# Access Point

# User Guide

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# Section 1

# Introduction

The AP (IEEE 802.11 HR, 11 Mbps WLAN Access Point) is a long-range, high performance LAN product, which provides Access Point services to a 2,4 GHz RF network and bridges to an Ethernet backbone. The design of this product is based on AT76C510 (bridge-on-a-chip) module, a highly integrated ASIC designed to combine legacy LANs with wireless LANs. AT76C510 performs all the necessary inter-networking and bridging functions. It receives data from both networks, stores them locally for further processing, installs and maintains connections and transmits the packets to the proper destination. Furthermore, AT76C510 interfaces three more modules, the Ethernet PHY, the wireless PHY and the RAM modules, for allowing compact system implementation and flexibility for supporting almost all the possible physical interfaces.

This document describes the steps required for the initial set up of the AP IP address, the AP configuration, and the firmware upgrade procedure. The description includes the implementation of the above steps through both Ethernet and USB.

## 1.1 Package Contents

Please make sure that you received the following with your AT76C510-Development Kit:

- One Bridge Access Point board
- One MACless Radio card
- User Guide
- Firmware, Drivers, and Software Tools CD

## 1.2 System Requirements

For configuration through USB:

- Operating System: MS Windows® 98
- Desktop PC or notebook PC with USB port
- USB cable
- 4.5-5V (regulated)-1Amp power supply cable

For configuration through Ethernet:

- Operating System: MS Windows® 98, Windows® 2000, Windows® NT 4.0
- Desktop PC or notebook PC connected on a LAN
- Ethernet cable
- 4.5-5V (regulated)-1Amp power supply cable

## 1.3 AT76C510 Features

Among the features of the AT76C510 bridge-on-a-chip are the following:

- **Glueless connection to Intersil PRISMI, PRISMII Direct Sequence Spread Spectrum (DSSS) radio chip set. Able to communicate also with other DSSS radios**
- **Supports 11, 5.5, 2 and 1 Mbps rates**
- **WEP encryption/decryption is accomplished on the fly**
- **Ethernet MAC supports MII interface and 10/100Mbit speeds**
- **Hardware modules for Packet Filtering and statistics gathering**
- **Glueless SRAM, Flash interface for data buffering and program storage, supporting up to 16 MB of memory**
- **Integrated 2 x 6K x 32 bit internal SRAM modules for fast 32-bit program execution and temporary storage of data**
- **Supports 3V supply**
- **128-pin PQFP, TQFP**
- **JTAG Boundary Scan (IEEE 1149.1) test access port for board-level production test**

## 1.4 Firmware Features

The IEEE 802.11 HR firmware implementation for the 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**
- **Probe Response**
- **Fragmentation and Reassembly**
- **Wired Equivalent Privacy Algorithm (WEP 40 bits)**
- **Authentication Algorithm (Open System, Shared Key)**
- **Short Preamble**

## 1.5 Bridging Functions

The following bridging functions are supported:

- **Automatic Learning Process**
- **Filtering Database**
- **Forwarding Process**
- **Protocol Filtering**
- **IP Filtering**

## 1.6 Management

For Bridge Management supports:

- **SNMP (MIB, traps)**
- **TFTP (firmware download)**
- **USB (DFU-configuration)**

## 1.7 Roaming

Roaming functions supported:

- **Among APs on the same subnet**

## 1.8 Operation Modes

Operation Modes supported:

- **Access Point**

## 1.9 Network Interface

AP supports 10/100 Mbps network interface.

## 1.10 Radio Interface

As far as the radio interface is concerned, AP supports:

- **Antenna Diversity**
- **Specific Antenna Tx/Rx**

# Section 2

# The AP Development Board

Figure 2-1 shows the  Access Point development board. The basic features of this board are outlined below:

- Interfaces directly to 10/100 IEEE 802.3 Ethernet networks.
- Supports IEEE 802.11b (High data rate) WLAN functions.
- Firmware is stored in a flash memory and can be upgraded remotely.
- Single 5V 1Amp universal power supply.
- Configurable through Ethernet and USB ports.
- Power and wireless activity LED indicators.

The MACless Radio card required is shown in Figure 2-2.

***Figure 2-1.*** AP development board

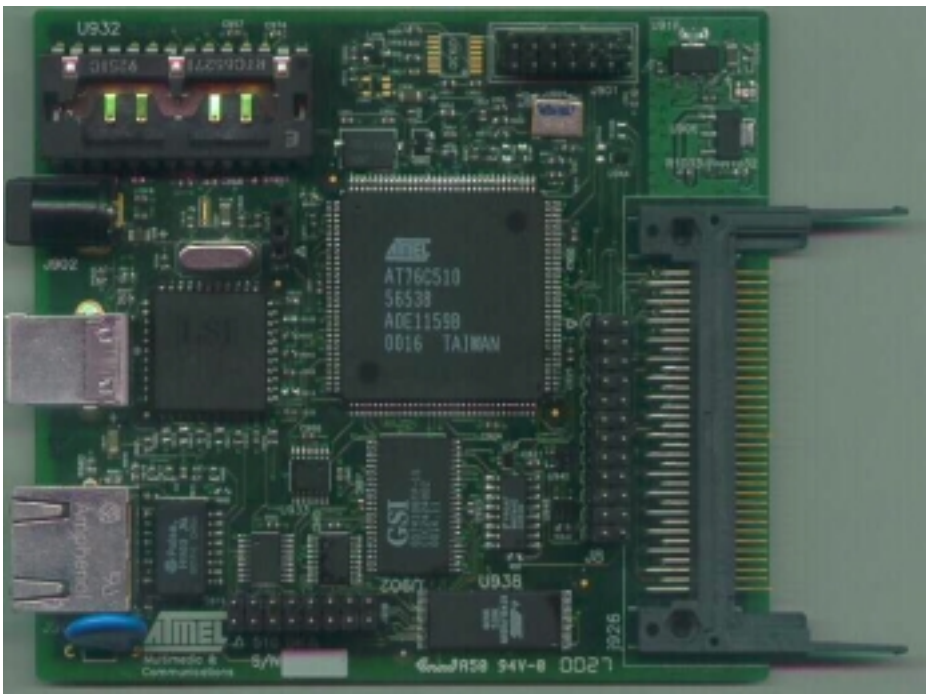


***Figure 2-2.*** MACless Radio

# Section 3

# Setting the IP Address of the Access Point

The first step in using the AP is to set its IP Address. This procedure can be done either through the Ethernet port by using a combination of Arp/Ping commands and the SNMP Manager, or the USB port by using the DFU utility.

## 3.1 Using the Ethernet Port

In order to set the Access Point IP address you need to know the Access Point MAC address. Follow the steps below giving the Access Point a temporary address at the beginning (Step A) and saving the IP address through the SNMP Manager application (Step B).

Step A:

1. Connect an Ethernet station and the Access Point on the same subnet. The simplest way to accomplish that is to connect the Access Point and the Ethernet station to the same hub. You need to check if the station IP address and the Subnet mask are configured properly. Also the new IP address for the Access Point must correspond to the Subnet mask.
2. Open a MS-DOS Prompt window and enter a static route in the arp table for the new IP address you want to assign. Use the arp -s command to do that:

   arp -s "new-IP-address" "AP-MAC-address"

   For example: arp -s 10.170.254.27 00-00-22-22-22-25
3. Ping the Access Point, using its new IP address.

