

Wireless PC Card

User's Manual



Version 1.5

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Electronic Emission Notices

This device complies with Part 15 of the FCC Rules and Canada RSS-210. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Radio Frequency 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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his expense. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio.

To assure continued compliance, any changes or modifications not expressly approved by Manufacturer could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement

This device and its antennas must operate with a separation distance of at least 5 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End users must be provided with specific operating instructions for satisfying RF exposure compliance.



This product has been certified in Canada, France, Germany, Italy, Spain, Sweden, Taiwan, UK, and US.

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1. INTRODUCTION

Wireless LAN is local area networking without wires, which uses radio frequencies to transmit and receive data between PC's or other network devices. Wireless LAN is able to configure independent networks and infrastructure networks. The former is suitable for small or temporary peer-to-peer configurations, and the later is offering fully distributed data connectivity via micro cells and roaming.

The Wireless PC Card is designed to meet the mobility, performance, security, interoperability, management, and reliability requirements of IEEE 802.11b high data rate standard. It is easy to install the Wireless PC Card on various devices with PCMCIA type II card slot. It is able to communicate with other IEEE 802.11b compatible products to create a wireless LAN in your office or home.

1.1 Features

- Compliant with 11 Mbps 802.11b high-speed specification.
- Data rate 11/5.5/2/1 Mbps automatic fallback under noisy environment.
- Advanced Power Management for battery saving.
- Build-in PCB patch diversity antennas.
- Supports Windows 95/98/ME/NT/2000/XP/CE, and Linux.
- Interoperable with IEEE 802.11b compliant equipment.
- Supports full mobility and seamless roaming from cell to cell.
- Plug-and-play installation and easy client management with utility software.
- Supports point-to-point and point-to-multipoint access.
- Direct Sequence Spread Spectrum (DSSS) technology provides robust, interference-resistant and secure wireless connection.
- Wireless connection without the hassles and cost of cabling.
- Greater flexibility to locate or move networked PC's.

1.2 Applications

- Home networking for device sharing - Remote access to corporate network information email, file transfer and terminal emulation.
- Frequently changing environments - Retailers, manufacturers and banks that frequently rearrange the workplace and change location.
- SOHO (Small Office and Home Office) users - SOHO users need easy and quick installation of a small computer network.
- Inter-building connection - The wireless building-to-building network installs quickly, requires no monthly lease fees, and provides the flexibility to reconfigure easily.
- Typical applications include hard-to-wire buildings, campuses, hospitals/medical offices, warehouse, security huts, exhibition centers, etc.
- Temporary LANs for special projects or peak time - Auditors require workgroups at customer sites. Trade shows, exhibitions, retailers, airline, and shipping companies need additional workstations for a peak period.

1.3 Wireless LAN System

1.3.1 802.11 Ad-Hoc Configuration

An 802.11 Ad-Hoc wireless LAN is a group of computers, each equipped with one Wireless PC Card, connected as an independent wireless LAN. Computers in a specific 802.11 Ad-Hoc wireless LAN must be configured at the same radio channel. 802.11 Ad-Hoc wireless LAN is applicable to a departmental scale for a branch or SOHO operation.

