

# **Wireless LAN 11Mbps PC Card**

## **User Manual**

**Version 1.2- August.2001**

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### **Federal Communication Commission 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 and , if not installed and used in accordance with the instructions, 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 into 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.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:(1) This device may not cause harmful interference, and (2) this Device must accept any interference received, including interference that may cause Undesired operation.

### **Federal Communication Commission(FCC) Radiation Exposure Statment**

This equipment complies with FCC radiation exposure set forth for an uncontrolled environment .In order to avoid the possibility of exceeding the FCC radio frequency Exposure limits, human proximity to the antenna shall not be less than 20 cm(8 inches) during normal operation.

### **R&TTE Compliance Statement**

This equipment complies with all the requirements of the DIRECTIVE 1999/5/EC OF

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF 9 March 1999 on radio equipment and telecommunication terminal Equipment and the mutual recognition of their conformity(R&TTE).

The R&TTE Directive repeals and replaces in the directive 98/13/EEC (Telecommunications Terminal Equipment and Satellite Earth Station Equipment) As of April 8, 2000.

### **Safety**

This equipment is designed with the utmost care for the safety of those who install and use it. However, special attention must be paid to the dangers of electric shock and static electricity when working with electrical equipment. All guidelines of this manual and of the computer manufacturer must therefore be allowed at all times to ensure the safe use of the equipment.

### **EU Countries Not intended for use**

The ETSI version of this device is intended for home and office use in Austria Belgium, Denmark, Finland, France (with Frequency channel restrictions). Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden and United Kingdom.

The ETSI version of this device is also authorized for use in EFTA member states Iceland, Liechtenstein, Norway and Switzerland.

### **EU Countries Not intended for use**

None.

### **Potential restrictive use**

France: Only channels 10,11,12,and13

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## 2. Introduction

Thank you for purchasing your Wireless LAN 11 Mbps PC Card. This manual will assist you the procedure for installation.

The following items should be found in the package you have purchased:

- Wireless LAN 11 Mbps PC Card
- Quick installation guide
- User manual
- Diskette or CD containing Wireless LAN Management utility and drivers

The diskette or CD contains the drivers and the software configuration utility that is used for managing the Wireless LAN Card as well as establishing the wireless connection with your Local Area Network (LAN).

**NOTE : PLEASE CONTACT YOUR VENDER IF ANYTHING IS MISSING.**

### **3. Wireless LAN Basics**

Wireless LAN (Local Area Networks) systems offer a number of greater excellences over a traditional wired system. Wireless LANs (WLANs) are easier to setup and manage, more flexible and often more cost effective than their wired equivalence.

By using radio frequency (RF) technology, the need for wired connections is minimized while WLANs transmit and receive data over the air. Therefore, WLANs

combine data connectivity and user mobility through simplified configuration, enabling movable LANs.

Wireless LANs allow users to access shared information without looking for a place to plug in. They also enable network managers to set up or augment networks without installing or moving wires. Consequently, WLANs offer various excellences of productivity, convenience and cost advantages over traditional wired networks as the followings:

- User friendly – WLAN systems enable LAN users accessing to real-time information anywhere in their organization. This mobility supports productivity and service opportunities that are not possibly offered by wired networks.
- Easy installation –Fast and easy to install a WLAN system and the installation process eliminates the need to pull cable through walls and ceilings.
- Cost down – While the initial money capital requirement of WLAN hardware might be greater than those of wired LAN hardware, the overall installation expenses and life-cycle costs will be significantly lower. WLANs offer the greatest Lang-term cost benefits when operating in dynamic environments that require frequent moves, adds and changes.
- Easy configuration –Specific applications and installations can be met easily while configuring WLANs in various topologies. Configurations also can be altered easily and a small number of users can full infrastructure networks of thousands of users in the range form peer-to-peer networks that allow roaming over a broad area.

