Wireless LAN PC Card

User's Manual
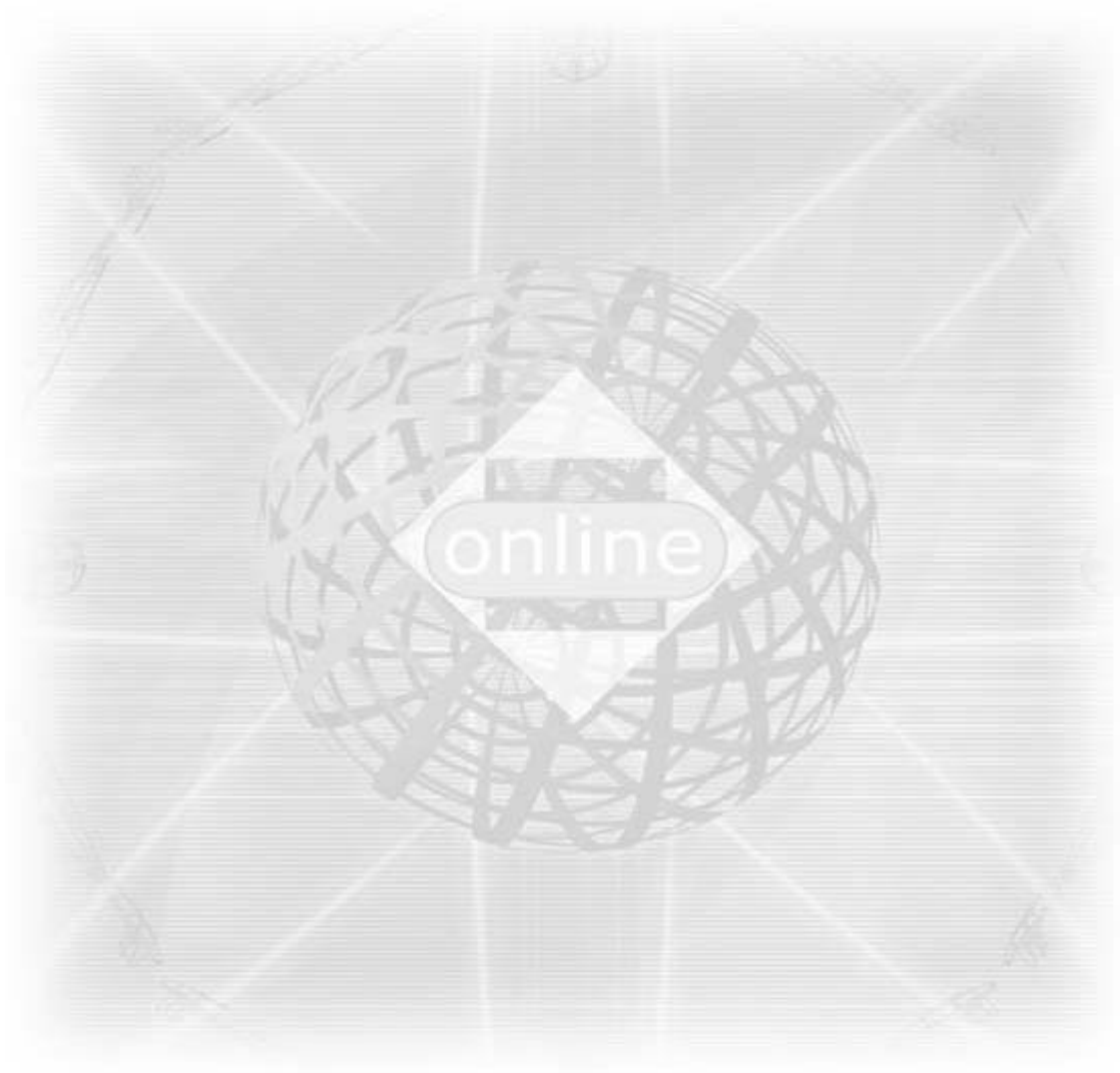
Ver 1.3

Statement of Conditions

The content described in this manual may be improved or changed at any time and it is subject to be changed without notice.

Manufacturer assumes no responsibility for errors contained herein or for direct, indirect, special, incidental or consequential damages with the furnishing, performance, or use of this manual or equipment supplied with it, even if manufacturer of its suppliers have been advised of the possibility of such damages.

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 will 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 need to correct the interference at his area. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