   For example: ping 10.170.254.27
4. If you get a ping reply, then the IP address has been temporarily set. In order to set it permantly you need to proceed to Step B without powering off the Access Point.

Step B:

1. Execute the SNMP Manager application using the IP address as set above (Step A).
2. Save the current configuration through the SNMP Manager application.
3. Open the SNMP Manager application, select “Connect AP-Bridge” option under the “File” menu. Try to connect to the Access Point, by typing its IP address in the panel which appears and at the Community field, type "public" and then

press OK. Type the IP address in the “IP Configuration” window under the “Setup” menu, “Bridge” submenu. In order to save the configuration select “Download Changes” under the “File” menu. See also the paragraph “Using the SNMP Manager” in the section “Access Point Configuration”.

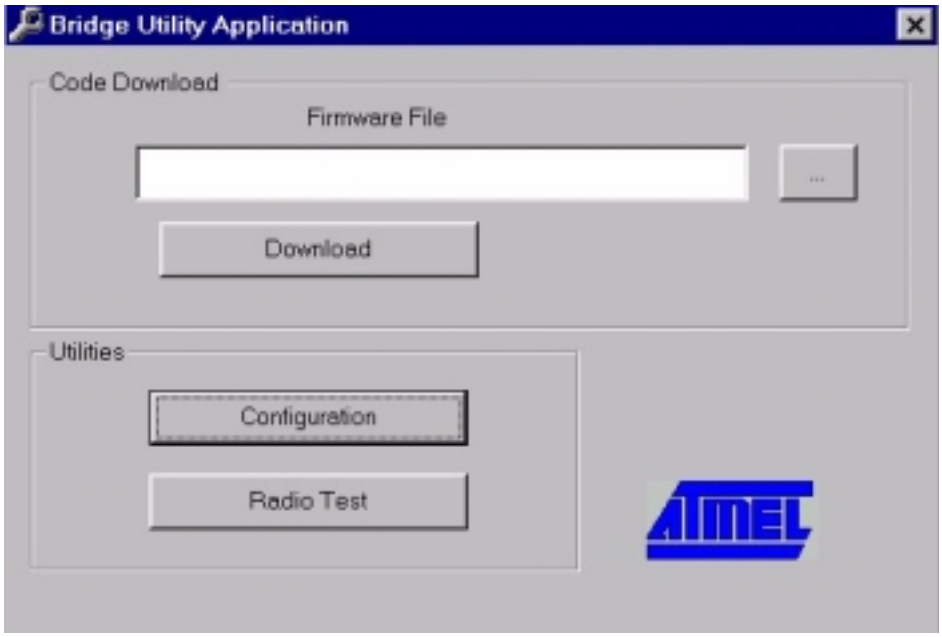
## 3.2 Using the USB Port

***Note:*** This procedure requires the use of the DFU Configuration Utility which can be used only through the USB port. When you connect the card to the USB port for the very first time, the operating system will ask for the driver of the card. Please locate the driver into your CD. At this time, only a driver for MS Windows 98 is available. After you have completed the installation of the driver, you can use the DFU Configuration Utility.

In order to configure the AP IP address through the USB port, you must use the DFU Configuration Utility.

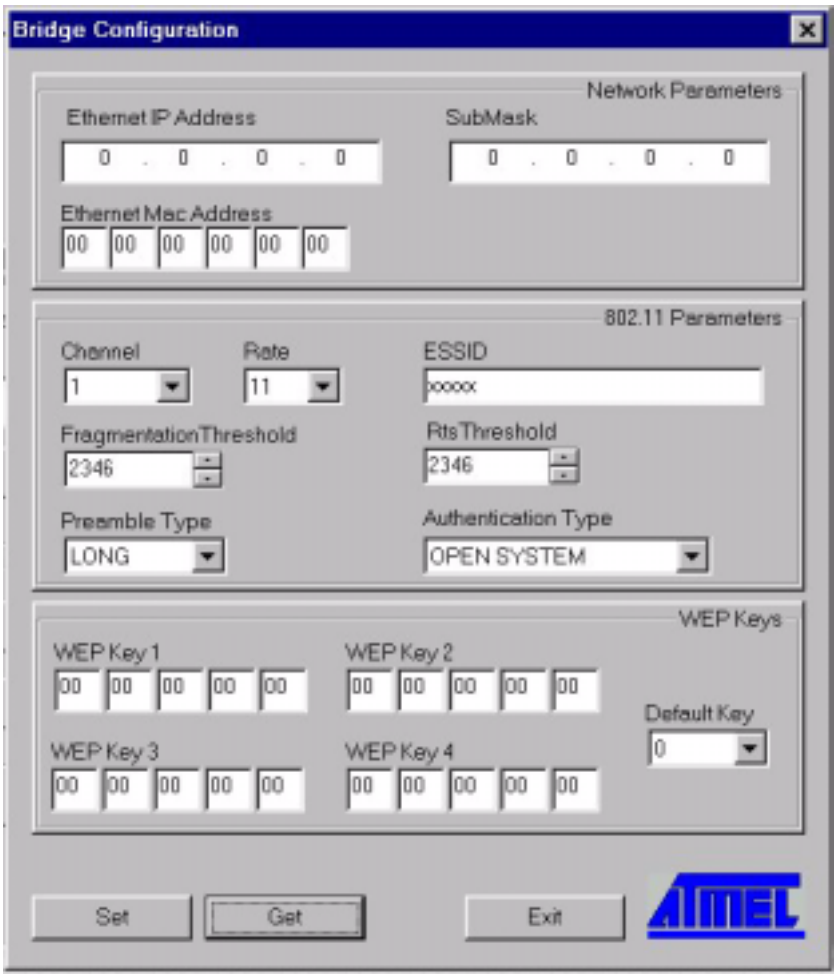
Plug the USB cable to the Access Point USB port. Open the application DFU.exe which you will find in the “Utilities” folder of your CD and select the “Configuration” button (Figure 3-1).

***Figure 3-1.*** DFU Configuration Utility




Press the “Get” button (Figure 3-2) if you want to view the current IP address. If you want to set a new IP address, first type the new IP address in the “Ethernet IP Address” field in the configuration window that is already opened, and then select the “Set” command. In order to set the new parameters you need to wait for a few seconds for the completion of this process.

***Figure 3-2.*** DFU Utility Bridge Configuration window



# Section 4

# Access Point Configuration

The AP configuration can be done either through the Ethernet port by using the SNMP Manager application, or the USB port by using the DFU Utility.

## 4.1 Using the Ethernet Port

In order to configure the AP through the Ethernet port, you must first install the SNMP Manager application, which is a powerful and reliable tool used for the remote configuration of the Access Point through the Ethernet port.