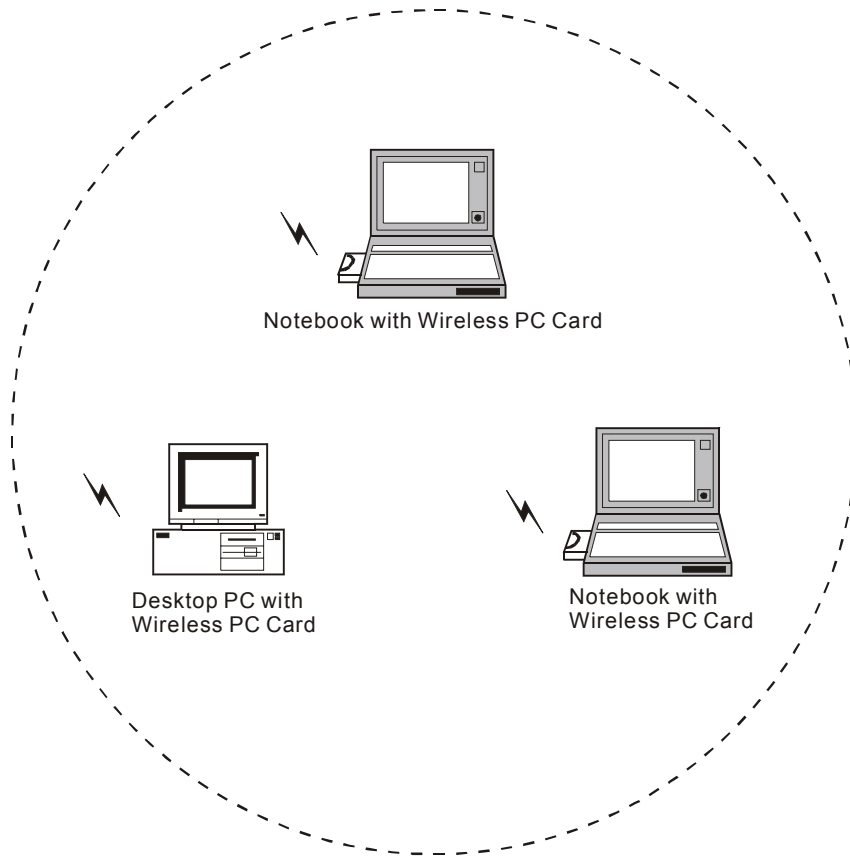


Figure 1. 802.11 Ad-Hoc Configuration

1.3.2 Infrastructure Configuration

An integrated wireless and wired LAN is called an infrastructure configuration. A group of Wireless PC Cards and an Access Point (AP) is called a Basic Service Set (BSS). Each Wireless PC Card in this BSS can be linked to any computer in the wired LAN infrastructure via the AP.

Infrastructure configuration not only extends the accessibility of a Wireless PC Card to the wired LAN, but also doubles the effective wireless transmission range between two Wireless PC Cards.

BSS ID is, in essential, the ID of each independent Wireless PC Card. All Wireless PC Cards configured without roaming options in this independent BSS must be configured with BSS ID of that AP. You may need to check BSS ID of your AP by using its vendor supplied program.

Infrastructure configuration is applicable to enterprise scale for wireless access to central database, or wireless application for mobile workers.

Two APs can be used as a point-to-point link between two LANs. LAN interconnection is applicable to a wireless backbone between buildings.

