

WaveBuddy WLAN Access Point

User Guide

EWP-645WA1

Version 1.0

INFORMATION TO USER

Federal Communications Commission Statement

This product has been tested and complies with the specifications 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. The antenna used for this transmitter must be installed to provide a separation distance of least 20 centimeters from all persons and must operate in conjunction with other antenna or transmitters. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used according to 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 is found 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 or device
- ◇ Connect the equipment to an outlet other than receiver's
- ◇ Consult a dealer or an experienced radio/TV technician for assistance

Notice: The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency. Any change or modification not expressly approved by the party responsible could void the warranty.

Regulatory

The wireless LAN Card must be installed and used in strict accordance with the manufacturer's instructions. This device complies with the following radio frequency and safety standards.

USA - Federal Communications Commission (FCC)

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference that may cause undesired operation

Europe - R&TTE Directive

This device complies with the specifications listed below:

- ☒ ETS 300-826 General EMC requirements for Radio equipment
- ☒ ETS 300-328 Technical requirements for Radio equipment
- ☒ EN60950 Safety requirements for Radio 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, 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.

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Section 1. Introduction

1.1 The WaveBuddy WLAN Access Point

The WaveBuddy WLAN Access Point (WaveBuddy-AP) 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.

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 Ethernet, USB and any current Web Browser, i.e., Internet Explorer 5x, Netscape Navigator 4x or above.

1.2 Package Contents

Please make sure that your received the following with:

- ◆ One WaveBuddy Access Point
- ◆ One Software Tools CD (Drivers and User Guide on CD)
- ◆ One USB cable
- ◆ One Ethernet cable (crossover)
- ◆ One power adapter

1.3 System Requirements

For configuration through USB:

- ◆ Operating System: Windows 98se/Me/2000/XP
- ◆ Desktop PC or notebook PC with USB port

For configuration through Ethernet:

- ◆ Operating System: Windows 95/98/98se/Me/2000/XP, Windows® NT 4.0
- ◆ Desktop PC or notebook PC connected on a LAN

1.4 Features

1.4.1 Firmware Features

The IEEE 802.11b firmware implementation for the WaveBuddy-AP supports:

- High data rate 11/5.5/2/1 Mbps
- Auto Rate fallback
- Basic Rate Set
- 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 64, 128 bits)
- Authentication Algorithm (Open System, Shared Key)
- Power Management
- Association, Re-association and Disassociation
- Support for 802.1x in AP mode (Tested only with Microsoft Internet Authentication Servers using EAP-TLS)

1.4.2 Bridging Functions

The following bridging functions are supported:

- Automatic Learning Process
- Filtering Database
- Forwarding Process
- IP Filtering
- Authorized Table
- Aging Function
- Protocol Filtering

1.4.3 Management

For Bridge Management, WaveBuddy-AP supports:

- SNMP (Wireless MIB, traps, firmware upgrade)
- USB (DFU-configuration, firmware upgrade)
- WEB Server for Configuration and Upgrade purposes
- Set IP Session (ARP/Ping)
- DHCP client
- Default Gateway

1.4.4 Roaming

Roaming functions supported:

- Among APs on the same subnet
- Preferred AP (only on WaveBuddy Bridge)

1.4.5 Operation Modes

Operation Modes supported:

- Access Point
- Access Point Client
- Wireless Bridge
- Wireless Repeater

1.5 Network Interface

WaveBuddy-AP supports 10 Mbps network interface.

Section 2. Network Configuration and Planning

2.1 Wireless LAN Basic

The WLANs support legacy Ethernet LAN network configuration options as defined by the IEEE 802.11b standards committee. The wireless LAN card/adaptor can be configured as:

- ◆ Ad-Hoc for departmental or SOHO LANs
- ◆ Infrastructure for enterprise LANs
- ◆ LAN-Interconnection for point-to-point link as campus backbone

2.2 Network Topology

An Ad-Hoc wireless LAN is a group of computers shown in Fig2.1, each equipped with one WLAN card/adaptor, connected as an independent wireless LAN. Computers in a specific Ad-Hoc wireless LAN must be configured to share the same radio channel.