### 4.1.1 How to Install the SNMP Manager

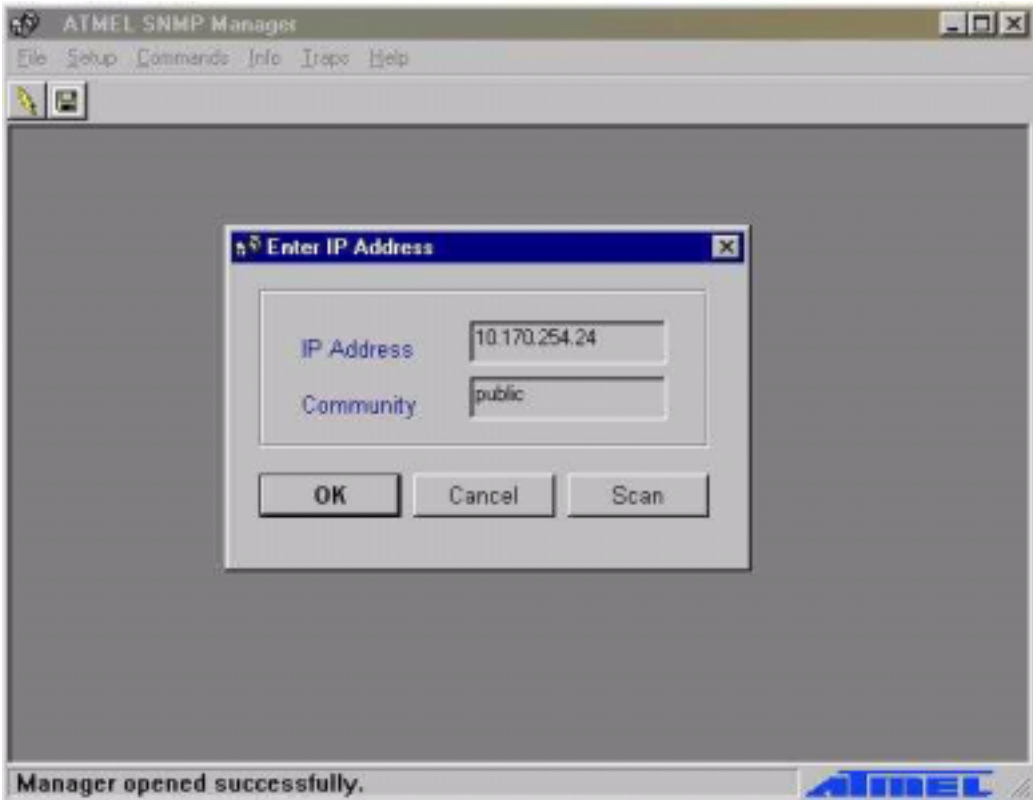
In order to install the SNMP Manager you need to extract the “SNMPManager.zip” file, which you will find into the “Utilities” folder of your CD, in a temporary file and then run the program “setup.exe”. Follow the instructions of the set-up program and select the directory where the application will be installed. Finally, a window will appear indicating the completion of the installation.

### 4.1.2 Using the SNMP Manager

***Note:*** Before using the SNMP Manager for configuring the AP, verify that the Access Point IP address has been set-up following the procedure described in the section “Setting the IP Address of the Access Point”.

On the Start Menu, select SNMP Manager. When the application opens, select “Connect AP-Bridge” option which is under the “File” menu. Try to connect to the Access Point, by typing its IP address in the panel which appears and at the Community field, type "public" and then press OK (Figure 4-1).

***Figure 4-1.*** Connecting to the AP using the SNMP Manager




In case of a successful connection to the Access Point, the following window appears (Figure 4-2). Press “OK”.

***Figure 4-2.*** Agent found


In case of an unsuccessful connection you receive the following message (Figure 4-3):

***Figure 4-3.*** Agent not found

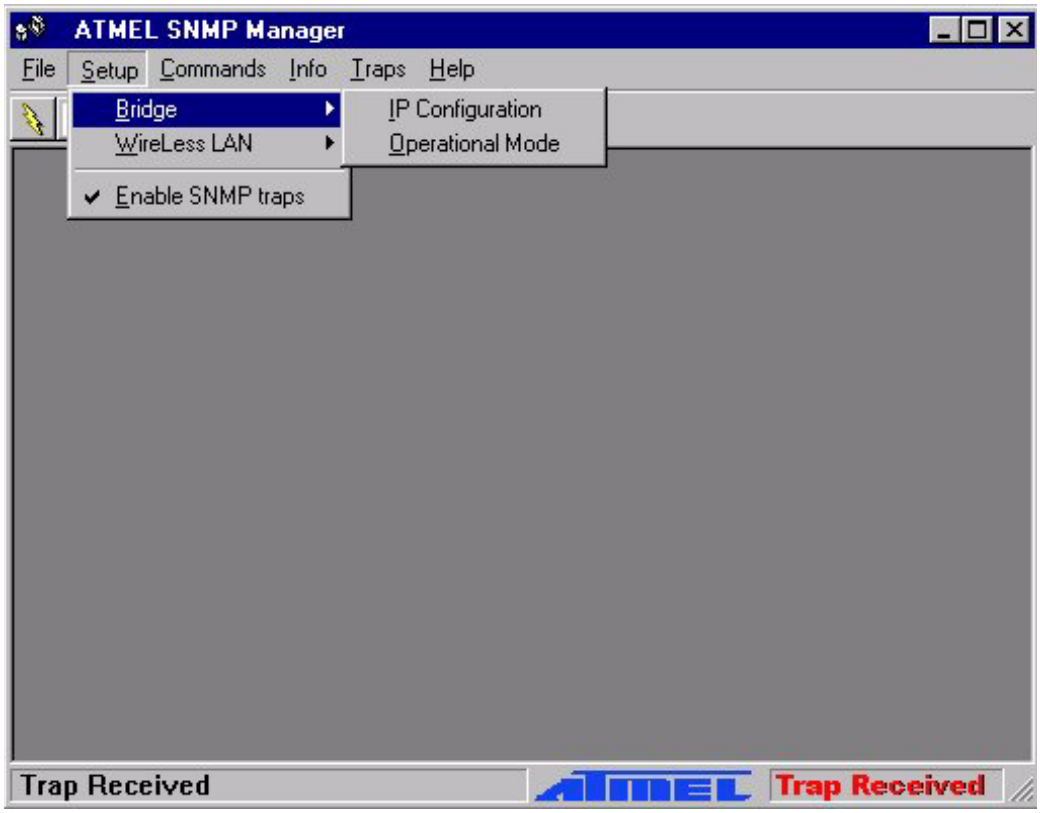

If the above error message appears, you need to check if the AP has the desired IP Address and is connected to the network. In order to check the validity of the IP Address you need to ping the AP.

When the connection has successfully been established, you get a message in the right bottom corner indicating “All values retrieved”. If the message “Not all values retrieved” appears, you need to repeat the above procedure (Figure 4-1).