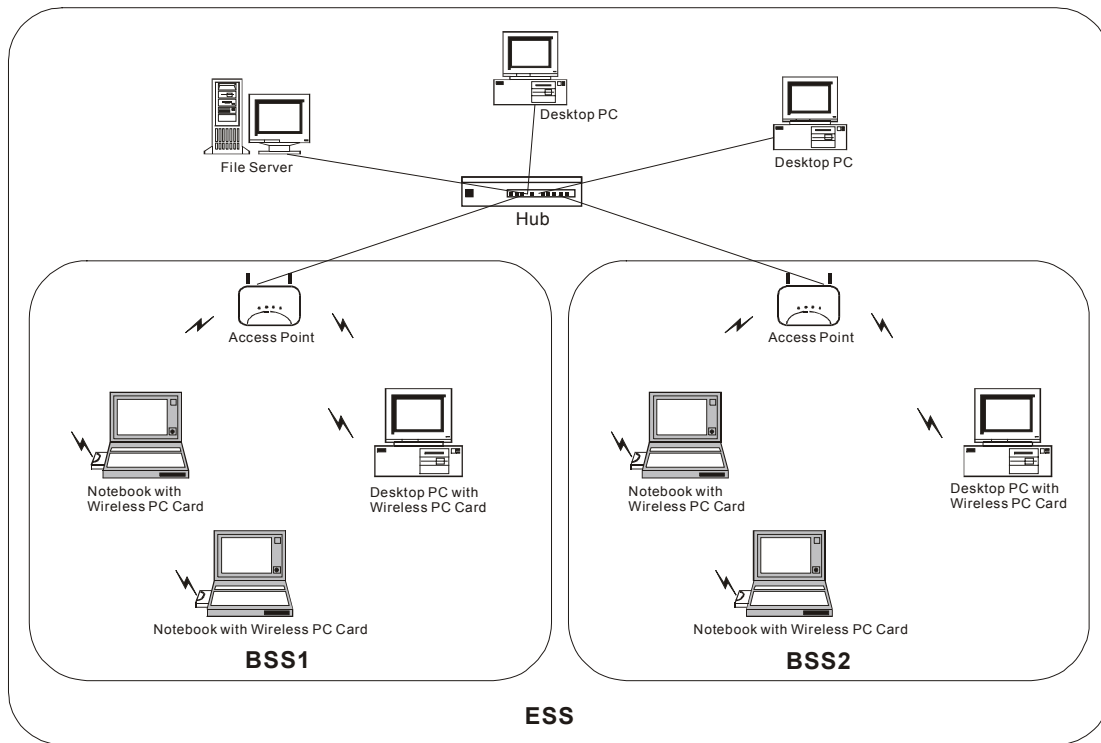


Figure 2. Infrastructure Configuration

The infrastructure configuration supports roaming capability for mobile workers. More than one BSS can be jointly configured as an Extended Service Set (ESS). On account of a continuous connection to the network, users within this ESS can roam freely. All Wireless PC Cards and APs within one ESS must be configured with the same ESS ID.

Before setting up an ESS for roaming, it would be helpful to achieve good performance by choosing a feasible radio channel and right places for APs.