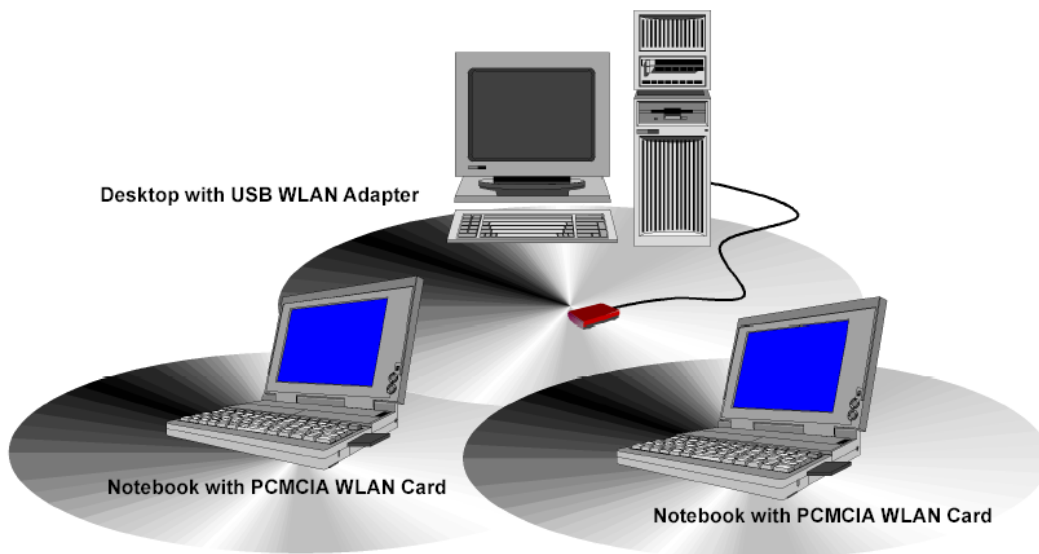


Fig 2-1 Ad-Hoc Wireless LAN

The card/adaptor provides access to a wired LAN for wireless workstations. An integrated wireless and wired LAN is called an infrastructure configuration shown in Fig 2.1. A group of WLAN PC users and an Access Point compose a Basic Service Set (BSS). Each WLAN PC in a BSS can talk to any computer in the wired LAN infrastructure via the Access Point.

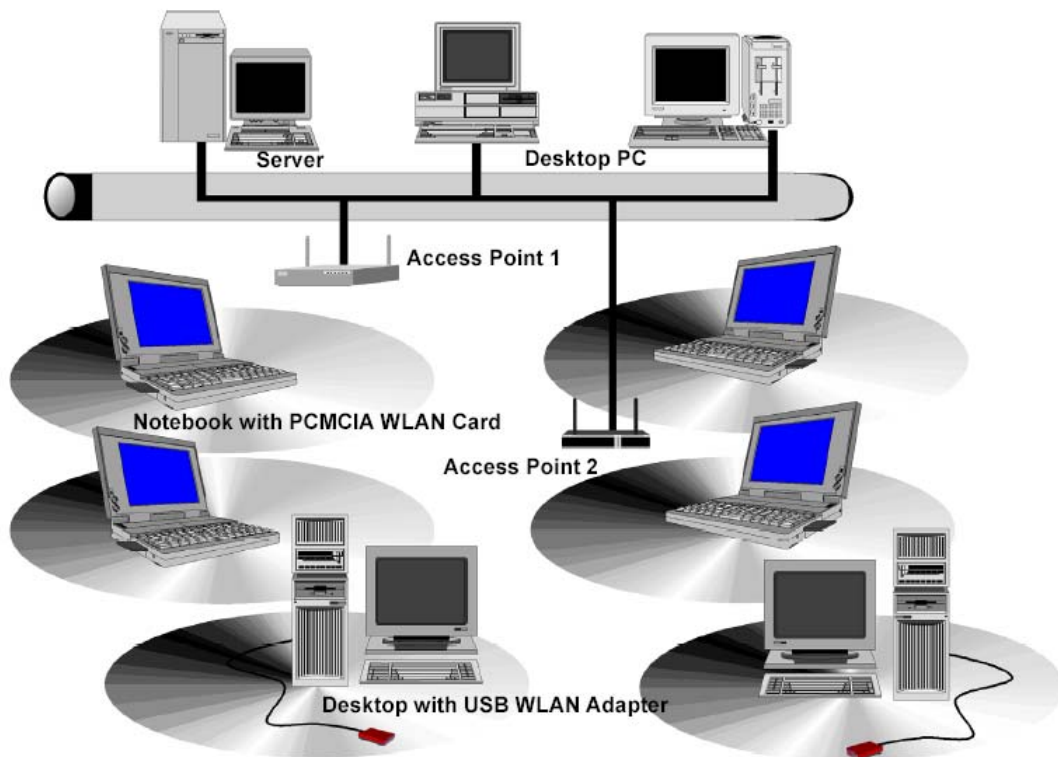


Fig 2-2 Infrastructure Wireless LAN

An infrastructure configuration extends the accessibility of a WLAN equipped PC to a wired LAN, and doubles the effective wireless transmission range for 2 WLANs PCs. Since the Access Point is able to forward data within its BSS, the effective transmission range in an infrastructure LAN is double shown in Fig 2.3.