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

FC CE0560① 晅 Canada

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

Table of Contents

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 WLAN 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 WLAN 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 PCB patch diversity antennas.
- Supports MS 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 functions .
- 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 WLAN 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.
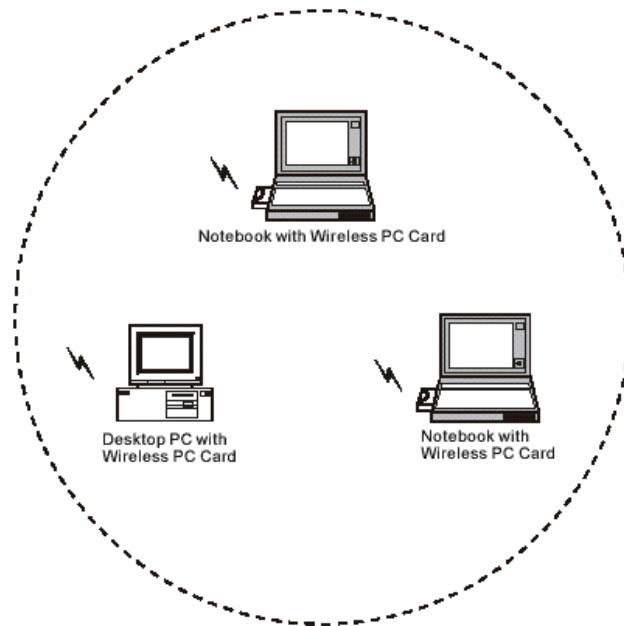
Figure 1-1 802.11 Ad-Hoc Configuration

1.3.2 Infrastructure Configuration

An integrated wireless and wired LAN is called an infrastructure configuration. A group of WLAN PC Card and an Access Point (AP) is called a Basic Service Set (BSS). Each WLAN 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 WLAN PC Card to the wired LAN, but also doubles the effective wireless transmission range between two WLAN PC Cards.

BSS ID is, in essential, the ID of each independent WLAN PC Card. All WLAN 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.
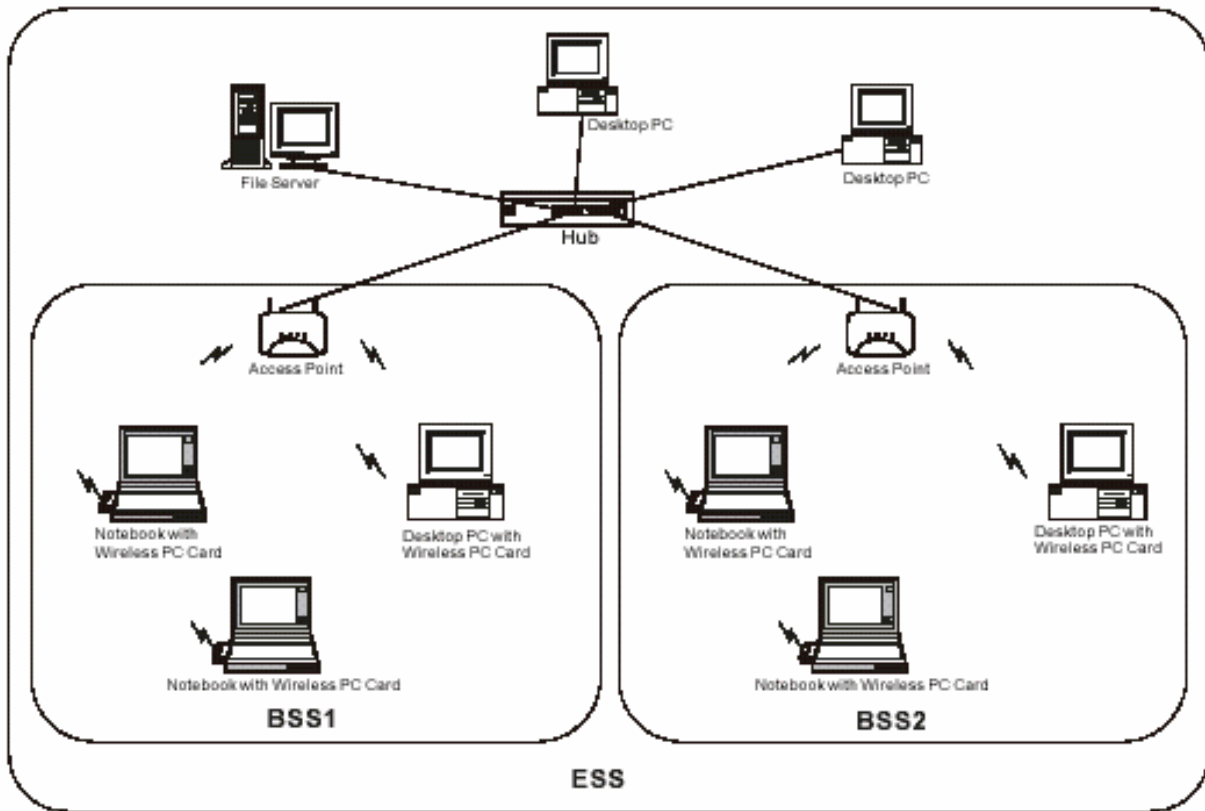
Figure 1-2   Infrastructure Configuration

