

**D-Link<sup>®</sup>**

CORPORATION

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# **Wireless USB Adapter Card**

**DW-120, DW-120XX**

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**User Guide**

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# Section 1

## Introduction

The Fast-VNET USB (A) adapter based on ATMEL AT76C503A Wireless Media Access Controller is a network card with a rate of 1, 2, 5.5, and 11 Mbps operating in the ISM band using Direct Sequence Spread Spectrum (DSSS) transmission implementing the IEEE 802.11b standard. For this card ATMEL currently provides Device Drivers for MS Windows® 98/2000, and Windows® Me. ATMEL also provides tools for the configuration and firmware upgrade of the cards. These tools, as well as the installation procedure for the MS Windows 98/2000, and Windows Me operating systems are described in this document.

To install the adapter and operate under an operating system two pieces of software are needed. The first one is the driver, which provides the necessary mechanisms to the operating system in order to use the adapter as any other networking adapter. The driver communicates with the firmware using exchange of commands (Set MIB, Get MIB, Scan, Sync, etc.). The other piece of software needed is the code written on the MAC chip, which is responsible for the interface with the driver, and for the implementation of the IEEE 802.11b functions.

### 1.1 Package

#### Contents

Please make sure that you received the following with your AT76C503A-Evaluation Kit:

- Two (2) Fast-VNET USB (A) cards
- Two USB Cables
- Two antennas
- User Guide
- Firmware, Drivers, and Software Tools CD

### 1.2 System

#### Requirements

- Operating System: MS Windows 98/2000, Windows Me with Service Pack 4 or later
- Desktop PC or notebook PC with CD-ROM drive

### 1.3 AT76C503A

#### Features

AT76C503A based Fast-VNET adapters offer compliance with the IEEE 802.11b specification. This feature allows them to communicate with wireless devices from other manufacturers that support the standard. Among the features of the AT76C503A WLAN MAC controller are the following:

- **Wireless interface following the IEEE 802.11b standard supporting DSSS 2.4 GHz wireless PHY**
- **Wireless LAN MAC Unit with ARM7TDMI RISC processor**
- **Integrated 128-byte transmit and 128-byte receive FIFOs, for wireless MAC layer functions**
- **16-bit PCMCIA bus interface**
- **Glueless SRAM interface for all MAC operations, supporting up to 16 MB of external memory**
- **Integrated 6Kx32 bit internal SRAM, used for fast program code execution and temporary storage of data**
- **Glueless Flash memory interface, supporting up to 16 MB on non volatile memory for permanent storage of program code**
- **Enciphering/deciphering of wireless data by the implementation of the WEP algorithm**
- **Supports 11, 5.5, 2, and 1 Mbps rates**

## **1.4 Firmware**

### **Features**

The IEEE 802.11b firmware implementation for the AT76C503A-EK supports:

– **Distributed Coordination Function**

**CSMA/CA**

**Backoff Procedure**

**NAV Management**

**ACK Procedure**

**Retransmission of unacknowledged frames**

– **RTS/CTS Handshake**

– **Duplicate Detection and Recovery**

– **Beacon Generation (ad-hoc mode)**

– **Probe Response (ad-hoc mode)**

– **Fragmentation and Reassembly**

– **Wired Equivalent Privacy Algorithm (WEP-40 bits, 128 bits)**

– **Auto Rate Fallback**

– **TSF synchronization**

– **Short Preamble**

**1.5 Driver Features** The drivers for the AT76C502-EK support:

– **Roaming**

– **Preferred AP**

– **Dynamic configuration**

– **Site Survey**

– **Preamble Type detection**

– **Firmware Upgrade**

– **Authentication Algorithm (Open System, Shared Key)**

## Section 2

# Installation Overview

This is a quick step by step guide on how to install your Fast-VNET USB (A) adapter. Please follow the steps described below and refer to the appropriate sections for further details:

- Power on the computer (laptop).
- Please make sure that you don't insert your USB (A) adapter yet.
- Install the drivers and application:

**Insert** the given Installation CD into your CD-Rom drive. Select the Utilities & Drivers folder.

**Locate** the executable file "setup.exe" and double click it.

**Follow** the installation instructions from the installShield Wizard by pressing the "Next" button.

**Choose** the type of installation you are going to perform (Application Only, Application & PCMCIA Drivers, Application & USB Drivers or Application & PCMCIA & USB Drivers).