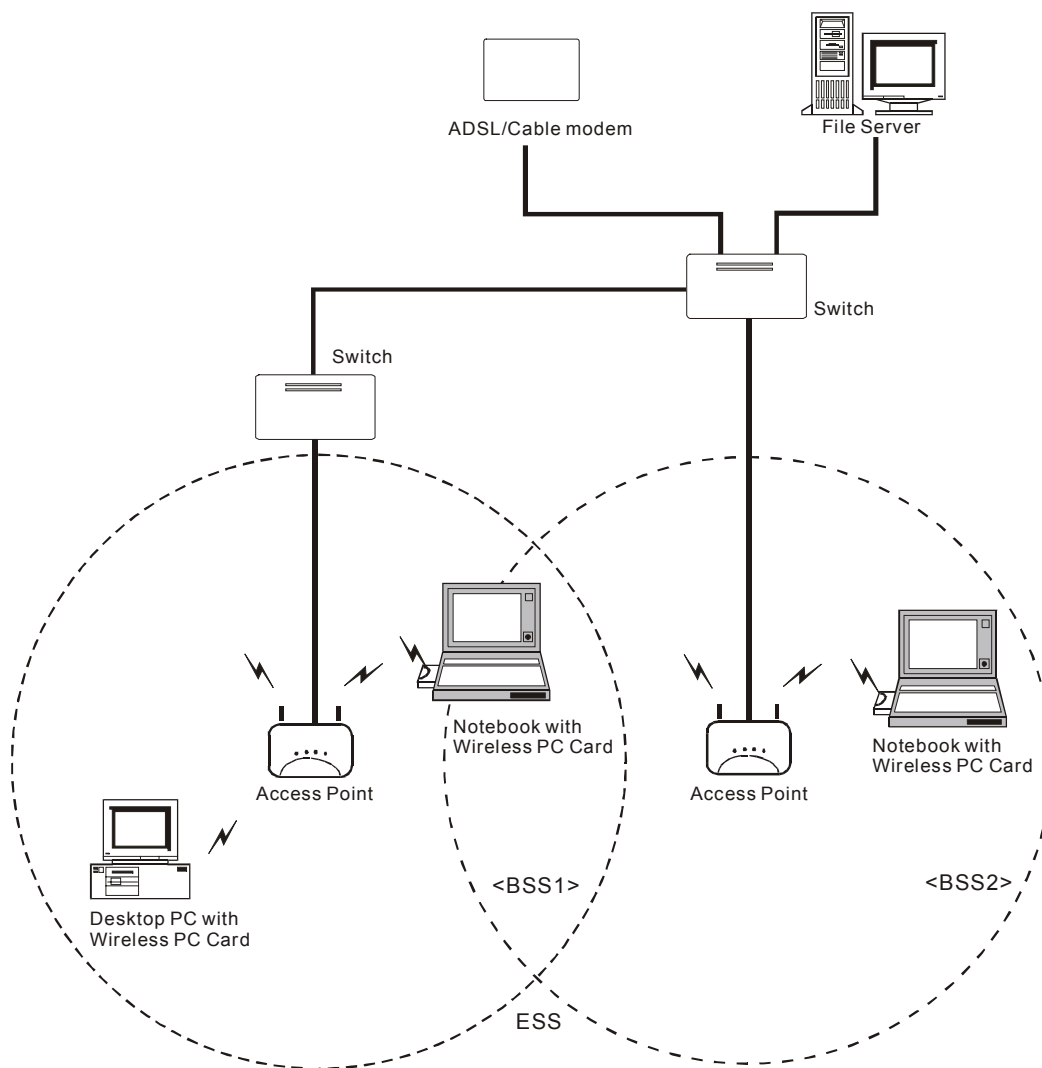


Figure 3. Seamless Roaming

2. INSTALLATION

2.1 Product Kit

Before starting installation, please make sure the Wireless PC Card package you purchased includes the following three items:

- 1) Wireless PC Card.
- 2) CD-ROM (containing Driver/Utility, and User's Manual).
- 3) Quick Start Guide.

If anything is missing, please contact your vendor.

2.2 PC's Minimum Requirements

To install the Wireless PC Card successfully, your PC (notebook, desktop, or PDA) should meet the following minimum requirements:

- 1) A PCMCIA slot complying with Release 2.1 of the PCMCIA specification.
- 2) Windows 95, 98, ME, NT, 2000, XP, CE, or Linux operating system.
- 3) Minimum 5 Mbytes free disk space for installing the driver and the utility program.

2.3 Insert and Remove

Insert

Insert the Wireless PC Card into PC's PCMCIA slot in the right direction, and push it gently into position. Note that the side marked with "INSERT THIS SIDE UP" should face up. The Wireless PC Card is designed for plug-and-play, you may directly plug it into a PC no matter it's powered ON or OFF.


Remove

Directly remove the Wireless PC Card from your PC (except PDA) may cause operating system failure. Please click the PCMCIA icon in the task bar first, and then follow the instruction steps. Finally, press the release lever or button on PCMCIA slot to free the card when the PC indicates it's safe to remove.


2.4 Install Driver and Utility

Depending on the operation system you use, please select one of the sections (2.4.1 ~ 2.4.5) and follow the steps to install the Driver and the Utility. After that, please go to Section 3 to continue the procedure.


2.4.1 Under Windows 95

- 1) Insert Wireless PC Card and turn on your PC.
- 2) Your PC should detect the inserted Wireless PC Card automatically and display "New Hardware Found" on the display box.
- 3) Put Driver/Utility CD-ROM in the CD-ROM drive.
- 4) The driver installation procedure will guide you through the steps standard for Windows 95. Select "Win95&NT" when you are asked to provide the directory path information.
- 5) Restart your PC. After the system is ready, the LED on the Wireless PC Card should be ON within a few seconds. Otherwise, please check and fix the problem first.
- 6) Run \Win95&NT\Setup.exe in the CD-ROM.
- 7) Follow the prompted instructions to finish the installation.
- 8) Restart your PC again.
- 9) A new utility icon  will be displayed in the task bar.
- 10) Please go to Section 3 for Configuration.