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 WLAN 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.
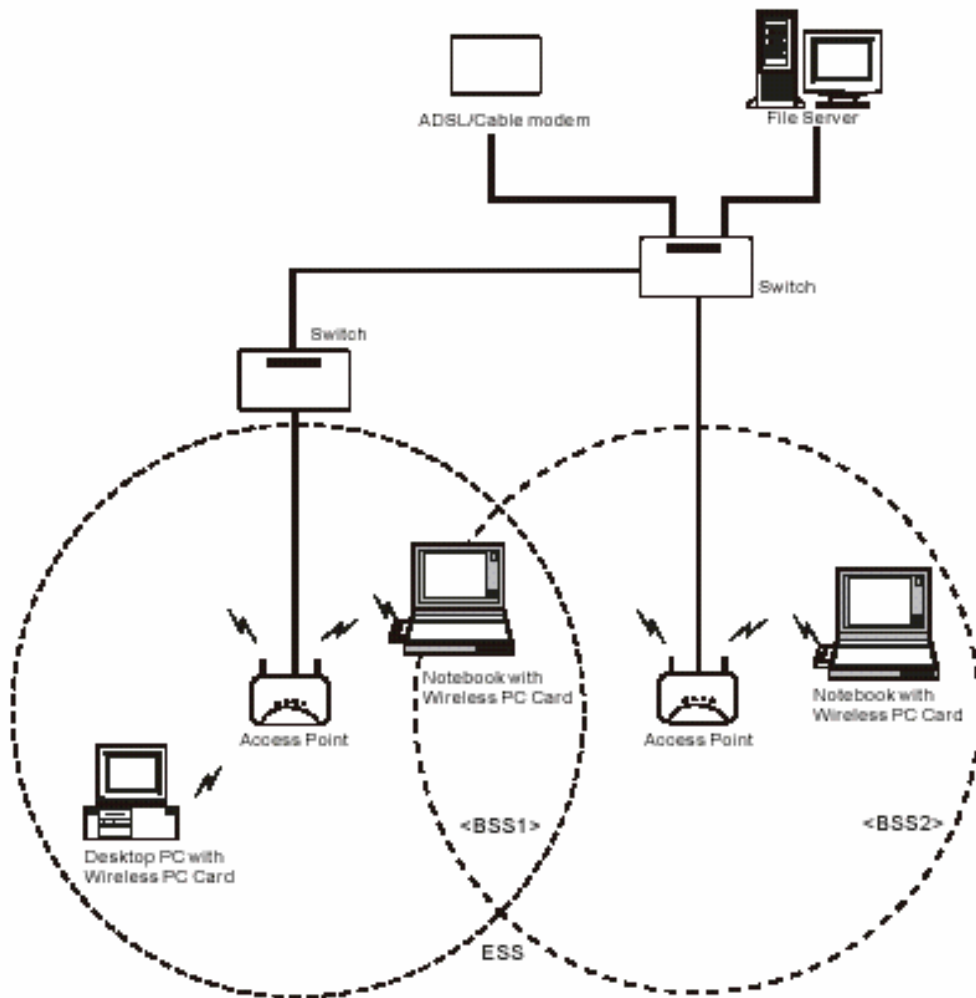
Figure 1-3 Seamless Roaming

2. INSTALLATION

Use the procedures described in this chapter to install your WLAN PC Card under MS Windows 95/98/Me/NT/2000 /XP/CE, and Linux.

2.1   Product Kit

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

1) WLAN 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 WLAN 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 10 Mbytes free disk space for installing the driver and the utility program.

2.3   Installing the Utility and Driver

Depending on the operation system you use, please select one of the sections (2.3.1~2.3.4) and follow the steps to install the Utility and Driver. After that, please go to Section 3 to continue the procedure.

Note: Please do not plug your WLAN PC Card until the setup procedure has been completed.

2.3.1   Under MS Windows 95/98/Me/2000/XP

Please follow the following steps to install the utility and driver.

1) Insert the supplied CD-ROM in the CD-ROM drive.
2) When the supplied CD-ROM is inserted into the CD-ROM drive, the InstallShield Wizard should start automatically. If Autorun is disabled in your Windows settings, you will need to go to the Windows "Start" button, choose "Run" and type "D:\setup.exe" in the text box, where D is the drive letter of your CD-ROM drive.
3) Follow the InstallShield Wizard to install the driver and utility.
4) After completing the installation process, it is recommended to reboot your PC.
5) Plug your WLAN PC Card. The "Add New Hardware Wizard" automatically loads the driver, then a new application (the Configuration & Monitor Utility) icon will be displayed in the task bar.
6) Finally, please go to Section 3 for Configuration.

Note: In the MS Windows 2000/XP installation procedure an extra window appears prompting you to select whether you would like to install the "Digital Signature Not Found" or not. You can safely select "YES".

2.3.2   Under MS Windows NT4.0

What You Need to Know About MS Windows NT4.0

Although Windows NT 4.0 is similar in appearance with Windows 95/98/Me, and Windows 2000, they have

different philosophy when installing a new hardware. Throughout this section it is assumed that you have a

basic working knowledge of Windows NT 4.0 and of how to install new network cards on them. However, in this paragraph, some specific features of Windows NT 4.0 are briefly explained. Unlike Windows 95/98/Me, and Windows 2000, Windows NT 4.0 does not support the "Plug & Play" and "Hot Swapping" features. In Windows NT 4.0 you need to inform the operating system about the existence of the new card in order to start installing the driver. Also, if you want to swap cards, you need to restart the PC in order to recognize the card.