#### **4. Installation for Windows platform**

The Wireless LAN can easily be installed and used, unlike wired LAN, no need of bother to connect cables for keeping your computer to use network resources. This section will assist you to install WLAN Adapter successfully. First, You will install software (driver). Secondly, insert the Wireless LAN PC card, and finally you will set the network properties to accommodate resource sharing and select the type of wireless network that you wish to install.

## **4.1. Installation Overview**

You will fulfill the following steps in establishing your wireless network connection:

- Install the Access Point (AP) firstly. AP is needed in case of Infrastructure network mode.
- Install the software using the Installation Diskette or CD.
- Install the Wireless LAN Card (WIRELESS LAN 11 Mbps PC Card).
- Install the network protocol(S) required to communicate on your network.  
(Most likely you will need the TCP/IP protocol.)



#### 4.2. Installation Procedure for Windows 95(OSR2) /98

**NOTE : DO NOT INSERT THE PCMCIA CARD UNTIL YOU ARE ASKED TO DO SO. FAILURE OF WHICH MAY RESULT IN UNSUCCESSFUL INSTALLATION OF YOUR WLAN PC CARD.**

In order to install the WLAN PC Card successfully, please follow the procedures below step by step:

- 1.) Power on your computer and allow **WINDOWS 95(OSR2) /98** to load fully.
- 2.) Make sure that there is no **PCMCIA** adapter inserted yet.
- 3.) Insert the given Installation CD in the **CD-ROM** and then click on the **SETUP**.
- 4.) Read and accept the license agreement.

- 5.) Choose the **SSID**. Default ESSID is default. You can change this later also using either the configuration utility or network configuration. Click on **NEXT**.
- 6.) Choose network type and click on **NEXT**. Default is **INFRASTRUCTURE**.
- 7.) Give the path of the destination folder. Click on **BROWSE** to set the path of your choice and then click **NEXT**.
- 8.) Setup will add program icon to the Program Folder. You can enter a new folder name, or select one from the existing Folder list.
- 9.) It takes a few seconds for copying the utility files and then click on Finish. Then insert **WIRELESS LAN 11Mbps PC CARD** into slot and restart PC.
- 10.) Restart the PC and Click on the Control Panel and then on PC Card. Check whether it has PCMCIA card in one of the sockets or not. If you find **WIRELESS LAN 11Mbps** in one of the sockets, it means the card is detected properly.
- 11.) Check for the **WIRELESS LAN 11Mbps** by right clicking on My Computer using the mouse. Choose the Device manager and then Network Adapters. If you find the **YELLOW (?)** sign on the adapter, it shows the installation is not successful. Choose the adapter and click on **REMOVE**. Restart your computer after uninstalling the driver to make the changes effective. And refer to manual.
- 12.) Right click on the Network **NEIGHBORHOOD** using the mouse.
- 13.) Choose **PROPERTIES** from the pop up menu. The network box appears and you see three main tables: **CONFIGURATION**, **IDENTIFICATION** and **ACCESS CONTROL**.
- 14.) Click on the **CONFIGURATION** tab and then click on the **ADD** button. Network Component Type box appears. Click on then **PROTOCOL** the click the **ADD** button.

- 15.) Network Protocols box appears. From the list of manufactures, click on **MICROSOFT**. From the list of network Protocols list, choose **NetBEUI**, then click **OK**.
- 16.) The **NetBEUI** protocol is now installed. After clicking on **OK** return back to Network Component Type box.
- 17.) Repeat the step 15 and 16 to add IPX/SPX protocol.
- 18.) Repeat the step 15 and 16 add TCP/IP protocol.
- 19.) Click on the **TCP/IP** option to set the **IP** address for your computer. You can choose **STATIC** or **DHCP** setting. If you use the static IP setup then enter the **IP** value, **SUBNET** masking, **DNS**, **DOMAIN / WORKGROU**P name, and **GATEWAY** Address values. After setting these parameter appropriately, click **OK** to return to Network Component Type and you can choose the **FILE AND PRINTER SHARING** options as well as the **ACCESS** to your computer like other users connected to that Network by setting the computer sharing options. Click on **OK**.
- 20.) Screen message **DO YOU WANT TO RESTART YOUR COMPUTER** will pop up. Choose **YES**. It will shut down your computer and will restart.