**Give** the destination path of where the application will be installed. To set the path of your choice select Browse and then Next.

**Choose** the Mode of Operation (Ad-Hoc or Infrastructure):

**In Ad-Hoc Mode**, set the ESSID of all station participating to be the same and choose the channel of operation.

**In Infrastructure Mode**, set the ESSID to be the same with the ESSID of the AP to which you will be associated with.

**Confirm** the current settings of ESSID, Network Mode and Utility directory and click Next.

**Finish** the installation.

- Plug your USB (A) card.
- The "Add New Hardware Wizard" automatically loads the Drivers.
- Refer to sections 3 for more details on the installation and configuration under Windows 98/2000 and Windows Me. Section 4 gives detailed instructions on how to use the Configuration Utility while section 5 given detailed instructions on how to use the Firmware Upgrade Utility.

### Upgrading your Wireless LAN Software when a new setup is released:

For Windows 98/Me

- Power on the computer (laptop).
- Uninstall the application by running the uninstall program.
- When prompted for reboot select "YES".
- After rebooting run the new setup.exe.
- When the setup of the application (see instructions above) is completed, you can then plug your USB (A) card.

**Note:** If you select the "Application Only" Installation option the installation procedure will only install the Utility while selecting any other option it will also install the latest drivers for your wireless card without prompting you.

For Windows 2000

- Power on the computer (laptop).
- Uninstall the application by running the uninstall program.
- When prompted for reboot select "YES".
- Run the new setup.exe.
- When the setup of the drivers and application (see instructions above) is completed, you can then plug your USB (A) card.

# Section 3

## Installation and Configuration Procedures Under Windows 98/Me/2000

Use the procedures described in this chapter to install and configure the Fast-VNET USB (A) card under MS Windows 98/Me/2000.

### 3.1 What You Need to Know About Windows 98/Me/2000

Although similar in appearance, Windows 98/Me/2000 have different philosophies when installing a new hardware.

Throughout this section it is assumed that you have a basic working knowledge of Windows 98/Me/2000 and of how to install new network cards on them. However, in this paragraph, some specific features of Windows 98/Me/2000 are briefly explained.

Windows 98/Me/2000 operating system supports the “Plug & Play” feature. That means that once you plug the Fast-VNET card for the very first time, the operating system will detect the card and automatically install the driver assuming that you have already installed the application utility.

Another feature is the “Hot Swapping”. With this feature, you can unplug and plug again the card whenever you want.

### 3.2 What You Will Need

During the installation, you may be prompted to load operating system files from the Windows installation disk. Please have this disk handy.

You will need the Firmware and Software Tools CD provided with your Evaluation Kit.

**Note:** In order to be able to install the Fast-VNET card on to your PC running under Windows 2000, you will need to log on as “Administrator”.

### 3.3 Installing the Application and Drivers Under Windows 98/Me/2000

**Note: Please do not plug your USB (A) card until the Application setup has been completed. The setup procedure described below installs the drivers, the Configuration & Monitor Utility and the Firmware Upgrade Utility.**

1. Insert the Firmware and Software Tools CD into your CD-ROM drive and locate the executable file “setup.exe”.
2. Follow the installation instructions from the InstallShield Wizard by pressing the “Next” button.

3. During the setup process, the window of Figure 3-1 will appear prompting you to select the adapter type you are going to install. If you plan to install an ATMEL USB (A) card only, then you must choose the “Application & USB Drivers” option. However, if you plan to install an ATMEL PCMCIA card in the future!, select the “Application, PCMCIA & USB Drivers” option.

**Figure 3-1.** Selection of adapter type



**Application & PCMCIA Drivers:**

- By selecting this installation option, you will install the Applications (Configuration & Monitor Utility and Firmware Upgrade Utility) and the latest PCMCIA drivers. If the PCMCIA drivers have been previously installed and they have not been uninstalled prior to the new installation the new drivers will overwrite the old ones without prompting you.