> ***Note:*** In order to be able to install the WLAN PC Card on to your PC running under Windows NT 4.0, you will need to log on as "Administrator". Also you will need to have at least NT Service Pack 4 installed.

Installing the Utility

Please follow the following steps to install the utility.

1) Insert the supplied CD-ROM in the CD-ROM drive.
2) When the supplied CD-ROM is inserted into the CD-ROM drive, the InstallShield Wizard should start automatically. If Autorun is disabled in your Windows settings, you will need to go to the Windows "Start" button, choose "Run" and type "D:\setup.exe" in the text box, where D is the drive letter of your CD-ROM drive.
3) Follow the InstallShield Wizard to install the utility.
4) Finally, completing the installation process, please go to next step for installing the driver.

Installing the Driver

Since MS Windows NT4.0 do not support "Plug & Play", you must enable the detection of PC cards by the operating system by following the following procedure:

1) Click Start -> Settings -> Control Panel.

2) Double-click the "Devices" icon.

3) Select "PCMCIA" from the list and click the "Startup" button.

4) Set the Startup type to "Boot" and click "OK".

5) Click "Close" on the "Devices" window.

In order to let the operating system know about yours new card, you must enable the Network support by following the next steps:

1) Click Start -> Settings -> Control Panel.

2) Double-click the "Network" icon.

3) In the "Network Settings" window you will be prompted to install Windows NT Networking in case no network has been installed yet. Click "Yes" and follow the instruction on the screen.
   If networking had been already installed, you will see a dialog with several tabs. In the "Adapters" tab click the "Add" button. Windows NT Networking Setup will determine the type of network adapter card that you are going to use.

4) When prompted to select a driver, locate the driver provided with the supplied CD-ROM.

5) During the installation, a dialog box appears asking for the I/O Base and IRQ resource information. In order to find out which values to use, go to Start -> Programs -> Administrative Tools -> Windows NT Diagnostics -> select the "Resources" tab -> press the "IRQ" button. Select one free IRQ from the

list. Next, press the button "I/O Port" and choose an 0x20 free I/O space. Add these values into the dialog box. If at any point after the installation you want to change these values, go to the Control Panel -> Network, select the Adapters tab, press the Properties button, and fill in the new values.

6) Next Windows will start copying the files. In case there is a version conflict. between one or more of the files being copied and the files in your system, you should normally keep the latest version.

7) Finally, when the installation has been completed, you will need to restart your computer.

Note: If the card is not working properly, after a restart procedure, you should make sure that your system has free resources ever it may shows them as being available.

2.3.3 Under MS Windows CE

Please follow the following steps to install the utility and driver.

1) Insert the supplied CD-ROM in the CD-ROM drive.
2) Click "Start" button, choose "Run" and type "D:\wince\setup.exe" in the text box, where D is the drive letter of your CD-ROM drive.
3) Follow the InstallShield Wizard to install the driver and utility.
4) After completing the installation process, insert the WLAN PC card. When the PC card is installed, a window showing two WIN TCP/IP options will automatically appear, see Figure 2-1.

Figure 2 -1 A typical screen with TCP/IP options

5) Use the first option if you have plans to connect to an Access Point (become associated) that is connected to a network, where a DHCP Server is available, then a unique IP Address will be automatically assigned to your PC card. In any other case, select the second option and assign a unique IP Address to your PC card.
6) Finally, please go to Section 3 for Configuration.

2.3.4   Under Linux

Please follow the following steps to install the utility and driver.

1) Unpack the ATMEL_linux_drivers.tgz package (anywhere you like).

   `# tar xzvf ATMEL_linux_drivers.tgz`

2) In the setup directory run:

   `# make config`

   `# make`

   This will do everything (install the driver patch and the necessary files). (make sure that you logged
   on as root).

3) In order for the applications to run you have to enable CONFIG_NET_RADIO in the kernel.

   in /usr/src/linux

   `# make menuconfig`

   Select Network Device Support

           |--->Wireless LAN (non-hamradio)

              |--->Wireless LAN (non-hamradio)

4) PCMCIA NOTE

   If you are installing the PCMCIA driver after the installation run :

   `#/etc/init.d/pcmcia restart`

   Note: FOR MORE DETAILS SEE THE README INSIDE THE vnetsetup PACKAGE

3. CONFIGURATION

The Configuration & Monitor Utility is a powerful application that helps you to configuration the WLAN PC Card and monitor the statistics of the communication. Unlike the standard method of configuring the card via the operating system utilities (e.g. Control Panel), this application permits the dynamic modification of the configuration parameter while the card is operating. It also offers some more configuration options.

3.1   Under MS Windows 95/98/Me/NT/2000/XP

The Configuration & Monitor Utility appears as an icon on the task bar of Windows every time the card is running (see Figure 3-1). You can open it by double-clicking on this icon. While the station is in infrastructure mode and not associated to an Access Point, the color of icon is red. As soon as the station associated itself to an Access Point , the icon color automatically turns to blue. In Ad-Hoc mode the color is always blue, except when the card is resetting and initializing where it turns to red during the reset and initialization procedure.