**IMPORTANT : RESTART YOUR COMPUTER TO MAKE THE CHANGES EFFECTIVE BEFORE YOU  
REINSTALL**

**THE DRIVER.**

### **4.3. Uninstallation Procedure for Windows 95(OSR2) /98**

If you want to uninstall the PCMCIA PC card under Win 95 ( OSR2)/98, please follow the steps below:

- 1.) Click on the **START** at the left bottom of your screen.
- 2.) Choose the **PROGRAMS**.
- 3.) Click on the **Wireless Lan** and click on **UNINSTALLER**.
- 4.) Confirm message about removing the “**Wireless Lan**” and all of its components appear. Click on **YES**
- 5.) Uninstall Shield removes the software “**Wireless Lan**” successfully.
- 6.) Click on **OK** to finish the uninstallation procedure.

**IMPORTANT : RESTART YOUR COMPUTER TO MAKE THE CHANGES**

#### **4.4. Installation Procedure for Windows NT4.0**

In order to install the WLAN PC card successfully, please follow the procedures below step by step:

- 1.) Insert **WIRELESS LAN 11Mbps PC CARD** into PC card slot.
- 2.) Power on your computer Please make sure Windows NT networking is already installed.
- 3.) Insert the given **INSTALLATION CD** in the **CD-ROM** and then click on the **SETUP**.
- 4.) Read and accept the license agreement.
- 5.) Choose the **SSID**. Default ESSID is default. You can change this later also using the Configuration utility or network configuration. Click on **NEXT**.
- 6.) Choose network type and click on **NEXT**. Default is **INFRASTRUCTURE**.
- 7.) Give the path of the destination folder. To set the path of your choice click on **BROWSE** and then click **NEXT**.
- 8.) Setup will add program icon to the Program Folder. You can enter a new folder name or Select one from the existing Folder list.
- 9.) It takes a few seconds for copying the utility files and then click on Finish.

- 10.) Few seconds later Microsoft TCP/IP properties table pops up. Set **INTERNAL PROTOCOL (TCP/IP)**, either choose “obtain an IP address automatically” or “set your own IP address.” Then click **OK**.
- 11.) Restart your Computer.

#### **4.5. Uninstallation Procedure for Windows NT4.0**

If you want to uninstall the PCMCIA PC card under Win NT4.0, please follow the steps below:

- 1.) Click on the **START** at the left bottom of your screen.
- 2.) Choose the **PROGRAMS**.
- 3.) Click on the **Wireless Lan** and click on **UNINSTALLER**.
- 4.) Confirm message about removing the “**Wireless Lan**” and all of its components appear. Click on **YES**
- 5.) Uninstall Shield removes the software “**Wireless Lan**” successfully.
- 6.) Click on **OK** to finish the uninstallation procedure.

**IMPORTANT : RESTART YOUR COMPUTER TO MAKE THE CHANGES  
EFFECTIVE BEFORE YOU REINSTALL THE DRIVER.**

Proceed to section 5 for the explanation of the Configuration Utility.

#### 4.6. Installation Procedure for windows 2000 / Windows ME

**NOTE : DO NOT INSERT THE PC CARD UNTIL YOU ARE ASKED TO DO SO. FAILURE OF WHICH MAY RESULT IN UNSUCCESSFUL INSTALLATION OF YOUR WLAN PC CARD.**

In order to install the WLAN 11Mbps PC card successfully, please follow the procedures below step by step:

- 1.) Power on your computer and allow **WINDOWS 2000 / ME** to load fully.
- 2.) Make sure that there is no **PC CARD** inserted yet.
- 3.) Insert the given **INSTALLATION CD** in the **CD-ROM** and then click on the **SETUP**.
- 4.) Read and accept the license agreement.
- 5.) Choose the **SSID**. Default ESSID is default. You can change this later also using the configuration utility or network configuration. Click on **NEXT**.
- 6.) Choose network type and click on **NEXT**. Default is **INFRASTRUCTURE**.
- 7.) Give the path of the destination folder. To set the path of your choice click on **BROWSE** and then click **NEXT**.
- 8.) Setup will add program icon to the Program Folder. You can enter a new folder name, or choose one from the existing Folder list.
- 9.) It takes a few seconds for copying the utility files and then click on Finish.