As soon as the connection has been established, you are now able to start viewing or setting the Access Point parameters. Under the “Setup” menu, there are three options available (Figure 4-4):

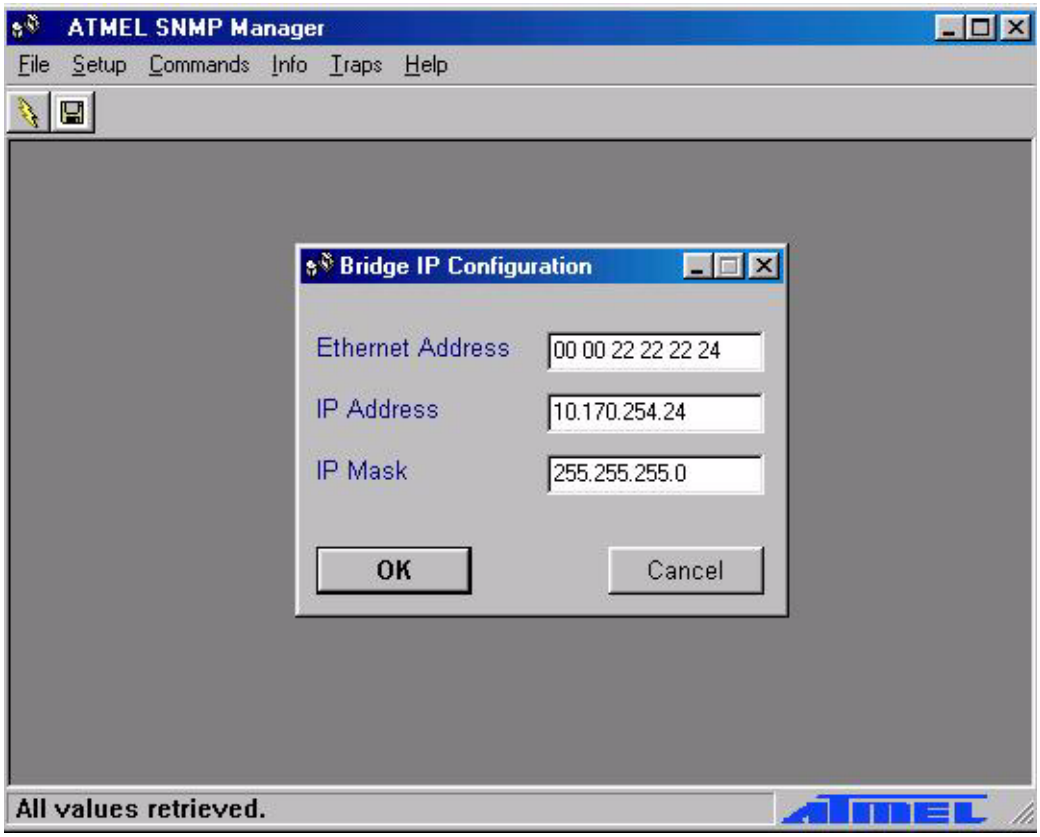
- Bridge
- Wireless LAN
- Enable SNMP Traps

***Figure 4-4.*** SNMP Bridge menu and submenus



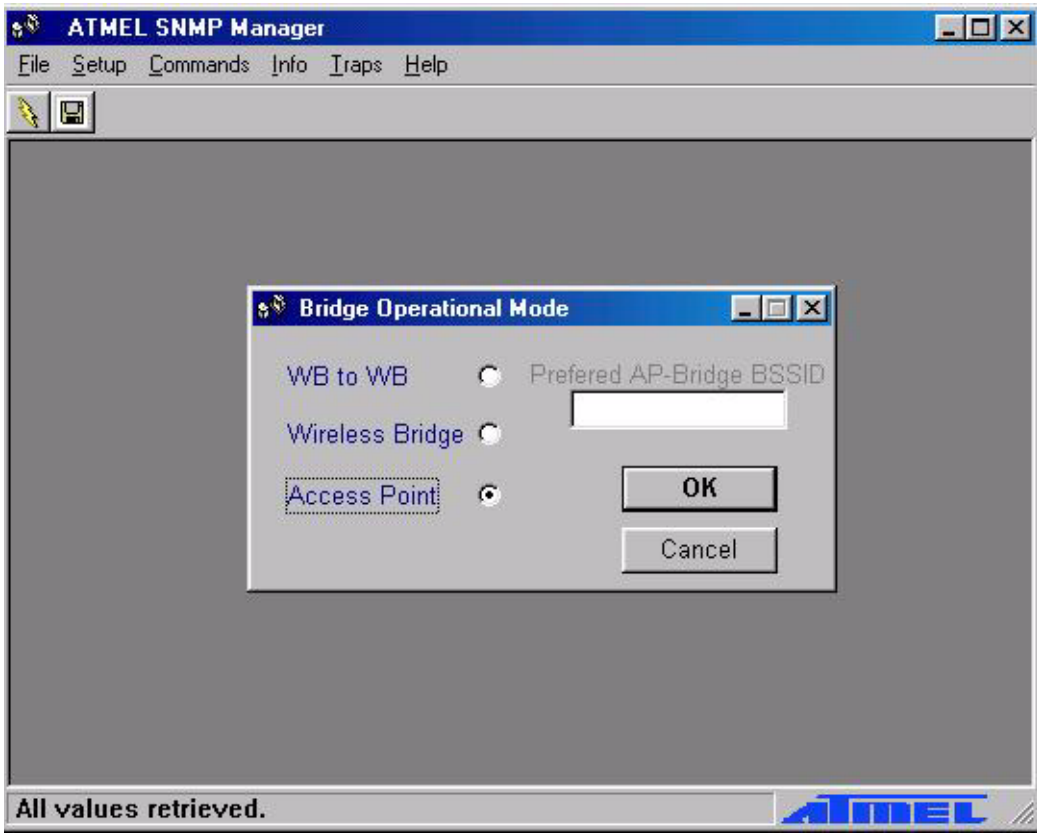

Under the “Bridge” option, there are two submenus: “IP Configuration” and “Operational Mode”. The “Ethernet Address”, “IP Configuration” and “IP Mask” can either be viewed or changed through the “IP Configuration” (Figure 4-5). If changes are made, you need to “Download Changes” under the “File” menu in order to save them.

***Figure 4-5.*** Bridge IP Configuration window




You also need to check that the “Access Point” option is enabled under the “Operational Mode” submenu (Figure 4-6).