Figure 3 -1   The icon of the Configuration & Monitor Utility

When the application is opened the following options (tabs) are available:

- Status
- Statistics
- Site Survey
- Encryption
- Advanced
- Version

Status

A typical screen of the application in infrastructure mode is shown in Figure 3-2. The configuration parameters are shown at the top of the screen (Operation Mode, Channel, SSID, TxRate, Int. Roaming and MAC Address of the PC card). In the middle of the screen there is information about the status of the communication (the BSSID of Access Point to which the card is associated, Signal Strength, and Link Quality). In order to change the configuration parameters press the "Change" button, make your changes and then press " Submit" in order to save your changes.
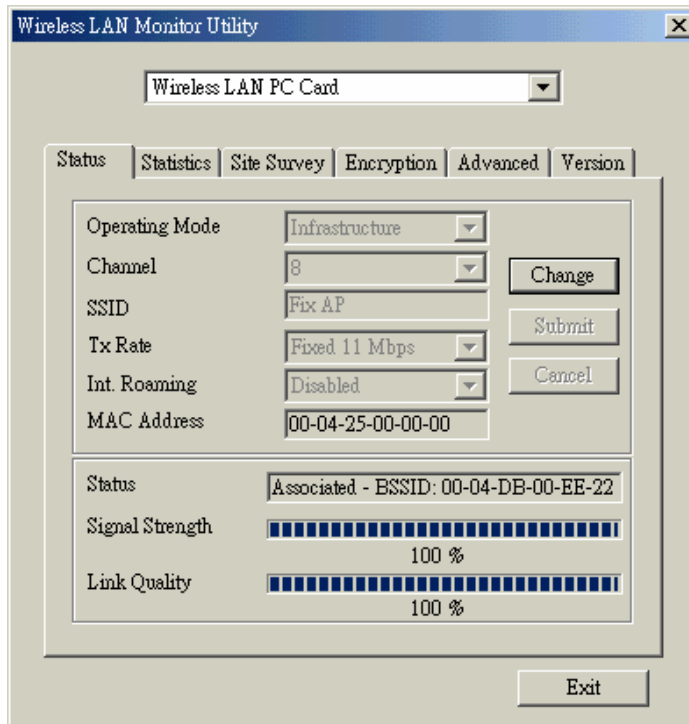
Figure 3-2   A typical screen of the Monitor Utility in Infrastructure mode.

Note: In Ad-Hoc mode, the Channel and SSID must be the same among stations so that the computers can communicate within the local LAN properly. Moreover, all connected computers should have the same netid and subnetid.

Statistics

This option enable you to view the available statistics information (Data packets, Management Packets and Rejected packets). In order to renew or update this list of statistics, press the "Reset" button. In order to exit press the "Exit" button at the bottom of the screen.
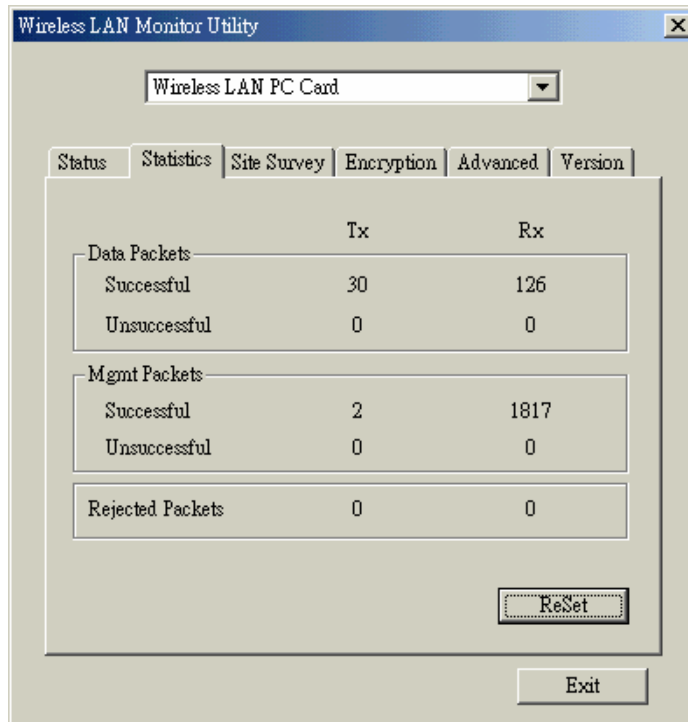
Figure 3-3   Statistic information available