- 10.) Then insert **WIRELESS LAN 11 Mbps PC CARD** into the slot, wizard will found new hardware **WIRELESS LAN 11 Mbps PC CARD**, click on **NEXT**.
- 11.) Choose **DISPLAY A LIST OF THE KNOWN DRIVERS FOR THE DEVICE SO THAT I CAN CHOOSE A SPECIFIC DRIVER**, then click on **NEXT**.
- 12.) Choose Hardware types **NETWORK ADAPTERS**, click on **NEXT**, then click **WIRELESS LAN 11 Mbps PC CARD ADAPTER**, click **HAVE DISK** then enter the path name **D:\** (where D is the CD drive of your Notebook PC). It copies the driver files.
- 13.) Restart your computer
- 14.) Click Control panel – System – Hardware – Device Manager, you will find **WIRELESS LAN 11 Mbps PC CARD** in **NETWORK ADAPTERS**. If you find the **YELLOW (?)** sign on the adapter, it shows the installation is not successful. Choose the adapter and click on **REMOVE**. Then reinstall from the step 3.
- 15.) If your **WIRELESS LAN 11 Mbps PC CARD** is installed properly, then right click on the **MY NETWORK PLACE** using the mouse, click **PROPERTIES** to set up local area connection. Own IP address. Then click **OK**.
- 16.) Restart your Computer.

#### 4.7. Uninstallation Procedure for Windows 2000/Windows ME

If you want to uninstall the Wireless LAN 11Mbps PC Card under Win 2000, please follow the steps below:

- 1.) Click on the **START** at the left bottom of your screen.
- 2.) Choose the **PROGRAMS**.
- 3.) Click on the **Wireless Lan** and click on **UNINSTALLER**.
- 4.) Confirm message about removing the “**Wireless Lan**” and all of its components appear. Click on **YES**
- 5.) Uninstall Shield removes the software “**Wireless Lan**” successfully.
- 6.) Click on to **OK** finish the uninstallation procedure.

**IMPORTANT : RESTART YOUR COMPUTER TO MAKE  
THECHANGEEFFECTIVEBEFORE YOU REINSTALL THE  
DRIVER.**

## 5. Configuration Utility

Wireless LAN 11 Mbps Wireless LAN adapter uses its own management software. This application usually starts automatically and it provides all functions controlled by user. To start the Manager application, click on **START, PROGRAMS** and then, **WIRELESS LAN 11 Mbps, WIRELESS LAN**.

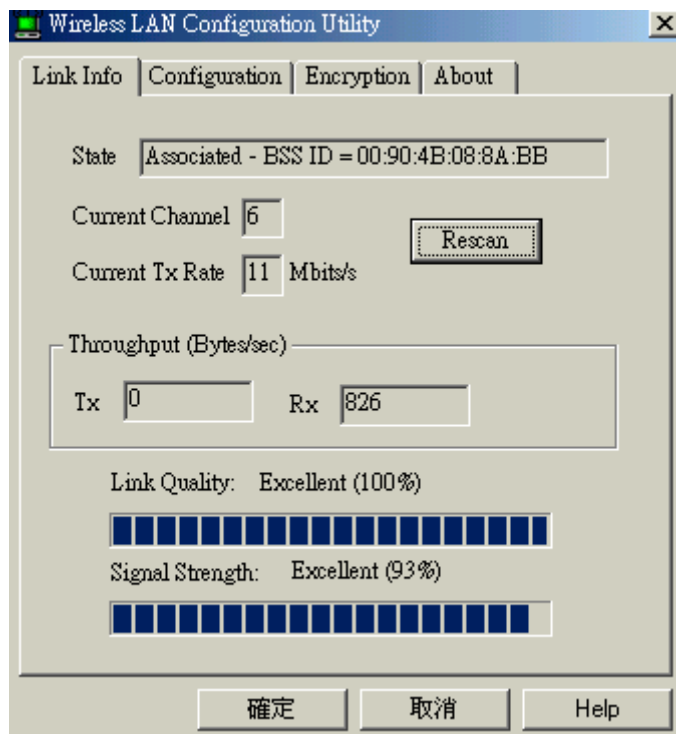
A new icon should appear in your Icon tray. If the icon with a red“x”tells that Wireless LAN 11 Mbps NIC configuration is invalid or incompleted. It happens when driver is in Pseudo BSS mode, and the radio channel used for communication is defined incorrectly.