**Application & USB Drivers:**

- By selecting this installation option, you will install the Applications (Configuration & Monitor Utility and Firmware Upgrade Utility) and the latest USB (A) drivers. If the USB (A) drivers have been previously installed and they have not been uninstalled prior to the new installation the new drivers will overwrite the old ones without prompting you.

**Application, PCMCIA & USB Drivers:**

- By selecting this installation option, you will install the Applications (Configuration & Monitor Utility and Firmware Upgrade Utility) and the latest PCMCIA & USB (A) drivers. If the PCMCIA & USB (A) drivers have been previously installed and they have not been uninstalled prior to the new installation the new drivers will overwrite the old ones without prompting you.

**Application Only:**

- By selecting this installation option, you will only install the Applications (Configuration & Monitor Utility and Firmware Upgrade Utility).

4. After you have assigned the Destination Location option where the application will be installed (by Default this option is set to C:\Program Files\ATMEL\802.11 Wireless LAN), you can then choose the mode of operation:

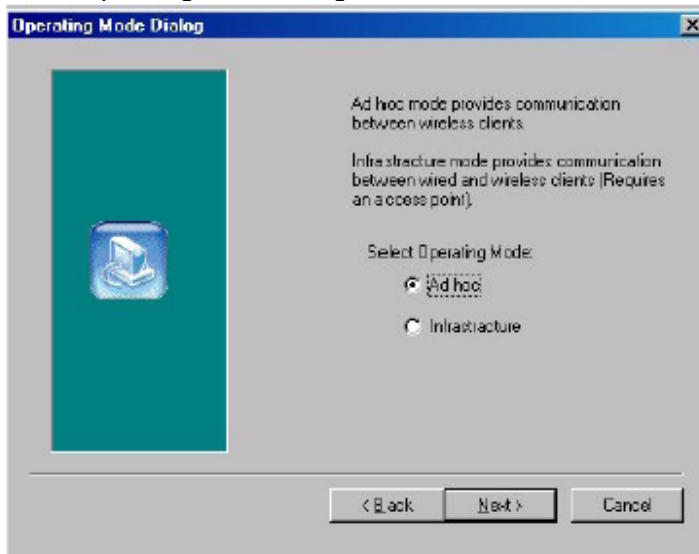
3a. Ad-Hoc (Figure 3-2, Figure 3-3)

3b. Infrastructure (Figure 3-4, Figure 3-5).

**Ad-Hoc Mode**

In Ad-Hoc Mode the wireless stations can directly communicate with each other.

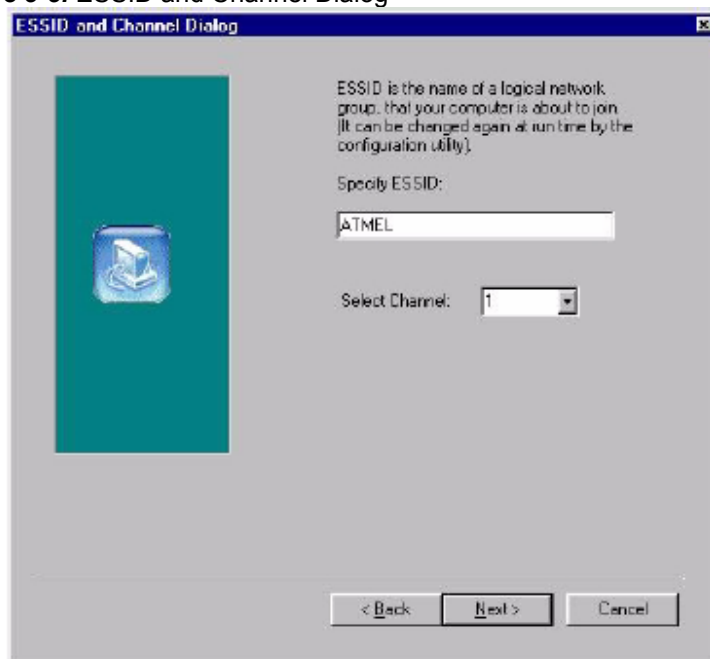
**Figure 3-2.** Operating Mode Dialog



When selecting the Ad-Hoc mode you have to specify the ESSID and the Channel parameters (Figure 3-3).

