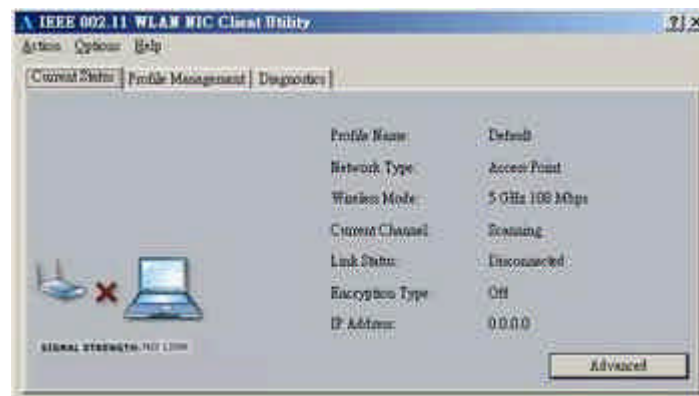


Figure 2-8

The tool bar provides three functions of Action, Option and Help.

**Action** : the **Disable Radio** function is used to break down the wireless connection, the **Country Select...** is used to select suitable country code for the utility and if you don't want to see icon shown in Taskbar, you can use **Disable Tray Icon** function to hide the icon.

**Option** : you can use **Display settings** to change Signal Strength Display Units, Refresh Interval and Data Display settings.

**Help** : click About IEEE 802.11 Client Utility... function to get related information of the Client Utility.

Except for tool bar's function, the Utility also provides Current Status, Profile Management and Diagnostics three main function page for configuration.

Below we explain the use and meanings of the various screen messages.

### 1. Current Status

In Current Status, it will provides user information of Profile Name, Network Type, Wireless Mode, Current Channel, Link Status, Encryption and IP Address. If you click **Advanced** button, it will pop advanced status as shown in **Figure 2-9**, and in Advanced Status, it provide user information of Country, Transmit Power Level, Network Name (SSID), Power Save Mode, Frequency, Transmit Rate and Receive Rate.



Figure 2-9

## 2. Profile Management

In Profile Management, it provides function to New, Modify, Remove or Activate an Profile settings as shown in **Figure 2-10**. With default status, the profile will be empty and you have to click **New** button to add an profile settings and if there exist Profile file, we can use **Modify** button to change settings or use **Remove** button to erase file or **Activate** button to activate another profile settings.

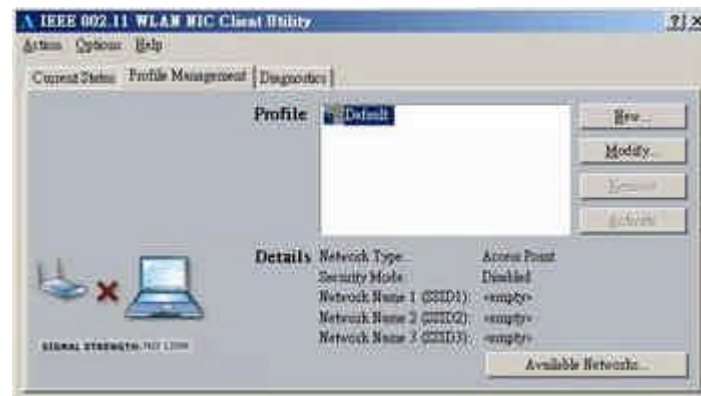


Figure 2-10

After click **New** button, it will pop Profile Management window including General, Security and Advanced three configuration pages.

**In General page** : type the desirable profile name into the Profile Name field and the known SSID into the Network field.

**In Security page** : the default value is Disable and we provide Pre-Shared Keys, LEAP and Externally Managed 802.1x Keys for selection.

**In Advanced page** : you can set Power Save Mode, Network Type, 802.11 Preamble, Transmit Power Level and Wireless Mode in this page.

In Profile Management, it also provides **Available Networks....** for the user to get information of available AP and Ad Hoc Networks as shown in **Figure 2-11**.