Site Survey

By choosing the Site Survey option in any of the two modes, you can scan all the channels in order to find all the access points within the range of your card. In Figure 3-4, the card can see four access points. The list includes information about the BSSID and SSID of the access point(s), the signal strength, the channel where the access point(s) operates, and whether or not WEP encryption is used. In order to update this list, press the "Re-scan" button. If you want to associate with any of the access point(s) listed, double click on your choice (on the BSSID field), and the system will take you back to the Monitor screen showing you the parameters of the connection newly established.
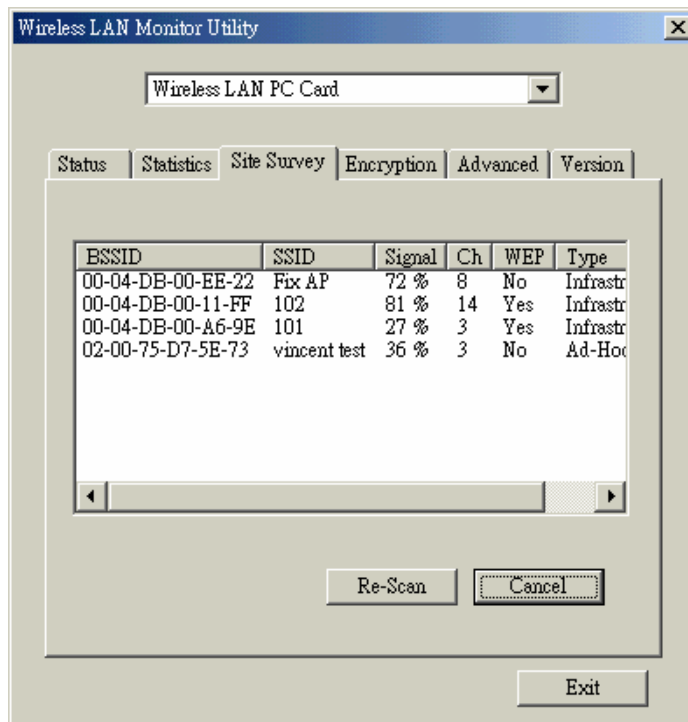
Figure 3-4 Site Survey Option

Encryption

By choosing this options in any of the two modes, you can set four different WEP keys and specify which one of them to use. First, either enable or disable encryption from the appropriate "Encryption" field (see Figure 35 below). If you decide to use encryption, you can choose any of the available WEP keys (1 to 4). You also have the option to select the WEP mode (Mandatory/Optional). If you select "Mandatory", then not only WEP will be used, but also any other station needs to use WEP encryption in order to establish a communication with your station. This requirement is in line with the IEEE 802.11b standard. If, on the other hand, you choose "Optional", then your station can communicate with every other station regardless if they use WEP or not. Please keep in mind that the WEP keys must be in HEX format. Finally, you have the option to select whether Open System or Shared Key authentication will be used. In order to take effect the changes you wish to make, press the "Submit" button at the bottom of the screen.
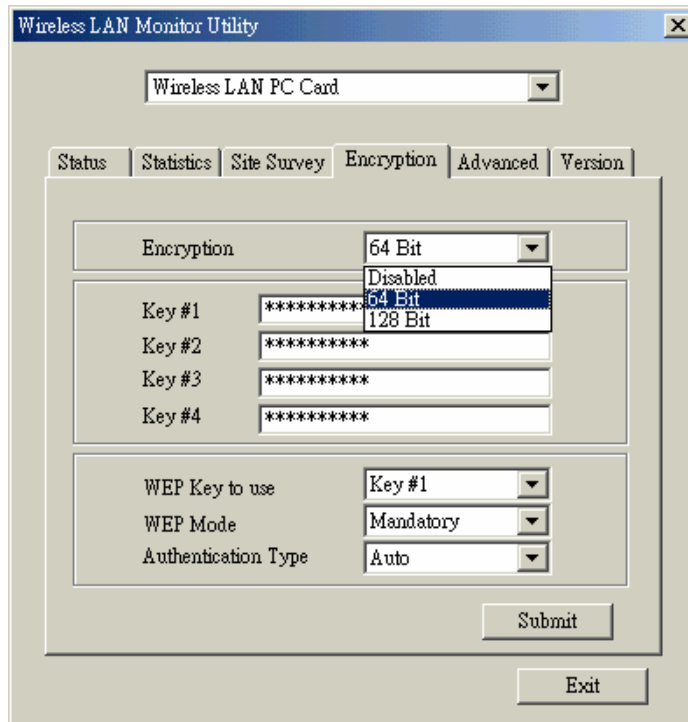
Figure 3-5 Encryption

Advanced

By choosing the Advanced option in any of the two modes, you can change advanced configuration settings, such as the Preamble Type, Fragmentation Threshold, and RTS/CTS Threshold (Figure 3-6). Figure 3-6 shows the recommended configuration for the advanced settings. Before selecting Short Preamble, make sure that the other stations and APs are also supporting this feature.
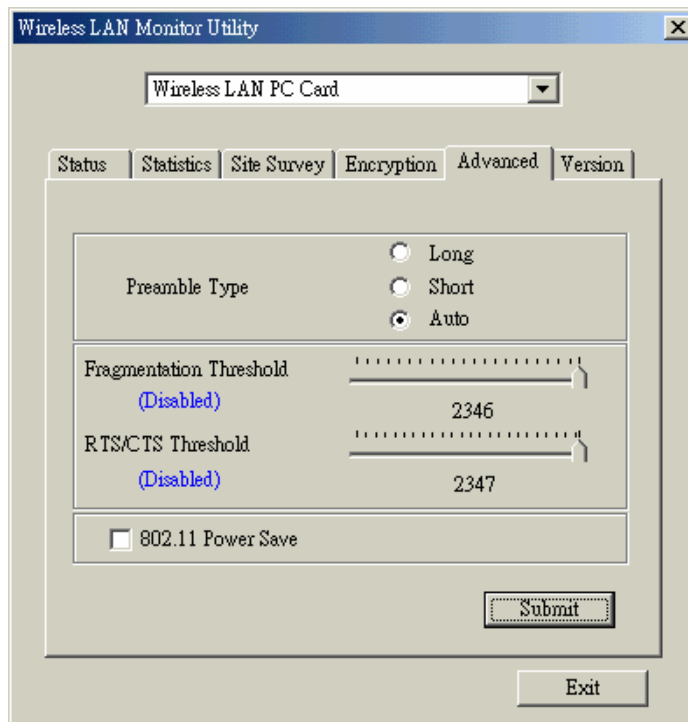
Note : The WLAN PC Card has an auto-detection feature therefore it automatically selects the Preamble Type depending on the Access Point Preamble type. In order to enable the Fragmentation and the RTS/CTS Threshold parameters move the slide bar with your mouse and then use the right and left arrow keys of your keyboard in order to select an exact number.