- ESSID: Select the ESSID of the Ad-Hoc network. All stations participating in the Ad-Hoc network should have the same ESSID.
- Channel: Select the channel to be used. There are 14 channels available.

**Figure 3-3.** ESSID and Channel Dialog



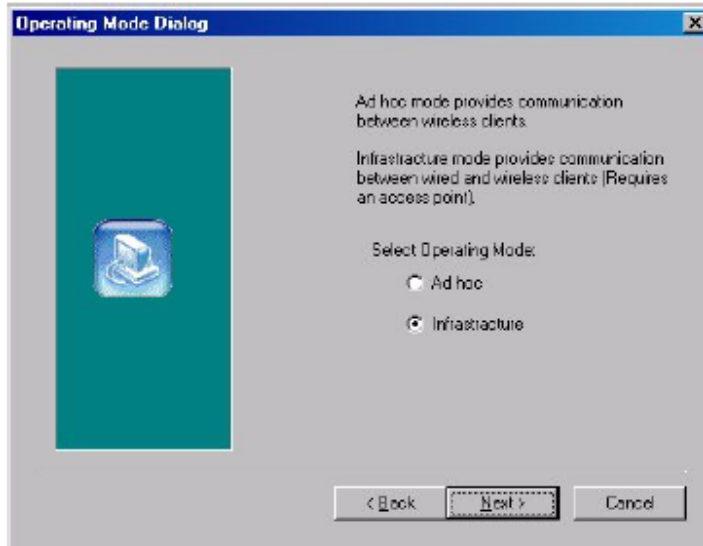
As soon as you have set your selections, press the “Next” button and a window appears with a review of your installation settings. Please make sure that these values are the desired ones. In case you have made a mistake you can always select the “Back” button to make a correction. Press the “Next” button to continue with the installation, and finally select the “Finish” button for the installation to be completed.



### **Infrastructure Mode**

In Infrastructure Mode the use of an Access Point is necessary in order for the wireless clients to communicate with each other.

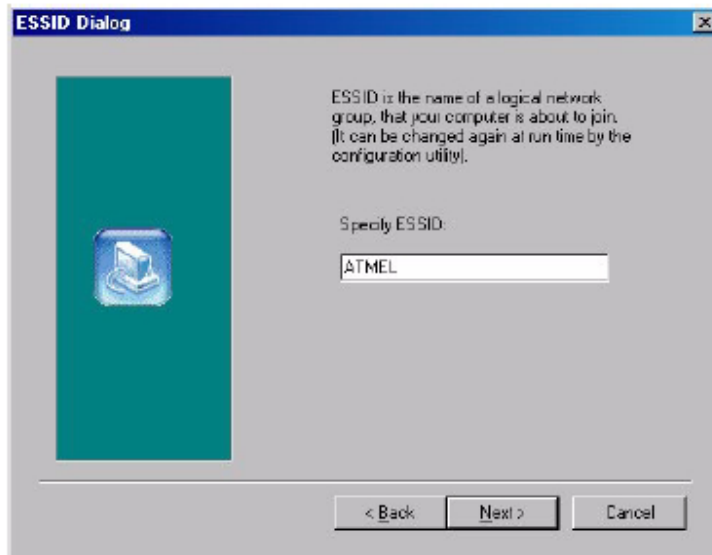
**Figure 3-4.** Operating Mode Dialog



When selecting the Infrastructure mode you need to specify the ESSID (Figure 3-5).

- ESSID: Select the ESSID of the access point to which the wireless station will be associated with in infrastructure mode.

**Figure 3-5.** ESSID Dialog



As soon as you have set your selections, press the “Next” button and a window appears with a review of your installation settings. Please make sure that these values are the desired ones. In case you have made a mistake, you can always select the “Back” button to make a correction. Press the “Next” button to continue with the installation, and finally press the “Finish” button for the installation to be completed.

Notes: 1. You can now safely plug your USB (A) card. The “Add New Hardware Wizard” automatically loads the Drivers for your USB (A) card. As soon as the procedure has been completed.