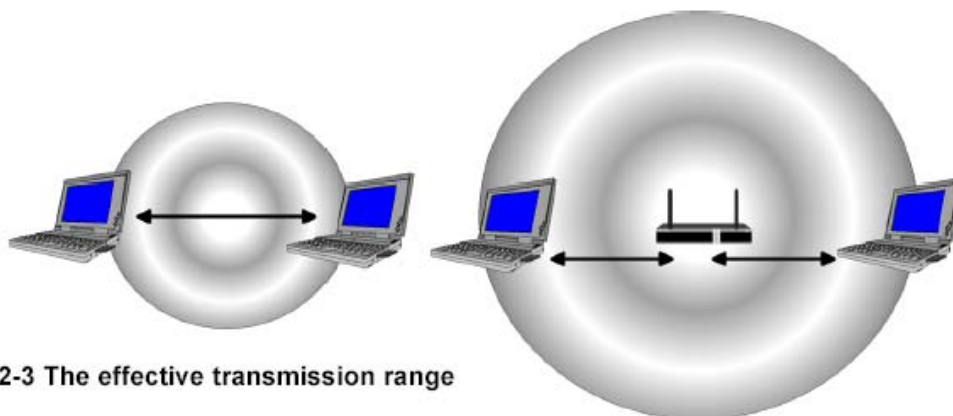


Fig 2-3 The effective transmission range

The use of a unique ID in a BSS is essential. All WLAN equipped PCs configured without roaming options in independent BSS must be configured with a BSS ID corresponding to the Access Point used in the BSS. Check your Access Point for its BSS ID or use the Access Point Utility program to determine the BSS ID. The infrastructure wireless LAN configuration is

appropriate for enterprise-scale wireless access to a central database, or as a wireless application for mobile users.