Double clicking on that new icon will show you the screen as shown below.



Figure 1 Icon tray with a new icon





**Figure 2 Management window with “Status”**

In this section, we will explain meanings and uses of various screen messages. Clicking or tapping sheets with a stylus to navigate; Clicking “OK” to minimize window and “X” to close the application.

## Link info

### State

State is to display the current state of the driver.

When the state is “Associated”, flow of operation in Infrastructure is normal, the PC is connected to access point, BSSID is shown in the form of hex digits and Network is available.

When the state is “Scanning”, the node is searching for available access point and it can not detect the SSID for an access point within the range.

An error message may be displayed here for some reason the driver failed to initialize.

### Rescan

Rescan allows the driver to restart and begins its connection procedure. Different modes of the driver perform different connection procedure.

### Infrastructure Mode

Non-stop scanning all available channels until it finds one or more Access Points that matches its SSID and then, it will authenticate and associate with the Access Point.

### **Ad Hoc Mode**

It will scan for 5 seconds searching for an existing Ad Hoc network that uses the same SSID. While not found, it will start its own Ad Hoc network.

### **Current Channel and Tx Rate**

Here displays the channel of the radio and transmit rate that are currently used for an active connection. If radio is “Scanning”, there is no particular meaning.

### **Throughput**

Here displays the instantaneous wireless Receive and Transmit throughput in bytes per second. They are updated every two seconds.

### **Link Quality bar graph**

This is active only when the node is in Infrastructure Mode. Here displays the quality of the link between the node and its Access Point. One of the following statuses will be indicated by the quality of the link over the bar graph:

- Not Applicable
- Poor
- Fair
- Good
- Excellent

Since link Quality is a measure of receives and transmits errors over the radio, the driver will start looking for a better Access Point when the Link Quality indication displays “Poor”.

### **Signal Strength bar graph**

It is active only when the node is in Infrastructure Mode. Here displays normalized signal strength as reported by the radio, averaged over all frames over 100 bytes long that are received from the Access Point.

### “Configuration” Tab

The Configuration Tab contains several different field areas where users can view or alter operating parameters of the driver. Any changes of the parameters made in this panel can be applied to the driver without restarting the PC.