2.4.2 Under Windows 98/ME/2000/XP

- 1) Insert Wireless PC Card and turn on your PC.
- 2) Your PC should detect the inserted Wireless PC Card automatically and display “New Hardware Found” on the display box.
- 3) Put Driver/Utility CD-ROM in the CD-ROM drive.
- 4) The driver installation procedure will guide you through the steps standard for your operating system.
- 5) Restart your PC. After the system is ready, the LED on the Wireless PC Card should be ON within a few seconds. Otherwise, please check and fix the problem first.
- 6) Run \Windows\Setup.exe in the CD-ROM.
- 7) Follow the prompted instructions to finish the installation.
- 8) Restart your PC again.
- 9) A new utility icon  will be displayed in the task bar.
- 10) Please go to Section 3 for Configuration.

2.4.3 Under Windows NT

- 1) Insert Wireless PC Card and turn on your PC.
- 2) Put Driver/Utility CD-ROM in the CD-ROM drive.
- 3) Run \Win95&NT\Setup.exe in the CD-ROM.
- 4) The driver installation procedure will guide you through the steps.
- 5) When prompt, select DHCP if your LAN provides DHCP server, otherwise input IP address.
- 6) Restart your PC. After the system is ready, the LED on the Wireless PC Card should be ON within a few seconds. Otherwise, please check and fix the problem first.
- 7) Windows NT does not support PnP function. In case of detecting devices conflict, you have to assign an unused IRQ to the Wireless PC Card. Click “Start”, “Settings”, “Control Panel”, “Network”, “Interface Card”, “PRISM IEEE 802.11b Adapter”, and “Property”. Set the IRQ Level to an unused IRQ. Click OK and restart your PC.
- 8) A new utility icon  will be displayed in the task bar.
- 9) Please go to Section 3 for Configuration.

2.4.4 Under Windows CE

- 1) Please make sure the Wireless PC Card is not in PCMCIA slot before you proceed to the next step.
- 2) Connect your PDA to a desktop/notebook PC with Microsoft ActiveSync running.
- 3) Put Driver/Utility CD-ROM in the CD-ROM drive on your desktop/notebook PC.
- 4) From your desktop/notebook PC, copy the file wlansetup.arm.CAB in subdirectory WinCE to PDA.
- 5) At your PDA, click Start, Programs, and File Explorer to find the wlansetup.arm.CAB. Click it to start the installation wizard.
- 6) Insert the Wireless PC Card into PDA's PCMCIA slot in the right direction, and push it gently into position.
- 7) A TCP/IP dialog box will be popped up.
- 8) Input the proper values for the TCP/IP configuration. Click OK when complete. Please note that these values should be absolutely correct. Otherwise, you still can not link up to the network when you complete all the procedures.
- 9) Please go to Section 3 for Configuration.

2.4.5 Under Linux


- 1) For Linux distribution kernel 2.2 earlier, please select source code “pcmcia-cs-3.1.29.tar.gz” located on CD-ROM Linux directory to install the wireless LAN card driver.
- 2) Edit “/etc/pcmcia/network.opts” option file to setup network properties (IP address, gateway and DNS) of PCMCIA Network Card.
- 3) Restart your PC. After the system is ready, the LED on the Wireless PC Card should be ON within a few seconds. Otherwise, please check and fix the problem first.
- 4) Please go to Section 3 for Configuration.