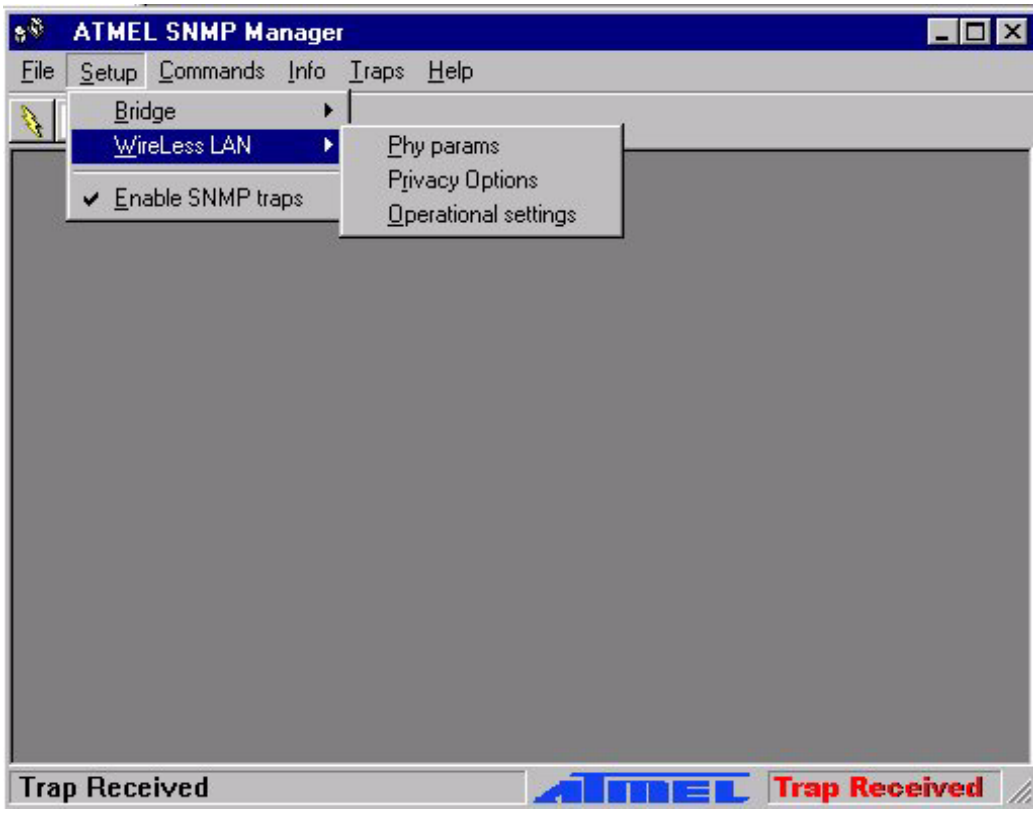
***Figure 4-6.*** Bridge Operational Mode window




Under the “Wireless LAN” option, the following submenus are available (Figure 4-7):

- Phy params
- Privacy Options
- Operational settings

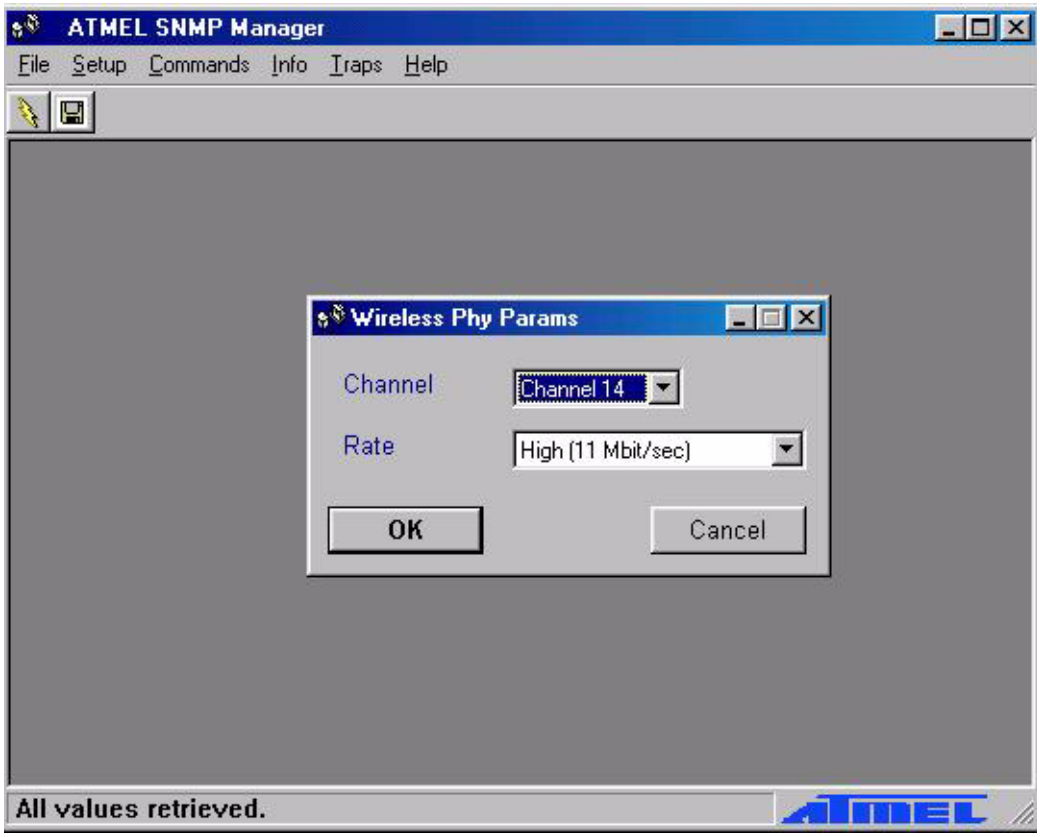
***Figure 4-7.*** SNMP Wireless LAN menu and submenus




**Phy Params (Figure 4-8):**

- Channel: Select the channel to be used. There are 14 channels available.
- Rate: Select the rate to be used among the following options 1 Mbps, 2 Mbps, 5.5 Mbps and 11 Mbps.

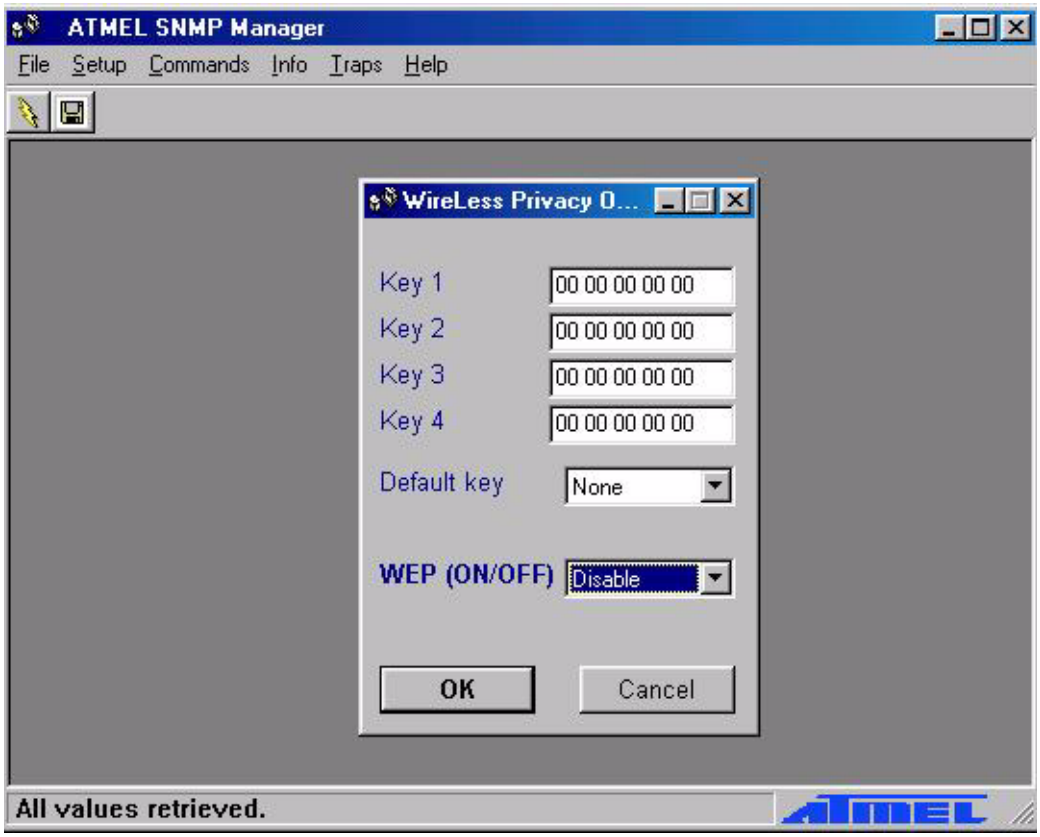
***Figure 4-8.*** Wireless Physical Parameters window




**Privacy Options (Figure 4-9):**

There are four 5 Hex digit encryption keys available, and you must define the value of the key of your choice. This key is enabled only if the you select it in the “Default key” option. Enable the WEP (ON/OFF) option in order to activate WEP encryption.