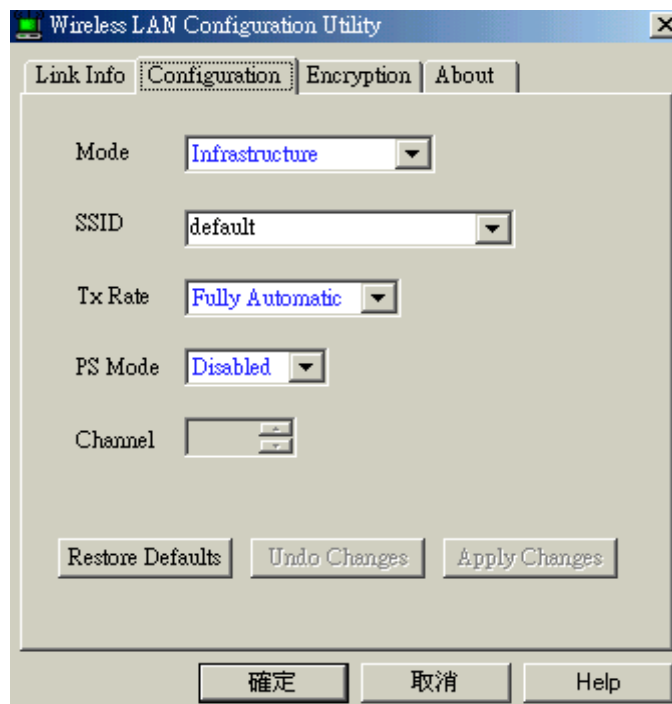


Figure 4 Management window with “CONFIGURATION” tab open

## Restore Defaults

Clicking on Restore Defaults will restore each field in the panel to its default value. However, the “Apply Changes” or “OK” button must be selected before the default values are saved to the driver and registry.

## Undo Changes

Clicking on Undo Changes will revert all fields in the panel back to the original values that were presented previously while the Configuration Utility was opened from the Task Bar.

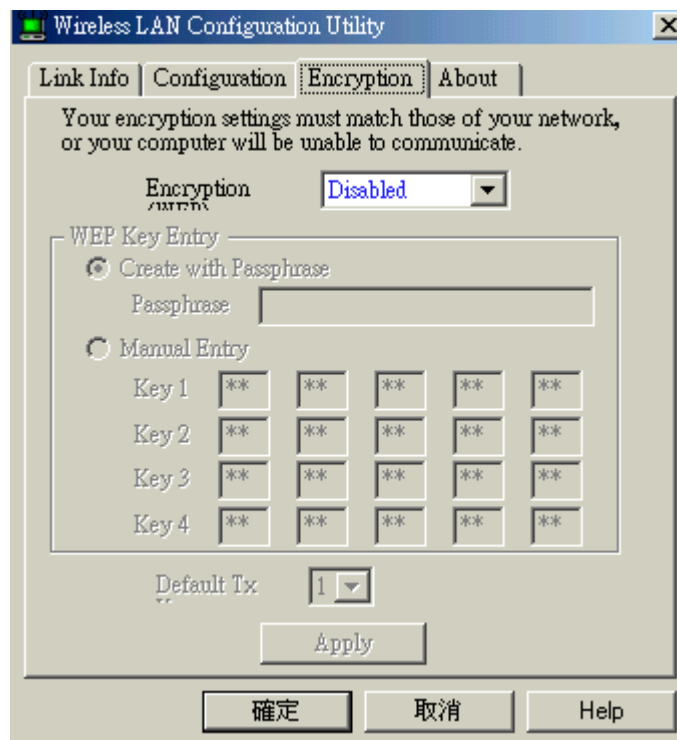
## Apply Changes

It is active only when one of the fields has been altered. Clicking on the Apply Changes will apply the altered values to the driver and saves them to the registry for the next time PC restarts.

## Mode

This field enables you to choose from a list of supported Network “Modes”. The modes shown will have three values, i.e. 802.11Ad Hoc, Ad Hoc and infrastructure.

- **802.11 Ad Hoc:** The 802.11 peer-to-peer mode of operation. 802.11 Ad Hoc networking use the same SSID for establishing the wireless connection. In 802.11Ad Hoc, only one wireless “cell” is supported for each different SSID. All communication is performed from Client to Client without using an Access Point.
- **Ad Hoc:** Ad Hoc is a non-compliant mode that allows Prism2 cards (only Prism2) to talk with one another without the use of an AP (regardless any SSID). It is not standards compliant so that it would have the interpretability with non-Prism2 radios.
- **Infrastructure:** Here, all communication is performed via an Access Point that relay packets to other wireless Clients in the BSS and nodes on a wired network. (E.g. Ethernet.) This mode of operation requires the presence of an 802.11 Access Point.
- **TX Rate:** This is the transmission rate where the data packets are transmitted by the client of an AP. You can set this to fixed 1 Mbps, fixed 2Mbps, fixed 5.5 Mbps or 11 Mbps.
- **PS Mode** – Power Saving Mode.