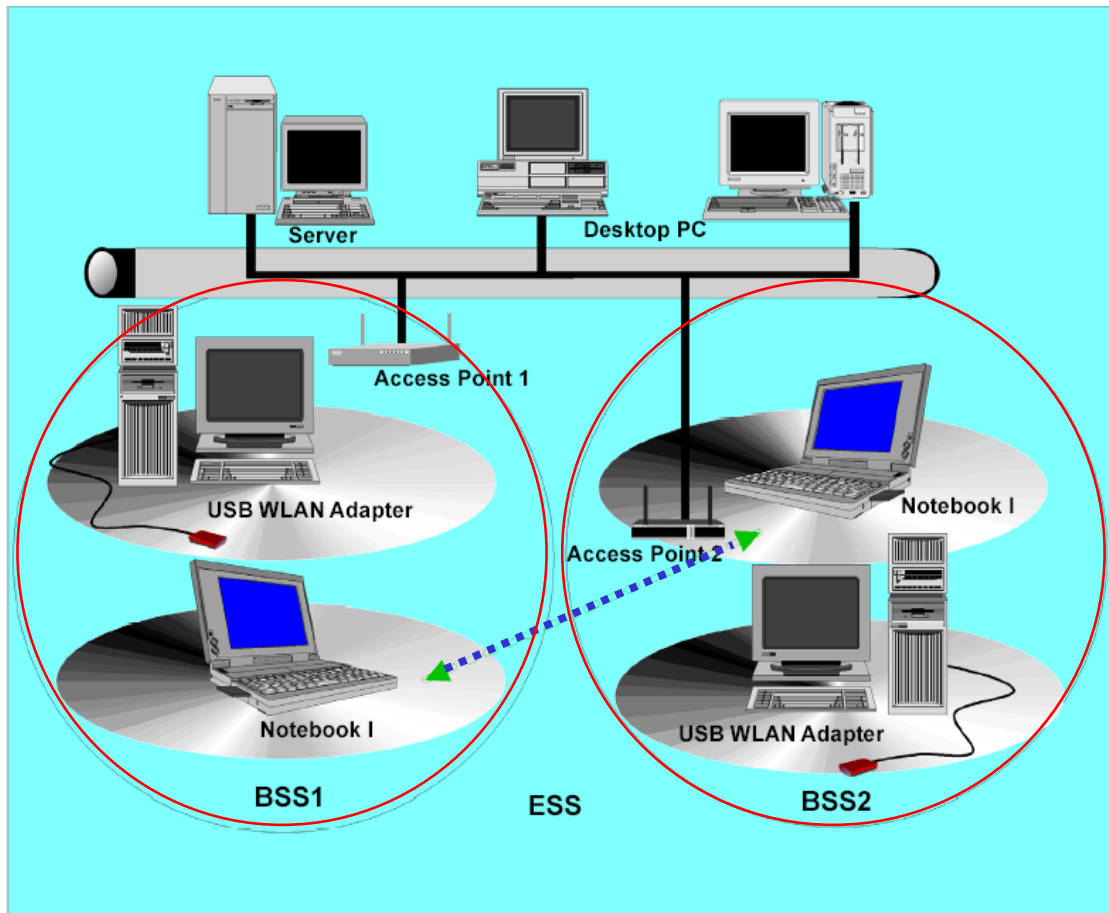


Fig 2-4 Roaming in an Extended Service Set (ESS)

Infrastructure mode also supports roaming capabilities for mobile users. More than one BSS can be configured as an Extended Service Set (ESS) shown in Fig 2.4. The continuous network allows users to roam freely within an ESS. All WLAN PCs and Access Point within one ESS must be configured with the same ESS ID.

Before enabling an ESS with roaming capability, it is recommended to select a feasible radio channel and optimum Access Point position. Proper Access Point positioning combined with a clear radio signal will greatly enhance performance.

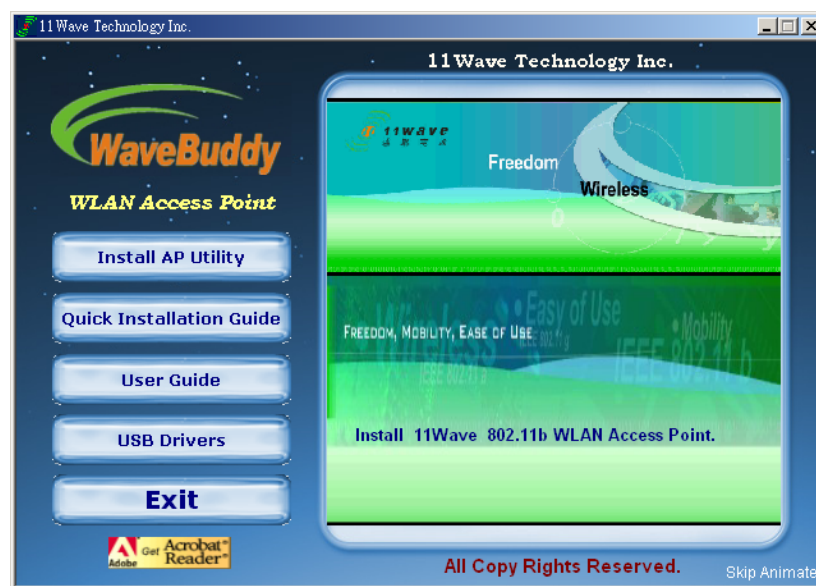
Section 3. Installation Overview

This section provides a quick step-by-step guide on how to install your WaveBuddy WLAN Access Point. Please follow the steps described below.