3. CONFIGURATION

After you have completed the Installation process of Section 2 successfully, please follow this section to configure the Wireless PC Card in order to connect to an existing wireless LAN. You shall configure the Wireless PC Card based on the existing wireless LAN configuration -- 802.11 Ad-Hoc or Infrastructure. Depending on the operation system you use, please follow the steps described in the corresponding section to configure the Wireless PC Card. If you are not familiar with the basics of "802.11 Ad-Hoc" or "Infrastructure", please refer to Section 1.3.

The procedure in this section allows you to link up with LAN network, to check status, and to change the working mode (IEEE 802.11 Ad-Hoc or Infrastructure).

3.1 Under Windows 95/98/ME/NT/2000/XP

Click the icon  in the task bar to show up the "Wireless LAN Configuration Utility". This Utility contains four tabs -- Link Info, Configuration, Encryption, and About. "Link Info" and "About" are only for your information, but you have to set some parameters in "Configuration" and "Encryption" tabs. The following sections (3.1.1 ~ 3.1.4) describe the detailed information of these tabs.

3.1.1 Link Info

"Link Info" tab provides the following six link information between the Wireless PC Card and the AP.

- 1) State: MAC address of AP, where the Wireless PC Card is connecting.
- 2) Current Channel: The channel currently used between AP and Wireless PC Card.
- 3) Current Tx Rate: The transmit rate currently selected by AP and Wireless PC Card.
- 4) Throughput: Transmit/Receive data flow rate.
- 5) Link Quality: Excellent, Good, Fair, Poor, or Not Connect.
- 6) Signal Strength: Excellent, Good, Fair, Poor, or Not Connect.

3.1.2 Configuration

"Configuration" tab allows you to set the value of Mode, SSID, Tx Rate, PS Mode, and Channel. Click "Apply Changes" when completed.

- 1) Mode: Choose "802.11 Ad-Hoc" (if you do not have an AP) or "Infrastructure" (if you have an AP). The default is "Infrastructure".
- 2) SSID: SSID is the unique name shared among all Wireless PC Cards and APs in a wireless network. If your network already has an SSID, please fill it in this field. If you are setting up a new network, please assign an SSID (up to 30 characters) and fill it in this field. The default is "any".
- 3) Tx Rate: Choose "Fully Automatic" for best performance and longest range. Choose other fixed rate (11, 5.5, 2, or 1 Mbps) in case you have special needs. Note that if you choose fixed rate, the AP (or the other Wireless PC Cards in 802.11 Ad-Hoc mode) should also be set to the same rate. The default is "Fully Automatic".
- 4) PS Mode: PS mode enables or disables the power saving feature of Wireless PC Card. When this mode is enabled, it can reduce power consumption. However, the throughput will be degraded. This feature is applicable to Infrastructure mode only. The default is "Disable".
- 5) Channel: For "Infrastructure" mode, please skip this item. For "802.11 Ad-Hoc" mode, please select the same channel for all Wireless PC Cards. The default is "3".

3.1.3 Encryption

"Encryption" tab allows you to set the following WEP (Wired Equivalent Privacy) keys, which is used to protect the privacy of wireless data communications. Note that all Wireless PC Cards and APs should be set to the same WEP keys, no matter in "Infrastructure" mode or "802.11 Ad-Hoc" mode. Please follow the following steps:

- 1) Encryption (WEP): Select "Disabled", "64 Bit", or "128 Bit". The default is "Disabled".
 - If you select "Disabled", go to step 2).
 - If you select "64 Bit" or "128 Bit", use one of the following two methods to generate the WEP

keys.