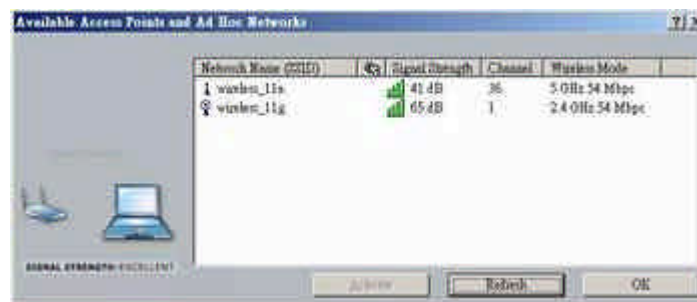


Figure 2-11

### 3. Diagnostics

In Diagnostics, it provides statistics of Multicast Frames, Broadcast Frames, Unicast Frames and Total Bytes for **Transmit** and **Receive** as shown in **Figure 2-12**.



Figure 2-12

In **Advanced Statistics**, it provides more advanced information for reference as shown in **Figure 2-13**.



Figure 2-13

In **Driver Information**, it provides information of Card Name, MAC Address, Driver, Driver Version and Driver Date as shown in **Figure 2-14**.



Figure 2-14

## 2- 4 Uninstalling Driver and Utility

If the PC Card installation is unsuccessful for any reason, the best way to solve the problem may be to completely uninstall the PC Card and its software and repeat the installation procedure again.

1. Click the **Start** button, select **Settings**, and then click **Control Panel**.
2. In the **Control Panel** window, double-click the **Add or Remove Programs** icon, then select the 802.11 Wireless LAN item and remove the driver and utility as shown in **Figure 2-15**.



Figure 2-15

3. Select **Remove** in InstallShield Wizard and click **Next** to start to remove driver then click **Finish** to complete driver and utility uninstallation as shown in **Figure 2-16**.

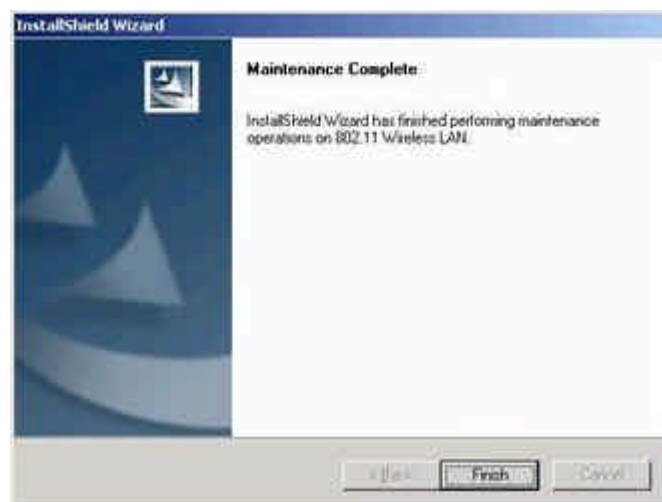


Figure 2-16

## Chapter 3 Connecting to a Network

This chapter describes how to prepare for connection to network after installing the PC Card drivers and utility. The following is required for all computers if you want to connect to a network.

1. Check Client to see if Microsoft Networks is installed.
2. Check if NetBEUI -> Wireless LAN PC Card is installed.
3. Check to see if TCP/IP -> Wireless LAN PC Card is installed.
4. Check file and printer sharing for Microsoft Networks.
5. Check computer name and workgroup name.

### 3-1 Checking and Adding Client for Microsoft Networks

The Client for Microsoft Networks enables you to connect to other Microsoft Windows computers and servers and use the files and printers shared on them. If you work in a Microsoft Networks environment, you need to set up Client for Microsoft Networks.

After finishing installation of the driver & utility and rebooting the computer as described in Chapter 2, the computer will show a dialog box titled Enter Network Password dialog box. Enter your password if it had been set or just click Cancel.

Click Start button, select Settings and then click Control Panel to open the Control Panel window.

In the Control Panel window, double-click the Network icon to open the Network dialog box.

Select Configuration tab to check if Client for Microsoft Networks is installed as shown in **Figure 3-1**. If it isn't, click the Add or Install button. Select Client and click the Add button.



Figure 3-1

Select Microsoft as the "Manufacturer" and "Client for Microsoft Networks," as the Network Client, and then click OK.



## 3-2 Checking and Adding NetBEUI

NetBEUI is a protocol you can use to connect to Windows NT, Windows for Workgroups, or LAN Manager servers. If you work in a Microsoft Networks environment, you need to set up NetBEUI protocol.