2. In the Windows 2000 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".

### **3.4 Uninstall**

#### **Procedure Under**

#### **Windows 98/Me**

In order to uninstall the Configuration & Monitor Utility from Windows 98/Me, you must select the "Uninstall Configuration & Monitor Utility" option (Start -> Programs -> Atmel 802.11 Wireless LAN -> Uninstall Configuration & Monitor Utility). It is recommended to stop the USB (A) card and "Exit" the application prior to starting the unistallation procedure.

If during the unistall procedure you receive an error message, please insert the CD which contains the setup program and try to uninstall the Utility again.

The above procedure uninstalls the Configuration & Monitor Utility, but not the card itself. In order to uninstall the Fast-VNET card from Windows 98/Me, you must double click on the "Network" option in the "Control Panel" (Start -> Settings -> Control Panel). Select the "ATMEL USB FastVNET (A)" card from the list and press the "Remove" button. The system will prompt you to re-boot. Press "Yes" to re-boot.

### **3.5 Uninstall**

#### **Procedure Under**

#### **Windows 2000**

The procedure in order to remove the Monitor & Configuration Utility is the same with the one described for Windows 98/Me.

In order to uninstall the Fast-VNET card from Windows 2000 you must select it in the Device Manager of Windows 2000 and press "Uninstall". **The "Uninstall" procedure can be performed only if the Fast-VNET card is plugged in.**

# Section 4

## Configuration & Monitor Utility

The Configuration & Monitor Utility is a powerful application that helps you to configure the Fast-VNET 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 parameters while the card is operating. It also offers some more configuration options. ATMEL offers the Configuration & Monitor Utility for Windows 98/Me/2000.

**Note:** Please keep in mind that the Configuration & Monitor Utility can be used to change the above configuration parameters when the cards are active. When the cards are not in use, please use the Control Panel method described in previous sections.

### 4.1 How to Install the Configuration & Monitor Utility

In order to setup the Configuration & Monitor Utility run the program "setup.exe," which you will find in your installation CD and follow the instructions as they appear on the screen (see section 3). As soon as a link is established, the application will start running and will appear as an icon on the system tray. You can locate the application under Start -> Programs -> ATMEL 802.11 Wireless LAN -> Configuration & Monitor Utility.

### 4.2 Using the Configuration & Monitor Utility

The Configuration & Monitor Utility appears as an icon on the system tray of Windows every time the card is running (see Figure 4-1). 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 the icon is red. As soon as the station associates itself to an Access Point (see page 4-4 "Site Survey"), the icon color automatically turns to blue. In Ad-Hoc mode the color is always blue, except when the card is resetting and Initialising where it turns to red during the reset and initialisation procedure.

**Figure 4-1.** The icon of the Configuration and Monitor Utility



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

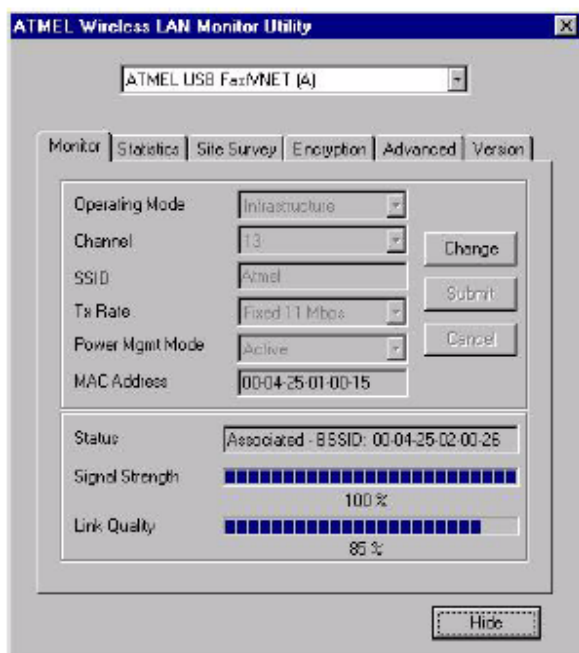
- Monitor
- Statistics
- Site Survey
- Encryption
- Advanced
- Version

**Note:** Please Note that at the very top of the Monitor and Configuration Utility of the application (Figure 4-2), you can either select ATMEL PCMCIA FastVNET (3.3V) or ATMEL USB (A) FastVNET card.