Version

By choosing this option, you can view basic information about the Utility like the Driver, Firmware and Application Version. Use the "Exit" button in order to exit the application.
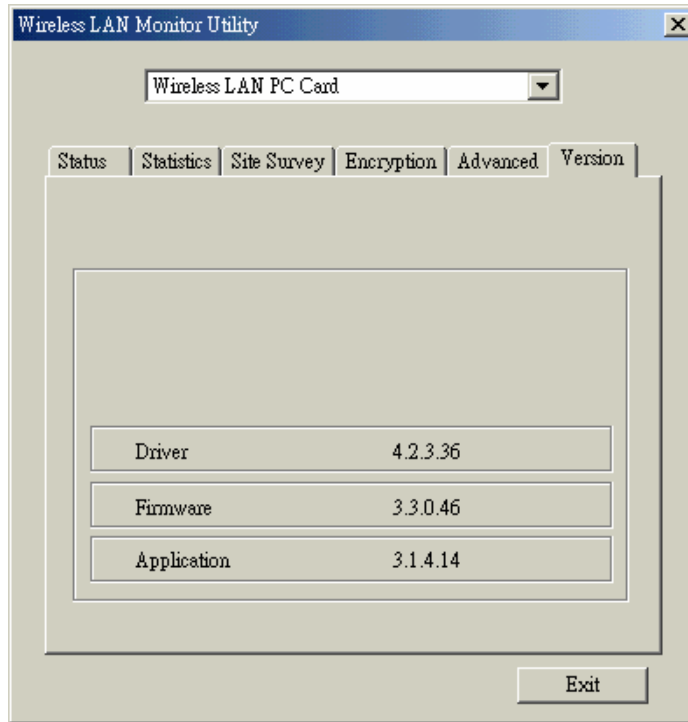

Figure 3-7 Version information

3.2 Under MS Windows CE

When the application is opened the following options (tabs) are available:

- Status
- Encryption
- Advanced
- Version

Status

A typical screen of the application in Ad-hoc Mode is shown in Figure 38. The configuration parameters are shown at the top of the screen in (Operation Mode, Channel, SSID, TxRate, Power Management Mode and MAC Address of the PC card). In order to change the configuration parameters press the "Change" button, make your changes and then press "Submit" in order to save your changes.
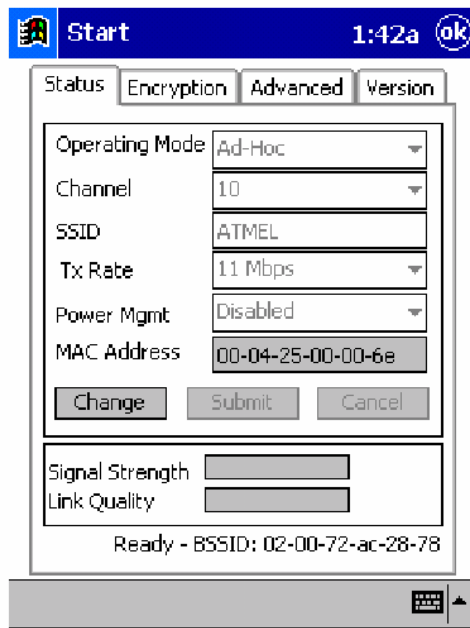
Figure 3-8 A typical screen of the Monitor Utility in Ad-hoc Mode

Encryption

By choosing this option in any of the two operational modes, you can set four different WEP keys and specify which one of them to use. First, either enable or disable encryption from the appropriate "Encryption" field (see Figure 3-9 below). If you decide to use encryption, you can choose any of the available WEP keys (1 to 4). You also have the option to select the WEP mode (Mandatory/Optional). If you select "Mandatory", then not only WEP will be used, but also any other station needs to use WEP encryption in order to establish a communication with your station. This requirement is in line with the IEEE 802.11b standard. If, on the other hand, you choose "Optional", then your station can communicate with every other station regardless if they use WEP or not. Please keep in mind that the WEP keys must be in HEX format. Finally, you have the option to select whether Open System, Shared Key , or Auto authentication will be used. In order to take effect the changes you wish to make, press the "Submit" button at the bottom of the screen.