Repeat step 2 and 3 of Chapter 3-1 Checking and Adding Client for Microsoft Networks. Select Configuration tab to check if NetBEUI -> Wireless LAN PC Card is installed. If not, click the Add or Install button. Follow same instructions for this part, as above:

Select Protocol and click the Add button. Select Microsoft for Manufacturer and NetBEUI for Network Protocol, and then click OK.

## 3-3 Checking and Adding TCP/IP

TCP/IP is the protocol you use to connect to the Internet and wide-area networks. If you want to connect to Internet, you need to set up TCP/IP protocol.

Repeat the step 2 and 3 of Chapter 3-1 Checking and Adding Client for Microsoft Networks. Select Configuration tab to check TCP/IP -> Wireless LAN PC Card is installed. If no, click the Add or Install button. Select Protocol and click the Add button. Select Microsoft for Manufacturer and TCP/IP for Network Protocol, and then click OK.

If yes, double-click TCP/IP -> Wireless LAN PC Card to open TCP/IP properties as shown in **Figure 3-2**. Due to different network applications there are many different settings here. You can select either Obtain an IP address automatically or Specify an IP address. If you use the Specify an IP address, then you need to enter an IP address, Subnet Mask, Gateway IP address, and DNS Server IP address for connecting to the Internet.



Figure 3-2

## 3-4 Checking and Adding File and Printer Sharing for Microsoft Networks

File and printer sharing for Microsoft networks gives you the ability to share your files or printers with Windows NT and Windows for Workgroups computers. If you want to share your files or printers with Microsoft networks, you need to set up this service.

Repeat step 2 and 3 of Chapter 3-1 Checking and Adding Client for Microsoft Networks. Select Configuration tab to check if File and Printer Sharing for Microsoft Networks is installed. If it isn't, click the File and Printer Sharing button.

In the File and Print Sharing window, select what you need, and click OK. Select File and Printer Sharing for Microsoft Networks, and then click OK.

## 3-5 Checking and Adding Computer Name & Workgroup Name

Windows uses the computer name and workgroup name to identify your computer on the network. Please enter an unique name for your computer, the workgroup it will appear in, and a short description of the computer.

In Windows 98SE/ME, Repeat step 2 and 3 of Chapter 3-1 Checking and Adding Client for Microsoft Networks. Select Identification tab or User Information tab to check if the computer name, workgroup name and computer description are entered. If it isn't, enter a computer name and a workgroup name and then click OK. The description field may be left blank. If you want to share data with other computers , all of you must have the same workgroup name.

In Windows 2000/XP, Click **Start > Settings > Control Panel**. Select **System**, select **Computer Name** page as shown in **Figure 3-3**.

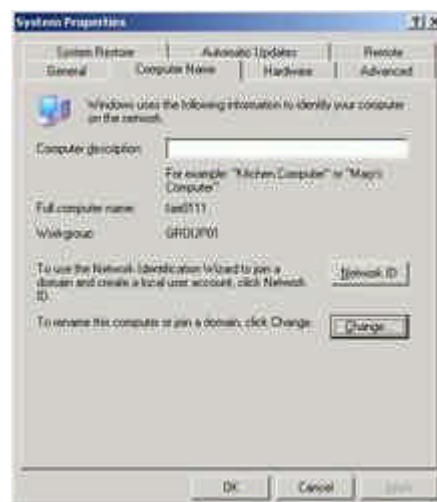


Figure 3-3

Then click **Change...** button to rename the computer or join a Domain or a Workgroup as shown in **Figure 3-4**.



Figure 3-4

## Chapter 4 Troubleshooting

This chapter describes the problems that may occur when installing a PC Card and their corresponding solutions.