#### **Monitor**

A typical screen of the application in Infrastructure mode is shown in Figure 4-2. The configuration parameters are shown at the top of the screen (Operation Mode, Channel, SSID, TxRate, Power Management Mode and MAC Address of the USB card). In the middle of the screen there is information about the status of the communication (the BSSID of the Access Point to which the card is associated, Signal Strength, and Link Quality). In order to change the configuration parameters press the "Change" button,

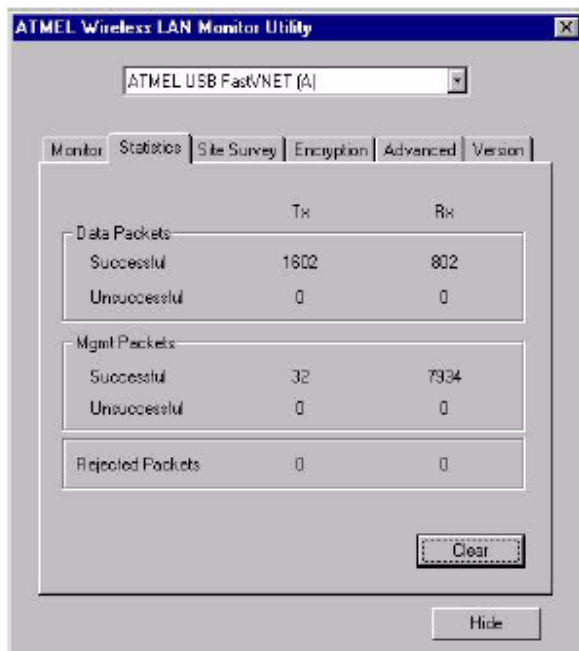
make your changes and then press “Submit” in order to save your changes.  
**Figure 4-2.** A typical screen of the Monitor Utility in Infrastructure mode.



### **Statistics**

This option enables you to view the available statistic information (Data packets, Management Packets and Rejected packets). In order to renew or update this list of statistics, press the “Clear” button. In order to exit press the “Exit” button at the bottom of the screen.

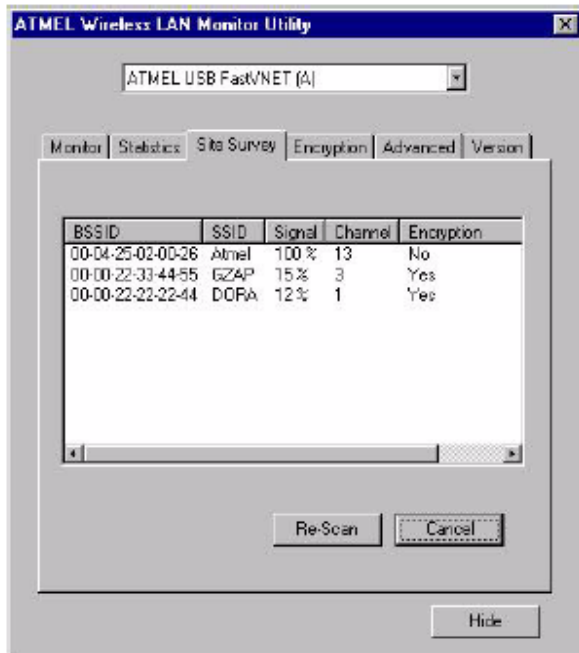
**Figure 4-3.** Stastic information available



### 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 4-4, 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 “Rescan” 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.