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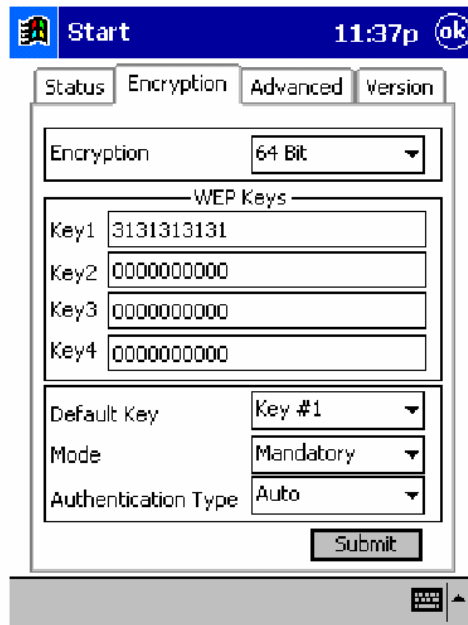
Figure 3-9 Encryption

Advanced

By Choosing the Advanced option in any of the two operational modes, you can change the advanced configuration settings, such as the Preamble Type, Fragmentation Threshold, and RTS/CTS Threshold (Figure 3-10). Figure 3-10 shows the recommended configuration for the advanced settings. The PC card has an auto-detection feature therefore when selecting "Auto" for the preamble Type.
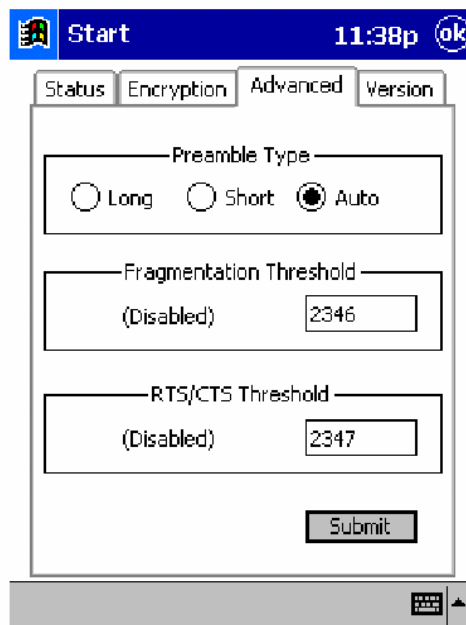

Figure 3-10 Advanced Settings

Version

By choosing this option, you can view basic information about the Utility like the Driver, Firmware and Application Version (see Figure 3-11). Use the "ok" button (in the top right corner) in order to exit the application.
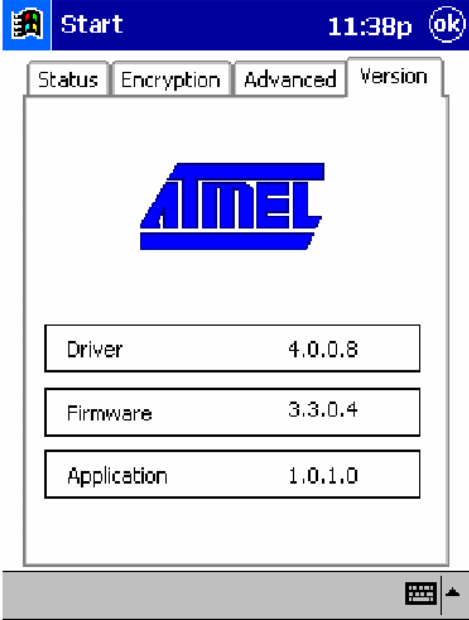

Figure 3-11 Version Information

4. SPECIFICATIONS

General	
Standards compliance	Compliant IEEE 802.11b Standard
Security	WEP 64-bit, 128-bit, encryption MD5
Hardware	
RF Range	Frequency range: 2.4 ~ 2.4835GHz
Data rate	11Mbps / 5.5Mbps / 2Mbps / 1Mbps
Modulation	DSSS (Direct Sequence Spread Spectrum) DBPSK/DQPSK
Coding	1, 2Mbps: 11 chip/bit Barker Coding 5.5, 11Mbps: 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	+13dBm (Typ.)
Receive sensitivity	-83dBm (Typ.) for 11Mbps; -86dBm (Typ.) for 5.5Mbps; -89dBm (Typ.) for 2Mbps; -91dBm (Typ.) for 1Mbps (@BER 10E-5)
Software	
Driver Support	MS Windows 95/98/Me/NT/2000/XP/CE and Linux
Utility	User setup and diagnostics tool
Mechanical	
Dimensions	118.4 x 54 x 5 mm
Weight	35 grams
Environmental	
Temperature	0 ~ 55°C (operation), -20 ~ +65°C (storage)
Relative Humidity	95% (non-condensing)
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

5. GLOSSARY

Wireless 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.

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.

LAN – Local Area Network.

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 medium that does not employ cryptographic techniques to enhance privacy.

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