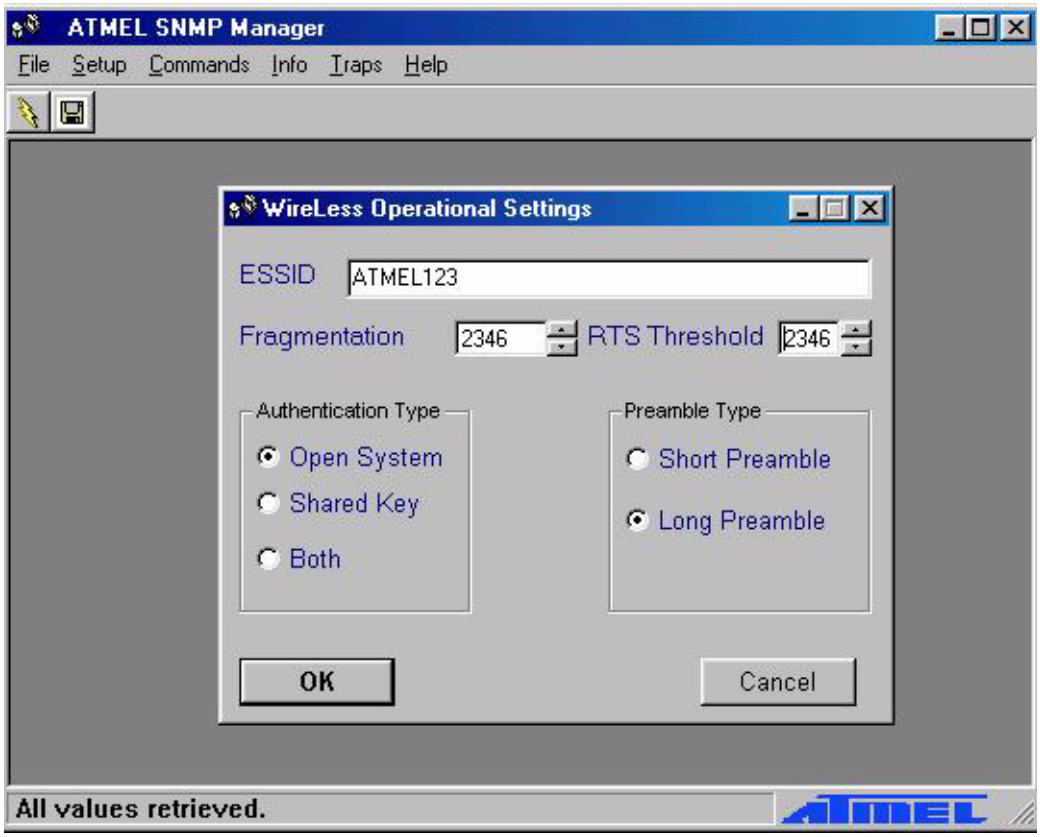
***Figure 4-9.*** Wireless Privacy Options window




**Operational Settings (Figure 4-10):**

- ESSID: Select the ESSID to be used.
- Fragmentation: This is the option for the Fragmentation Threshold activation.
- RTS Threshold: This is the option for the RTS Threshold activation.
- Authentication Type (Open System, Shared Key, Both).
- Preamble Type (Short, Long).

***Figure 4-10.*** Wireless Operational Settings window




Under the “Setup” menu you can either enable or disable SNMP traps, which are messages displayed in the right bottom corner indicating that an action related to the AP - Bridge took place, such as:

- Trap Reassociation: This trap message is sent when a Station’s reassociation request is received from the AP - Bridge.
- Trap Association: Indicates the reception of an association request packet and the sender Station's successful association with the Wireless Bridge.
- Trap Disassociation: This trap message is sent when a disassociation notification packet is received from a Station.
- Trap Reset: This trap message is sent when the AP-Bridge resets.
- Trap Setting IP Address with Ping: This trap message is sent when the AP-Bridge IP address is set with the transmission of a ping message.
- Trap Start Up: This trap message is sent when Bridge starts up.
- Trap Failed To Erase Flash: This trap message is sent when Bridge fails to erase flash.

You can see additional information for every Trap Message by selecting the “View Record” option under the “Traps” menu.

In order to “Reset Device” or “Restore Defaults” you need to select the appropriate submenu under the “Commands” menu.

Finally, the “Info” menu contains “Wireless and Ethernet Statistics”.

### 4.1.3 How to Uninstall the SNMP Manager

In order to uninstall SNMP Manager you must go to the ‘Control Panel” (“Start->Settings->Control Panel”) and press the “Add/Remove Programs” button. Select the application from the list and press the “Add/Remove...” button. Press “Yes” when asked whether you want to remove this program and its components. A window indicating the uninstallation progress appears.

## 4.2 Using the USB Port

***Note:*** This procedure requires the use of the DFU Configuration Utility which can be used only through the USB port. When you connect the card to the USB port for the very first time, the operating system will ask for the driver for the card. Please locate the driver into your CD. At this time, only a driver for MS Windows 98 is available. After you have completed the installation of the driver, you can use the DFU Configuration Utility.

In order to configure the AP through the USB port, you must use the DFU Configuration Utility.

In order to change or view the Bridge parameters you have to plug the USB cable and then open the DFU.exe application which you will find into the “Utilities” folder of your CD.

By pressing the “Configuration” button in the main dialog box (Figure 4-11) the Bridge Configuration dialog appears (Figure 4-12).