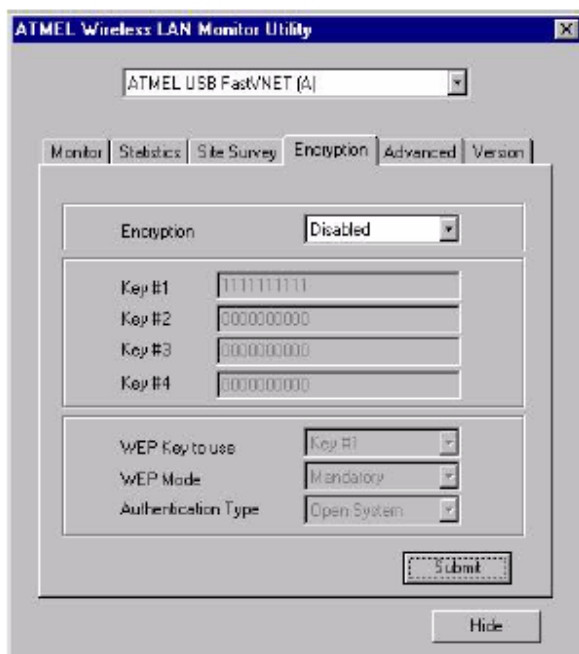
**Figure 4-4.** Site Survey Option



### **Encryption**

By choosing this option 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 4-5 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 4-5.** Encryption

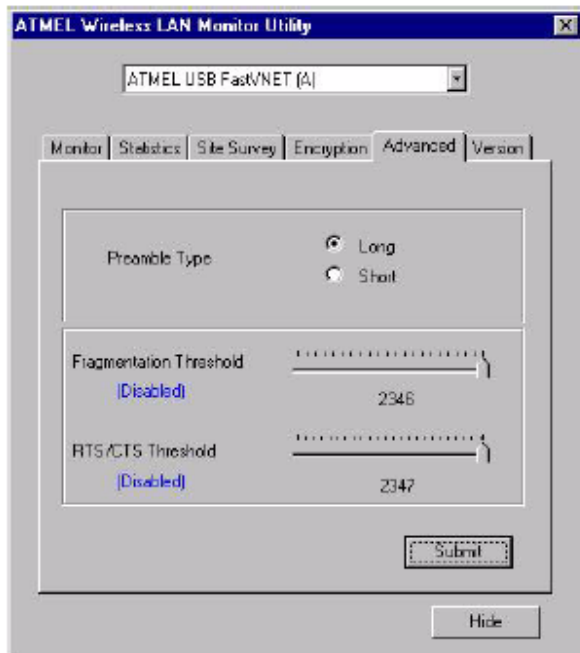


### **Advanced**

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 4-6). Figure 4-5 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 USB (A) 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.

**Figure 4-6.** Advanced Settings



**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 4-7.** Version information



### 4.3 How to Uninstall the Configuration & Monitor Utility

In order to uninstall the Configuration & Monitor Utility, you must select the “Uninstall Configuration & Monitor Utility” option (Start -> Programs -> Atmel 802.11 Wireless LAN -> Uninstall Configuration & Monitor Utility). It is recommended to “Exit” the Configuration & Monitor Utility prior to starting the unistallation procedure. Finally a window will appear prompting you to reboot and you must select YES.

## Section 5 Firmware Upgrade Utility

For the Fast-VNET USB (A) cards, ATMEL offers a firmware utility which is a Windows application (Firmware Upgrade utility) that allows you to upgrade the firmware of your card while your card is running.

### 5.1 Firmware Upgrade Utility

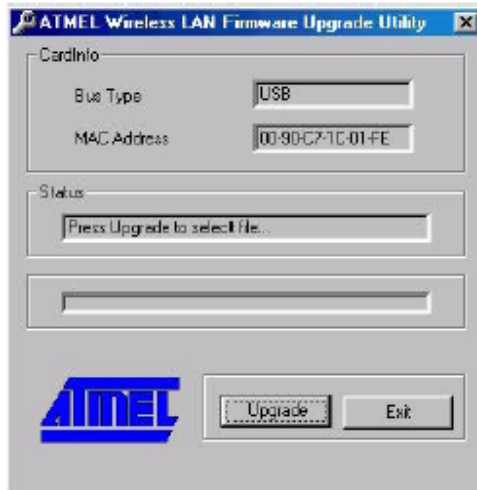
**Note:** Please DO NOT use this utility unless you have got new binary files from ATMEL. If you use this utility and you do not supply the correct binary file, you may damage your card.

The Firmware Upgrade utility allows you to upgrade the firmware of your card while your card is running. It will download the new firmware and it will reset your card in order to start operating with the new firmware.