Symptom	Solution
Windows does not detect the PC Card when installed.	<p>Verify that the PC Card is properly inserted into the PC Card slot.</p> <p>Check whether the computer has a Plug and Play BIOS.</p> <p>Windows 95/98/ME/2000/XP might not detect the PC Card if a previous installation of the PC Card was cancelled before it was finished.</p> <p>Remove the previous driver, and perform the installation again.</p>
Driver fails to load	<p>A resource conflict could exist.</p> <p>For Windows 95/98/ME/2000, use the <b>Device Manager</b> to resolve resource conflicts.</p> <p>Select <b>System</b> from the <b>Control Panel</b>, then click on the <b>Device Manager</b> tab.</p>
Device conflict on a Windows system	<p>A device conflict under Windows 95/98/ME/2000 may be related to the PC Card.</p> <p>For Windows 95/98/ME/2000, use the Computer properties to identify the used I/O port addresses and IRQ values.</p> <p>If there is a device conflict, select alternative settings for I/O Base Address or IRQ values. If you know which device is conflicting with the PC Card, you have the option of changing that device's I/O address or IRQ instead of changing the PC Card.</p>

No resource conflicts were detected, but the wireless station does not attach to the network	<p>Verify that the <b>SSID</b> of the PC Card matches that of the access point. Use the <b>Network Configuration Properties Application</b> in the <b>Control Panel</b> to modify the <b>SSID</b>.</p> <p>Verify that the <b>Network Mode</b> of the PC Card is configured correctly.</p>
----------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Nonfunctioning card LED	<p>The PC Card is not powered on. The cause may be:</p> <ul style="list-style-type: none"> <li>• No Driver loaded or installed.</li> <li>• Card – Driver mismatch which prevented the driver from loading.</li> <li>• Device conflict which prevented the driver from loading.</li> </ul> <p>Actions:</p> <ul style="list-style-type: none"> <li>• Verify that a driver has been installed.</li> <li>• Determine if there is a conflict with another device.</li> </ul>
Weak signal or intermittent connection.	<p>Try reorienting the antenna. The PC Card antenna is attached to the end of the PC Card. For best use of the antenna:</p> <p>Keep the area around the antenna clear from materials that could block radio transmission, such as metal objects, electronic devices, and cordless telephones.</p> <p>If your signal is weak, change the direction of the antenna slightly.</p> <p>If necessary, move your notebook computer a few inches to find a better signal.</p> <p>Use the Link Quality and Signal Strength display in the <b>Client Utility</b> to determine the best location and orientation for a network connection.</p>

## Appendix A Product Specifications

### 1. IEEE802.11a

General	
Media Access Control	CSMA/ CA
Compatibility	IEEE802.11a & Wi-Fi5 Compliant
Regulations	FCC Part 15/UL, ETSI 300/328/CE
Operating Voltage	3.3V/5V
Radio, Frequency and Output Power	
Data Transfer Rate	6,9,12,18,24,36,48,54Mbps 72,96,108Mbps in <b>Turbo</b> mode
Frequency Band	5.150 - 5.350 GHz
	5.250 - 5.350 GHz
	5.725 - 5.825 GHz
Modulation	OFDM (64-QAM, 16-QAM, QPSK , BPSK)
Channels	<b>FCC</b> : 12 non-overlapping channels
	<b>CE</b> :19 non-overlapping channels
	<b>TELEC</b> : 4 non-overlapping channels
Output Power	<b>Up to 18dBm</b>
Sensitivity	-81dBm @ 6Mbps   -79dBm @ 18Mbps   -71dBm @ 48Mbps
	-80dBm @ 9Mbps   -78dBm @ 24Mbps   -68dBm @ 54Mbps
	-79dBm @ 12Mbps   -76dBm @ 36Mbps
Network Information	
Network Architecture	Support <b>Ad-hoc</b> networks and <b>Infrastructure</b> communications to wired Ethernet networks via Access Point
Drivers	Windows 98/ME/2000/XP
Security	IEEE802.1x with EAP-TLS, EAP-TTLS and EAP-MD5,

	WEP (64, 128, 152bit) and AES Support
<b>Environmental Specifications</b>	
Temperature Range	-10°C to 60°C (14°F to 140°F) - Operating -40°C to 70°C (-40°F to 158°F) - Storage
Humidity (non-condensing)	5%~ 95% Typical
<b>Physical Specifications</b>	
Interface	32-bit CardBus PC Card Standard V7.1 Type II
Dimensions (H*W*L)	118(L) mm x 54(W) mm x 7.5(H) mm ( 4.65(L) in x 2.13(W) in x 0.30(H) in )
Weight	45 g ( 0.1 lb )