- ✓ Create with Passphrase: The Passphrase is any case-sensitive text string (up to 31 characters). Key in the Passphrase you choose to create the WEP keys.
 - in "64 Bit" case: four (4) WEP keys will be generated. Select one of them from "Default Tx" field, and then click "Apply". Then go to step 2).
 - in "128 Bit" case: only one (1) WEP key will be generated. Click "Apply" to store the settings. Then go to step 2).
 - ✓ Manual Entry: Enter the WEP keys in hex data format (0 ~ 9, a ~ f) into the fields.
 - In "64 Bit" case, select one of them from "Default Tx" field, and then click "Apply". Then go to step 2).
 - In "128 Bit" case, click "Apply" to store the settings. Then go to step 2).
- 2) Click "OK" to complete all of the installation and configuration procedures. Now your Wireless PC Card should be working with a green LED always ON.

3.1.4 About

"About" tab provides the information of software version (driver, utility, firmware).

3.2 Under Windows CE

Click  Start, Programs, and  WLANSetup to run Wireless LAN Utility. Then, follow all the procedures of Section 3.1.

3.3 Under Linux

- 1) Open the option file "/etc/pcmcia/config.opts".
- 2) Key in the initial value into the option file, according to your network structure:
 - For Infrastructure mode:
The initial value is listed below.
Module "wvlan_cs" opts "port_type=1 network_name=any"
 - For 802.11 Ad-Hoc mode:
The initial value is listed below.
Module "wvlan_cs" opts "port_type=0 channel=1 network_name=any"
- 3) Change the initial value
If you need to change the initial value to comply with existing network, you have to stop the Wireless PC Card function first by key in the following shell command:

```
# modprobe -r wvlan_cs
```


Then, please follow the setting rules below:
 - Port_type
For infrastructure mode: set to 1.
For 802.11 Ad-Hoc mode: set to 0.
 - Channel
For infrastructure mode: channel setting is not needed.
For 802.11 Ad-Hoc mode: please set to the same channel as other Wireless PC Cards.
 - Network_name
Please set to the same network name as existing network, no matter in Infrastructure mode or 802.11 Ad-Hoc mode.
The followings are some examples:
 - For Infrastructure mode
To link Wireless PC Card with an AP with no linking barrier, please key in the following shell command:

```
# modprobe wvlan_cs
```


To link Wireless PC Card with an AP with it's SSID set as "AP_SSID", please key in the following shell command:

```
# modprobe wvlan_cs port_type=1 network_name=AP_SSID.
```
 - For 802.11 Ad-Hoc mode

To link Wireless PC Card with a network with it's SSID set as "SOHO" by using channel 3, please key in the following shell command:

```
# modprobe wlan_cs port_type=0 channel=3 network_name=SOHO
```

4. TROUBLESHOOTING

4.1 Poor Linking

Solution:

The antenna is attached to the end of the Wireless PC Card. For best use of the antenna, please follow the instruction below:

- 1) Keep the area around the antenna clear to avoid any interference from materials that could block radio transmission, such as metal objects, electronic devices, and cordless telephones.
- 2) Adjust the direction of the PC slightly to improve the linking quality.

4.2 Windows does not detect the installed Wireless PC Card

Solution:

- 1) Make sure the driver of the PCMCIA controller is installed.
- 2) Make sure whether the PC has a Plug and Play BIOS.
- 3) Make sure if there is any conflict between PCMCIA devices. If there is conflict, please click "Start", "Settings", "Control Panel", "System", "Device Manager", "Other devices" to find "INTERSIL-HFA384x/IEEE" and delete it. Now, please install Wireless PC Card.

4.3 PC cannot connect to the Network

Solution:

Make sure the Wireless PC Card's Mode, SSID, Channel and Data Rate is set as same as Network.