**“ENCRYPTION” Tab****Figure 5 Management window with “encryption” tab open**

An additional security measurement may be desired on protecting your wireless network. This can be achieved by applying WEP (Wired Equivalent Privacy) encryption. WEP encrypts each frame transmitted from the radio by using one of the

Keys entered from this panel.

An encrypted frame received can be accepted only when it decrypts correctly. This happens only when the receiver has the same WEP Key used by the transmitter.

According to the WEP function selected, this panel allows the entry of four keys for 64-bit encryption and one set of 128-bit key. To be written to the driver and registry, each key must consist of six digits meaning from digit 0-9 and letters A-F that are recognized as valid entries. If entered wrongly, program will not write keys to a driver. On the other hand, a Pass-phrase can be entered (known as a “seed”) to randomly organize the four keys. This saves significant timing since the same keys must be entered into each node on the wireless network.

### **Key 1 – Key 4**

The Keys can be entered manually in these four fields. It may be necessary if you prefer this node to match keys in a different vendor’s product. If they are organized by using a Pass-phrase, the Keys are displayed in these fields.

### **Default Tx Key**

For 128 bit encryption, this Default Tx Key button will be invisible. Default Tx Key updates the driver with the four keys that are displayed in key 1 through key4. The keys are also written to the registry for permanent storage.

### **Apply**

This Apply button updates the driver with the four keys displayed in Key1 through Key4. The keys are also written to the registry for permanent storage. This Apply button clears all the bytes in the four keys. It is useful when you wish to start over and apply manually entering.

## “ABOUT” Tab

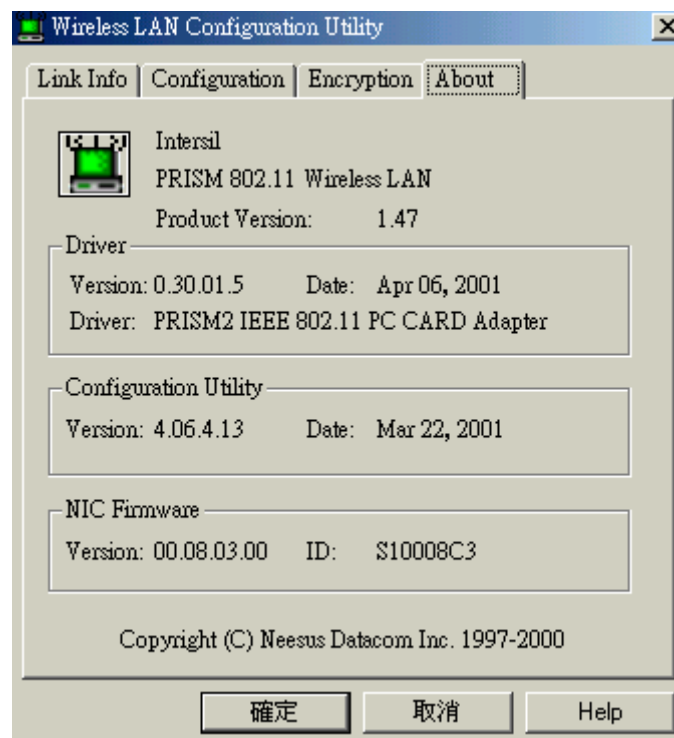


Figure 6 Management window with “ABOUT” tab open

About Tab tells the product version including the detail of Driver, Configuration Utility, and NIC Firmware version. Users must tell this version number when reporting their problems to technical support.

## 6. Troubleshooting

To have the installation of Wireless LAN Card more users friendly, we suggest users following the installation procedures step by step as listed in the section 4 and section 5. If some problems occur when installing the WLAN Card OR you want to confirm if your card is installed properly, here are the procedures for checking the various components after you have installed the card.