## 2. IEEE802.11g

<b>General</b>	
Data Rates	<b>802.11g</b> : 6, 9, 12, 18, 24, 36, 48 & 54Mbps. <b>802.11b</b> : 1, 2, 5.5, 11Mbps.
Network Standards	IEEE 802.11g draft, IEEE 802.11b, IEEE 802.11
Compliance	FCC Part 15/UL, ETSI 300/328/CE
Drivers	Windows 98/ME/2000/XP
Operational voltage	3.3/5 V
Security	IEEE802.1x Support for LEAP (Optional) WPA - Wi-Fi Protected Access (64,128,152-WEP with TKIP, Shared Key Authentication) AES (Advance Encryption Security) Support
<b>RF Information</b>	
Frequency Band	2.412~2.462GHz(US) 2.412~2.484GHz(Japan) 2.412~2.472GHz(Europe ETSI) 2.457~2.462GHz(Spain)

	2.457~2.472GHz(France)
Channels	11 for North America, 14 for Japan, 13 for Europe, 2 for Spain, 4 for France
Media Access Protocol	Carrier sense multiple access with collision avoidance (CSMA/CA)
Modulation Technology	<b>802.11g</b> : OFDM (64-QAM, 16-QAM, QPSK, BPSK) <b>802.11b</b> : DSSS (DBPSK, DQPSK, CCK)
Receive Sensitivity (Typical)	-91dBm @ 1Mbps    -83dBm @ 12Mbps -89dBm @ 2Mbps    -82dBm @ 18Mbps -89dBm @ 5.5Mbps    -79dBm @ 24Mbps -84dBm @ 6Mbps    -77dBm @ 36Mbps -84dBm @ 9Mbps    -74dBm @ 48Mbps -87dBm @ 11Mbps    -71dBm @ 54Mbps
Transmit Output Power (Typical)	<b>802.11g</b> : Up to 18dBm <b>802.11b</b> : Up to 21dBm
<b>Physical</b>	
LED	RF Link activity
Interface	32-bit CardBus PC Card Standard V7.1 Type II
Antenna	Integrated built-in diversity Antenna
Dimensions (HxWxL)	6.3mm x 54mm x 118mm ( 0.30in x 2.13in x 4.65in)
<b>Environmental</b>	
Temperature Range	-10°C to 60°C (14°F to 140°F) - Operating -40°C to 70°C (-40°F to 158°F) - Storage
Humidity (non-condensing)	5%~95% Typical



### 3. IEEE802.11a/b

General		
Media Access Control	CSMA/ CA	
Compatibility	WECA (Wi-Fi & Wi-Fi5) Compliant  IEEE802.11a & IEEE802.11b Compliant	
Regulations	FCC Part 15/UL, ETSI 300/328/CE	
Operating Voltage	3.3V/5V	
Radio, Frequency and Output Power		
Data Transfer Rate	6,9,12,18,24,36,48,54Mbps	1,2,5.5&11Mbps
	72,96,108Mbps for <b>Turbo</b> mode	Auto-Fallback
Frequency Band	5.150 - 5.350 GHz, 5.250 - 5.350 GHz  5.725 - 5.825 GHz	2.412 - 2.484GHz
Modulation	OFDM  (64-QAM, 16-QAM, QPSK, BPSK)	DSSS  (CCK, BPSK, QPSK)
Channels	<b>U.S:</b> 12 non-overlapping channels  <b>Europe:</b> 19 non-overlapping channels  <b>Japan:</b> 4 non-overlapping channels	3 non-overlapping  channels
Output Power	<b>Up to 18dBm</b>	<b>Up to 21dBm</b>
Network Information		
Network Architecture	Support <b>Ad-hoc</b> networks(without via Access Point) and <b>Infrastructure</b> communications to wired Ethernet networks via Access Point	
Drivers	Windows 98SE/ME/2000/XP	
Security	IEEE802.1x with EAP-TLS, EAP-TTLS and EAP-MD5,  WEP (64, 128, 152bit) and AES Support	

## Environmental Specifications

Temperature Range	-10°C to 60°C (14°F to 140°F) - Operating -40°C to 70°C (-40°F to 158°F) - Storage
Humidity (non-condensing)	5%~ 95% Typical