***Figure 4-11.*** DFU Configuration Utility

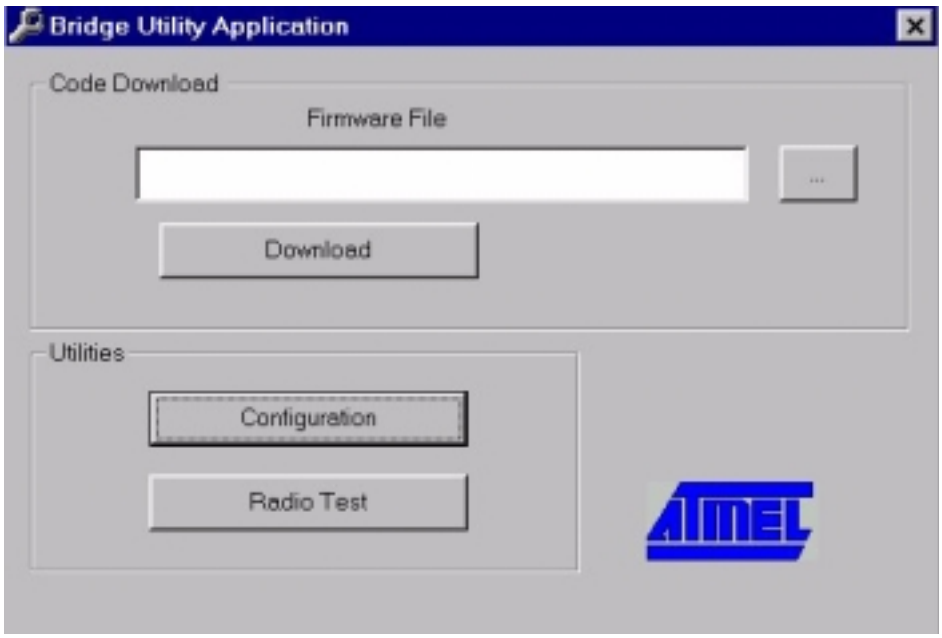
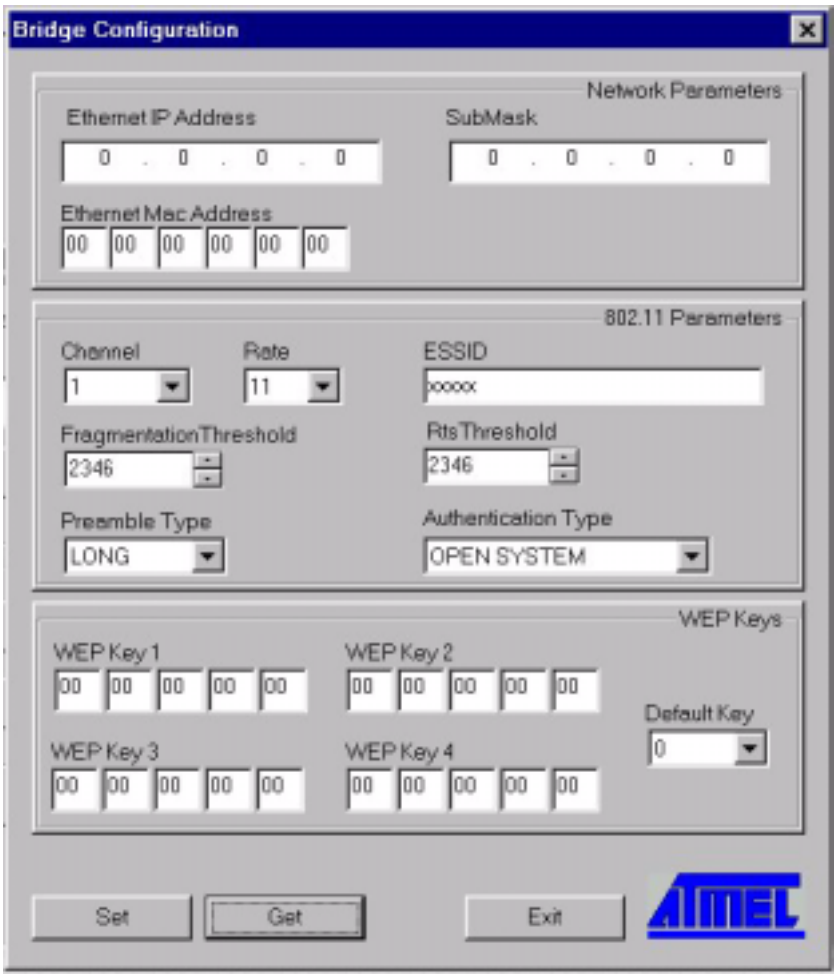


***Figure 4-12.*** DFU Utility Bridge Configuration window




The current parameters of the Bridge can be retrieved by pressing the “Get” button in the Bridge Configuration dialog. You can update the bridge configuration parameters by setting them first and then selecting the “Set” button.

**Network Parameters:**

- Ethernet IP Address: The IP Address of the AP
- Ethernet Subnet Mask: The Ethernet station and the Access Point must be on the same subnet. The IP address for the Access Point must correspond to the Subnet Mask.
- Ethernet MAC Address: The MAC address of the AP.

**802.11 Parameters:**

- Channel: Select the channel to be used. There are 14 channels available.
- Rate: Select the rate to be used among the following options: 1 Mbps, 2 Mbps, 5.5 Mbps, and 11 Mbps.
- ESSID: Select the ESSID to be used.
- Fragmentation Threshold: This is the option for the Fragmentation Threshold activation.
- RTS Threshold: This is the option for the RTS Threshold activation.

- Preamble Type: Select Short or Long Preamble Type.
- Authentication Type: Select Open System or Shared Key Authentication Type.

**WEP Keys:**

- WEP Key #1-#4: Set the value of the WEP key. WEP keys must be in HEX and in two bytes per character format e.g. if you want the WEP Key #1 to be 12345, then you must set it as 0102030405.
- Default Key: Select which of the four WEP Keys is going to be used. By selecting 0, no WEP encryption will be used.

# Section 5

# Access Point Firmware Upgrade

The AP firmware upgrade can be done either through the Ethernet port by using the TFTP Client Utility, or the USB port by using the DFU Utility.

## 5.1 Using the Ethernet Port

In order to upgrade the firmware of the AP through the Ethernet port, you must first install the TFTP Client Utility, which is a powerful and reliable tool used for the remote firmware upgrade of the Access Point through the Ethernet port.

### 5.1.1 How to Install the TFTP Client

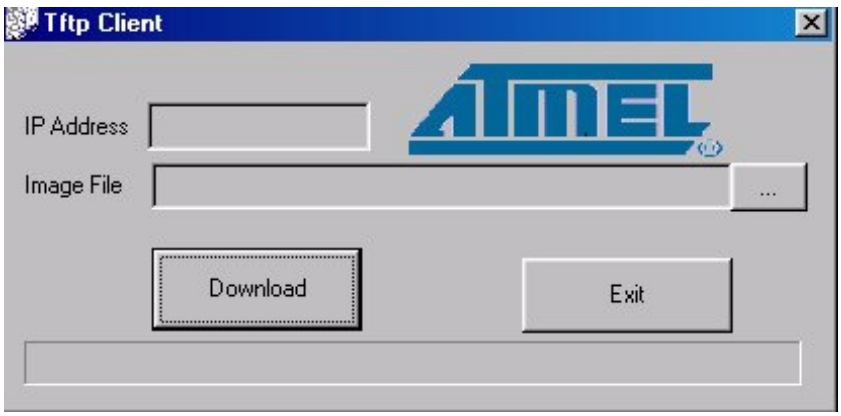
In order to install the Tftp Client Utility you need to extract the given “TFTP.zip” file which you will find into the “Utilities” folder of your CD, in a temporary folder and then run the program “setup.exe”. Follow the instructions of the set-up program and select the directory where the application will be installed. Finally, a window will appear indicating the completion of the installation.