ATMEL offers the Firmware Upgrade Utility for Windows 98, Windows Me, Windows 2000.

The Firmware Upgrade Utility is automatically installed when you run the program “setup.exe” of you installation CD (see Section 4- “How to install the Configuration & Monitor Utility”). Locate the program from the Start Menu -> Programs -> ATMEL 802.11Wireless LAN -> Firmware Upgrade Utility. When you open the program, you will see the main screen of Figure 5-1.

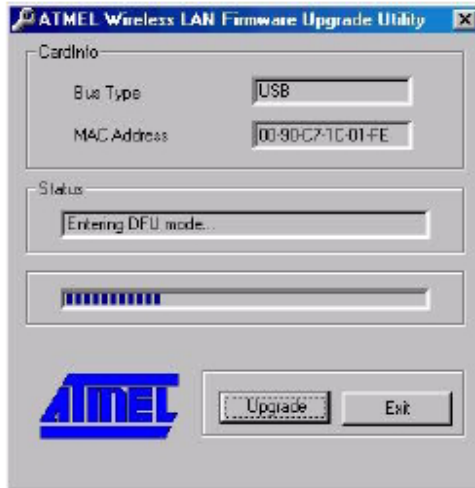
**Figure 5-1.** The ATMEL PCMCIA Firmware Upgrade Utility





Press the “Upgrade” button in order for a file selection window to appear. Browse for the xxxx.rom file that contains the new firmware. After you have located and selected the file, the firmware upgrade process will begin (Figure 5-2).

**Figure 5-2.** Upgrading the firmware



When the firmware has been upgraded, you will see a notification from the Firmware Upgrade Utility (Figure 5-3). Press “OK” to complete the upgrade.

**Figure 5-3.** Completion of the firmware upgrade procedure



## ***Regulatory Compliance Information***

### **FCC Notice**

This device has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the Federal Communications Commissions Rules and Regulation. 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 own expense. However, there is no guarantee that interference will not occur in a particular installation. If the 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 or more of the following measures:

- Re-orient 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 which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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.

### **FCC Radiation Exposure Statement**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

### **CAUTION**

Any change or modifications not expressly approved by the grantee of this device could void the user' authority to operate the equipment.

## **European Notice**

Equipment with CE marking complies with the R&TTE Directive (1999/5/EC), EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the European Community. Compliance with these directives implies conformity to the following European Norms or Regulations (in parentheses are the equivalent international standards and regulations):

- EN 55022 (CISPR 22) – Electromagnetic Interference
- EN 50082-1 (IEC 801-2, IEC 801-3, IEC 802-4) – Electromagnetic Immunity
- EN 60950 (IEC 60950) – Product Safety
- ETS 300 326 – Technical characteristics and test conditions for data transmission equipment operating in the 2.4GHz ISM band and using spread spectrum modulation techniques
- ETS 300 826 – Electromagnetic Compatibility (EMC) standard for 2.4GHz wide band transmission systems and High Performance Local Area Network (HIPERLAN) equipment

This product may be used in the following EU and EFTA countries: Austria, Belgium, Denmark, Finland, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and United Kingdom. Products not marked with “Not for use in France” may be used in France.

## Specifications

<b>Radio Technology</b>	IEEE 802.11b Direct Sequence Spread Spectrum
<b>Operating Frequency</b>	2400-2497MHz ISM band
<b>Modulation Schemes</b>	DQPSK, DBPSK and CCK
<b>Channel Available</b>	11 channels for United States 13 channels for Europe 14 channels for Japan
<b>Data Rate</b>	11Mbps with fall back rates of 5.5, 2 and 1Mbps
<b>Media Access Protocol</b>	CSMA/CA with ACK
<b>RF Power</b>	16dBm
<b>Antenna Gain</b>	0 – 2 dBi
<b>Antenna Type</b>	Integrated dual diversity antennas
<b>Operating Voltage</b>	5VDC
<b>Interface</b>	USB 1.1
<b>Range Coverage</b>	Indoor: 35 - 100 meters (depends on environment) Outdoor: 100 - 300 meters (depends on environment)
<b>LED Indicator</b>	Power & Link status