## Physical Specifications

Interface	32-bit Cardbus PC Card
Dimensions (H*W*L)	118(L) mm x 54(W) mm x 7.5(H) mm ( 4.65(L) in x 2.13(W) in x 0.30(H) in )
Weight	40 g ( 0.09lb )

### 4. IEEE802.11a/g

## General

Data Rate (Auto-rate capable)	<b>802.11a :</b> 6, 9, 12, 18, 24, 36, 48, 54 & 108Mbps turbo mode. <b>802.11g :</b> 6, 9, 12, 18, 24, 36, 48 & 54Mbps. <b>802.11b :</b> 1, 2, 5.5, 11Mbps.
Network Standards	WECA (Wi-Fi & Wi-Fi5), IEEE802.11, IEEE802.11a, IEEE802.11g draft, IEEE802.11b, draft IEEE 802.11e, f, h, and i standards, IEEE802.11x(Optional)
Compliance	FCC Part 15/UL, ETSI 300/328/CE
Drivers	Windows 98/ME/2000/XP
Operational voltage	3.3/5 V
Security	<ul style="list-style-type: none"> <li>IEEE802.1x Support for LEAP (Optional)</li> <li>WPA - Wi-Fi Protected Access (64,128,152-WEP with TKIP)</li> <li>AES (Advance Encryption Security) Support</li> </ul>

## RF Information

Frequency Band	<b>802.11a</b> <ul style="list-style-type: none"> <li>5.15~5.25GHz</li> <li>5.25~5.35GHz</li> <li>5.725~5.825GHz</li> </ul> <b>802.11b/g</b> <ul style="list-style-type: none"> <li>2.412~2.462GHz(US)</li> <li>2.412~2.484GHz(Japan)</li> <li>2.412~2.472GHz(Europe ETSI)</li> <li>2.457~2.462GHz(Spain)</li> <li>2.457~2.472GHz(France)</li> </ul>
Media Access Protocol	CSMA/CA with ACK
Modulation Technology	<b>802.11a/g</b> : OFDM (64-QAM, 16-QAM, QPSK, BPSK) <b>802.11b</b> : DSSS (DBPSK, DQPSK, CCK)
Receive Sensitivity (Typical)	<b>802.11a</b> : -81dBm @6Mbps -79dBm @ 18Mbps -71dBm @ 48Mbps -80dBm @9Mbps -78dBm @ 24Mbps -68dBm @ 54Mbps -79dBm @ 12Mbps -76dBm @ 36Mbps <b>802.11b/g</b> : -91dBm @ 1Mbps -87dBm @ 11Mbps -74dBm @ 48Mbps -89dBm @ 2Mbps -83dBm @ 12Mbps -71dBm @ 54Mbps -89dBm @ 5.5Mbps -82dBm @ 18Mbps -84dBm @ 6Mbps -79dBm @ 24Mbps -84dBm @ 9Mbps -77dBm @ 36Mbps
Transmit Output Power	<b>802.11a/g</b> : Up to 18dBm <b>802.11b</b> : Up to 21dBm
<b>Physical</b>	
LED	RF Link activity
Interface	32-bit CardBus PC Card Standard V7.1 Type II
Antenna	Integrated built-in diversity Antenna
Dimensions (HxWxL)	6.3mm x 54mm x 118mm ( 0.30in x 2.13in x 4.65in)
<b>Environmental</b>	
Temperature Range	-10°C to 60°C (14°F to 140°F) - Operating

	-40°C to 70°C (-40°F to 158°F) - Storage
Humidity (non-condensing)	5%~95% Typical

All specifications are subject to change without notice.

## Appendix B Regulatory Compliance Information

### Radio Frequency Interference Requirements

This device complies with Part 15 of FCC Rules and Canada RSS-210.

Operation is subject to the following conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.
3. To comply with RF safety requirements, you must maintain a distance of 20 cm from the antenna when operating the device.
4. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
5. Since the module is installed inside the end product, a label showing that the product contains a RF module should be affixed on the end product in a visible area. This label should also show the FCC ID.

### Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules; these limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. Thus, if it is not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, (which can be determined by turning the equipment off and on), the user is encouraged to try to correct the interference by one of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

**FCC Caution:** To assure continued compliance, (example – use only shielded interface cables when connecting to computer or peripheral devices). Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.