### 5.1.2 Using the TFTP Client

***Note:*** Before using the TFTP Client for upgrading the firmware of the AP, verify that the Access Point IP address has been set-up following the procedure described in the section “Setting the IP Address of the Access Point”.

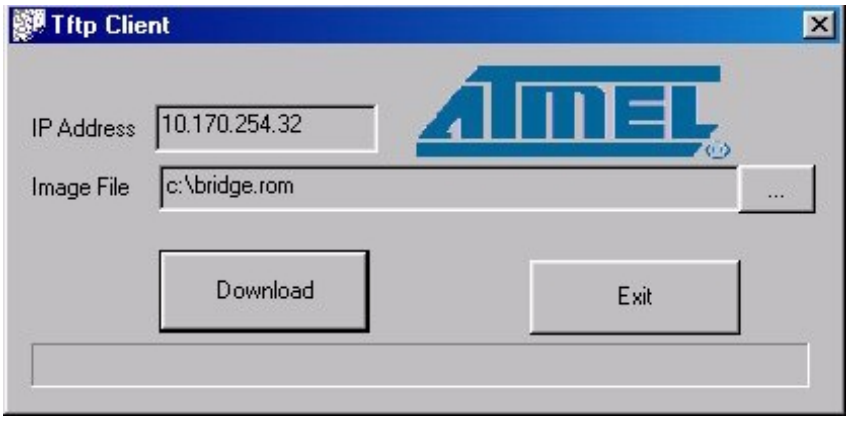
On the Start Menu, select TFTP. The window of Figure 5-1 appears.

***Figure 5-1.*** Tftp Client Utility




Type the IP address of the Access Point in the first edit box of the panel. Then, browse for the file xxxx.rom by pressing the “three dots” button. Finally press the "Download" button (Figure 5-2).

***Figure 5-2.*** Type the IP address, browse for the file bridge.rom and download




The Firmware Download procedure will be completed successfully if a message in the right bottom corner appears indicating “Firmware download has been completed”. If you receive the message “TimedOut”, in the right bottom corner, during the firmware download procedure, you need to check if the Access Point is powered on and if it has a valid IP address. In order to check the validity of the IP address you must ping the Access Point.

If you receive the message “Flash Programming in progress” during the firmware download procedure you shouldn’t power off the Access Point. In order to close the application press the "Exit" button.

***Note:*** If the download procedure has not been completed successfully you must try again but before starting the download you need to confirm that you are using the correct firmware file .

### 5.1.3 How to Uninstall the TFTP Client

In order to uninstall SNMP Manager you must go to the ‘Control Panel” (“Start->Settings->Control Panel”) and press the “Add/Remove Programs” button. Select the application from the list and press the “Add/Remove...” button. Press “Yes” when asked whether you want to remove this program and its components. A window indicating the uninstallation progress appears.

## 5.2 Using the USB Port

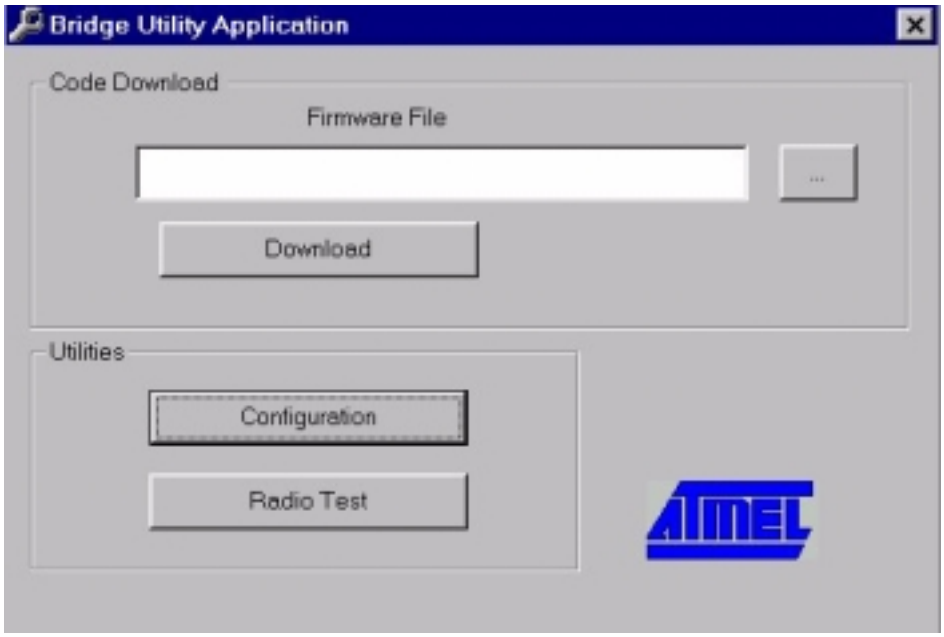
***Note:*** This procedure requires the use of the DFU Configuration Utility which can be used only through the USB port. When you connect the card to the USB port for the very first time, the operating system will ask for the driver for the card. Please locate the driver into your CD. At this time, only a driver for MS Windows 98 is available. After you have completed the installation of the driver, you can use the DFU Configuration Utility.

In order to upgrade the firmware of the AP through the USB port, you must use the DFU Configuration Utility.

First of all you have to plug the USB cable and then open the DFU.exe application which you will find into the “Utilities” folder of your CD.

In the main window of the DFU Configuration Utility (Figure 5-5), select the file xxxx.rom, by pressing the “three dots” button. Finally press the “Download” button.

***Figure 5-3.*** DFU Configuration Utility




Please keep in mind that this process needs some time to complete. When the DFU completes successfully a window appears indicating the status of the download (DFU succeeded, DFU failed). Finally, close the application and unplug the cable.

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1932A–9/28/00

# I N S T R U C T I O N S  M A N U A L

## FEDERAL COMMUNICATIONS 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 or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the euipment into an outlet on a circuir different from that to which the receiver is connected.

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

CAUTION:

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

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance

# RTW020 AP H/W Specifications

## Hardware

| | |
|---|---|
| Model Type | 11Mbps Wireless LAN Access Point |
| Frequency Band | 2400 – 2483.5 MHz |
| Number of Allowed Channels | 11Ch ( for FCC)<br>13Ch (for ETSI)<br>14Ch ( for TELEC) |
| Ethernet interface | Support Both Ethernet and 802.3(Max. Bit rate 10Mbps)with RJ-45 10BaseT connector |
| Serial interface | USB (console port for configuration) |
| DC Power Adapter | DC Power Adapter<br>AC Input:100V~240V(50~60HZ)<br>DC Output:5V / 2.0A |
| Modulation Technique | Direct Sequence Spread Spectrum (CCK, DQPSK, DBPSK) |
| LED Indicator | Active(Green), Line Link(Green)<br>Power(Red) |
| Operational Conditions | Temperature 0-55$^{o}$C<br>95%max. Humidity (no condensation allowed) |
| PCB Dimensions | 116.77mm(L)*75.47mm(w) |
| Antenna type | 2 External Antenna |
| Average Output Power | 20 dBm |
| Power Consumption | Rx :780mA Tx:1.2A |
| Standards | IEEE 802.11b, Wi-Fi –Certified |