First part of Troubleshooting contains suggestions to users to check various properties of the card for the proper installation. In second section lists various problems that may occur during the installation as well as the possible solutions. It is recommended that users check the first part to identify the probable reason of unsuccessful installation.

### **Procedure to Check the Various Properties of Card after Installation under Windows 95 (OSR2)/98:**

If some problems occurred while installing the PC card **OR** your PC Card is not functioning, please check the followings:

- I. Click on the **CONTROL PANEL** and then **PC CARD**. Check if it has **WIRELESS 11Mbps PC CARD** in one of the sockets. If it is in one of the sockets, the card is detected properly. If there is **YELLOW** sign question-mark (?), the resources are conflicting.
- II. Right click on **MY COMPUTER** and then **PROPERTIES**. Choose the **DEVICE MANAGER** and click on the **NETWORK ADAPTER**. You will see **WIRELESS 11Mbps PC CARD** if it is installed successfully. If there is **YELLOW** sign (?), the resources are conflicting. Click on **PCMCIA CARD** and then **PCMCIA CARD SERVICE**, you will see the status of PCMCIA card. If there is yellow sign (?) either on adapter or PCMCIA card, please check the followings,
  - Check if your Notebook supports **3.3V** card.
  - Check if your Notebook has a free **IRQ**. If not, make an IRQ free by



assigning the same IRQ to some devices, for example COM 1, COM 2 can be assigned same IRQ values.

- Check if you have inserted the correct card and have installed the proper driver.

### **Procedure to Check the Various Properties of Card after Installation under Windows NT4.0:**

If some problems occurred while installing the PC card **OR** your PC Card is not functioning, please check the followings:

- I. Check the **WINDOWS NT DIAGNOSTICS**. You should see whether there is conflict in the **RESOURCE** allocation or the **I/O ADDRESS, IRQ** allocations. If the IRQ or I/O addresses are already assigned to some other devices, you must change that value, i.e. I/O address needs **40h** byte length.
- II. Click on the **CONTROL PANEL** and then, on the **PC CARD**, you will see **WIRELESS 11Mbps PC CARD**. Click on that will show you the **CARD INFORMATION, DRIVER NAME** and the **DRIVER FILE**. You must confirm the name of the driver and the driver file as **“cw10”** and **“cw10.sys”**. If you do not find the names as listed before, there are some problems and the driver is not installed properly. Reinstall the driver.

**NOTE:** Check the PnP BIOS setup menu and select **NO** in case of the Wireless LAN Card installation.

## **7. Technical specifications of Wireless LAN**

### **Hardware compatibility**

- IBM-compatible computer with a PC Card Type II

### **Driver support**

- Windows 95 OSR2
- Windows 98
- Windows 2000
- Windows ME
- Windows NT 4.0 and higher

### **Standards supported**

- IEEE 802.11 standard for Wireless LAN
- All major networking standards (including TCP/IP, IPX)

### **Environmental**

#### Operating voltage:

- +5V, +3.3V DC  $\pm 5\%$
- Nominal Temp Range: 17 dBm
- Extended Temp Range: 14 dBm min
- Transmit Power, 2.7v to 3v: 14 dBm min.

### **Radio specifications**

#### Range:

- per cell indoors approx. 35-100 meters or more
- per cell outdoors up to 100-300 meters

#### Frequency range:

- 2.4-2.4835 GHz, direct sequence spread spectrum

#### Number of Channels:

- Europe: 13(3 non-overlapping)
- US: 11 (3 non-overlapping)

- France: 4 (1 non-overlapping)
- Japan: 14 (4 non-overlapping)

Antenna system:

- Internal patch antenna supporting diversity.

Mobility:

- Seamless roaming across cell boundaries with handover

**Specific features**

Supported bit rates:

- 11Mbps
- 5.5 Mbps
- 1 Mbps
- 2 Mbps

Data encryption:

- 64/128 bit WEP Encryption

Utility Software:

- Management utility software