5. SPECIFICATIONS

General	
Standards compliance	IEEE 802.11b standard for wireless LAN
Security	WEP 64, 128 bit, encryption MD5
Hardware	
RF	Frequency range: 2.4 ~ 2.4835 GHz
Data rate	Supported bit rates: 11 Mbps / 5.5 Mbps / 2 Mbps / 1 Mbps
Modulation	DSSS (Direct Sequence Spread Spectrum) DBPSK/DQPSK
Coding	1, 2 Mbps: 11 chip/bit Barker Coding 5.5, 11 Mbps: Complementary Code Keying
Number of channels	Europe: 13 (3 non-overlapping) US: 11 (3 non-overlapping) France: 4 (1 non-overlapping) Japan: 14 (3 non-overlapping)
Host interface	PC Card 95 PCMCIA type II 16 bit
Transmit power (Typ.)	+15 dBm
Receive sensitivity (Typ.)	-83 dBm for 11Mbps; -88 dBm for 5.5/2/1 Mbps; (@BER 10E-5)
Power consumption (Max. @ 3.3Vdc)	Tx mode: 350 mA; Rx mode: 230 mA; Stand by mode: 30 mA
Software	
Driver support	Windows 95/98/ME/NT/2000/XP/CE and Linux
Utility	User setup & diagnostics tool
Mechanical	
Antenna system	Two integrated antennas
Indicator	Green LED for activity
Environmental	Operating temperature: 0 ~ 55°C Relative humidity: 95% (non-condensing)
Package	PCMCIA type II extended
Dimensions	116.2 x 54.0 x 7.0 mm
Weight	Less than 50 g
Certificate	
EMC	U.S., Canada: FCC Part 15, sections 15.247, 15.205, 15.209; RSS-210 Europe: ETS 300 328, ETS 300 826, CE Marked Japan: ARIB STD T-66, D-33

6. GLOSSARY

Access Point (AP) – Any entity that has station functionality and provides access to the distribution services, via the wireless medium (WM) for associated stations.

Ad-Hoc – A network composed solely of stations within mutual communication range of each other via the wireless medium (WM). An ad hoc network is typically created in a spontaneous manner. The principal distinguishing characteristic of an ad hoc network is its limited temporal and spatial extent. These limitations allow the act of creating and dissolving the ad hoc network to be sufficiently straightforward and convenient so as to be achievable by non-technical users of the network facilities; i.e., no specialized technical skills are required and little or no investment of time or additional resources is required beyond the stations that are to participate in the ad hoc network. The term ad hoc is often used as slang to refer to an independent basic service set (IBSS).

BSS (Basic Service Set) – An AP associated with several wireless stations.

ESS (Extended Service Set) – More than one BSS can be configured as an Extended Service Set. An ESS is basically a roaming domain.

Ethernet – A popular local area data communications network, originally developed by Xerox Corp., which accepts transmission from computers and terminals. Ethernet operates on 10 Mbps baseband transmission over shielded coaxial cable or over shielded twisted pair telephone wire.

LAN – Local Area Network.

Infrastructure – The infrastructure includes the distribution system medium (DSM), AP, and portal entities. It is also the logical location of distribution and integration service functions of an extended service set (ESS). An infrastructure contains one or more APs and zero or more portals in addition to the distribution system (DS).

IEEE – Institute of Electrical and Electronic Engineering.

PCMCIA (Personal Computer Memory Card International Association) – It develops standards for PC cards, formerly known as PCMCIA cards, are available in three “types” which are about the same length and width as credit cards, but range in thickness from 3.3 mm (Type I) to 5.0 mm (Type II) to 10.5 mm (Type III). These cards can be used for many functions, including memory storage, as landline modems and as wireless LAN.

Roaming – A function that allows one to travel with a mobile end system (wireless LAN mobile station, for example) through the territory of a domain (an ESS, for example) while continuously connecting to the infrastructure.

RTS (Request To Send) Threshold – Transmitters contending for the medium may not hear each other. RTS/CTS mechanism can solve this “ Hidden Node Problem”.

SOHO – Small Office Home Office

SSID – Service Set Identifier

Wired Equivalent Privacy (WEP) – The optional cryptographic confidentiality algorithm specified by IEEE 802.11 used to provide data confidentiality that is subjectively equivalent to the confidentiality of a wired local area network (LAN) medium that does not employ cryptographic techniques to enhance privacy.