1. Power on the computer.

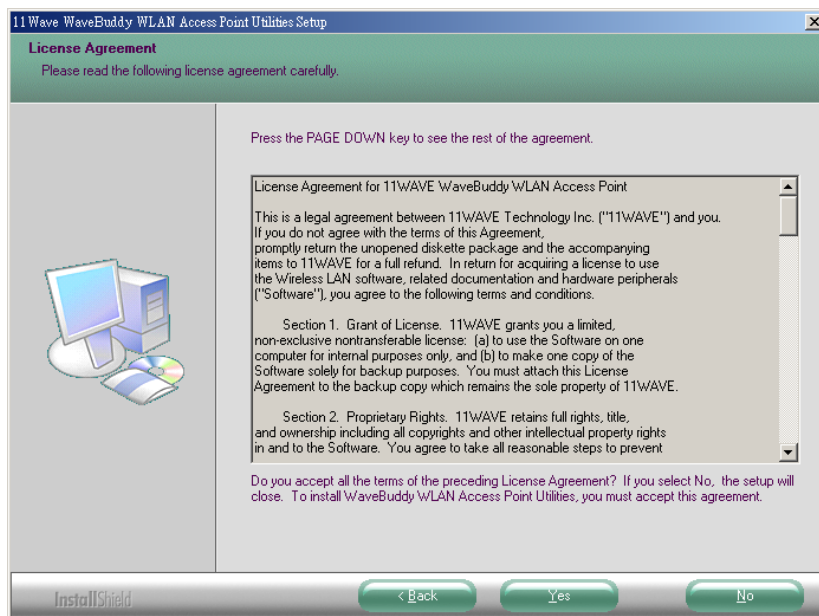
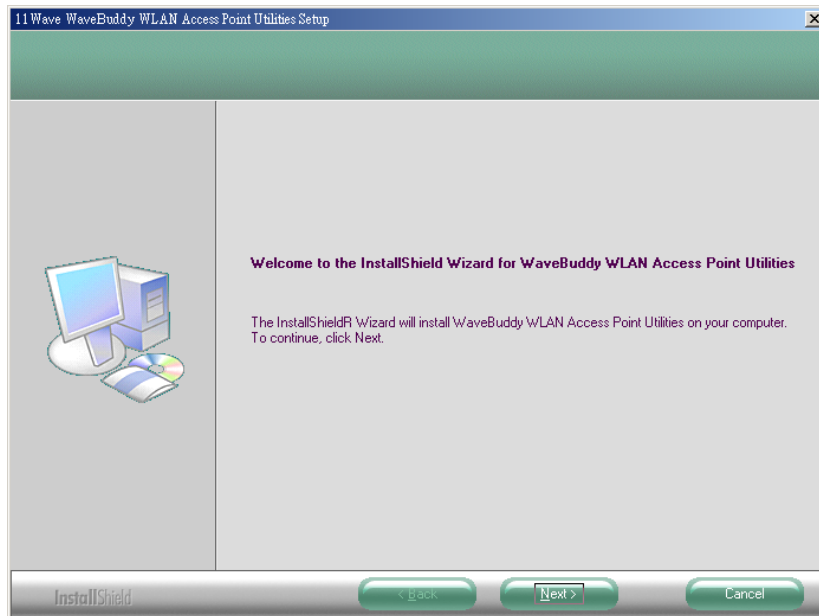
2. Install the drivers and application:

Step 1. Insert the given Installation CD into your CD-ROM driver. Unless you have deactivated the autorun feature of the window, the screen shown as below should appear automatically. If this screen doesn't appear automatically, you can access the installation by clicking the *Autorun* button and choosing *Run*. In the drop-down box provided type *D:\Autorun.exe* (where D: is the letter of your CD-ROM drive). Alternately, double-click "My Computer" and double-click the *Autorun.exe* icon in the folder that appears or browse to your CD-ROM drive and go to *D:\WLAN Access Point\AP Utility* and click on the *Setup.exe*.

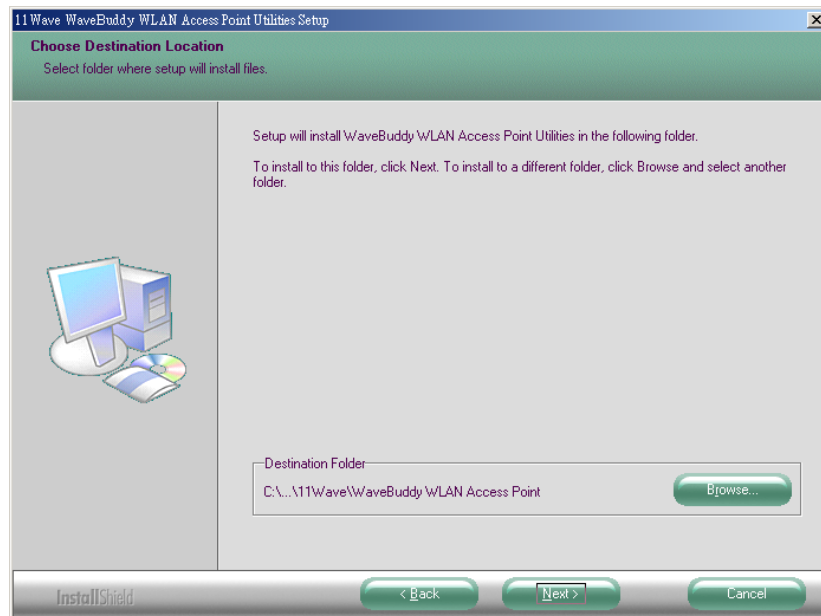


Step 2. Click the "Install AP Utility" button to start the driver and application installation process.

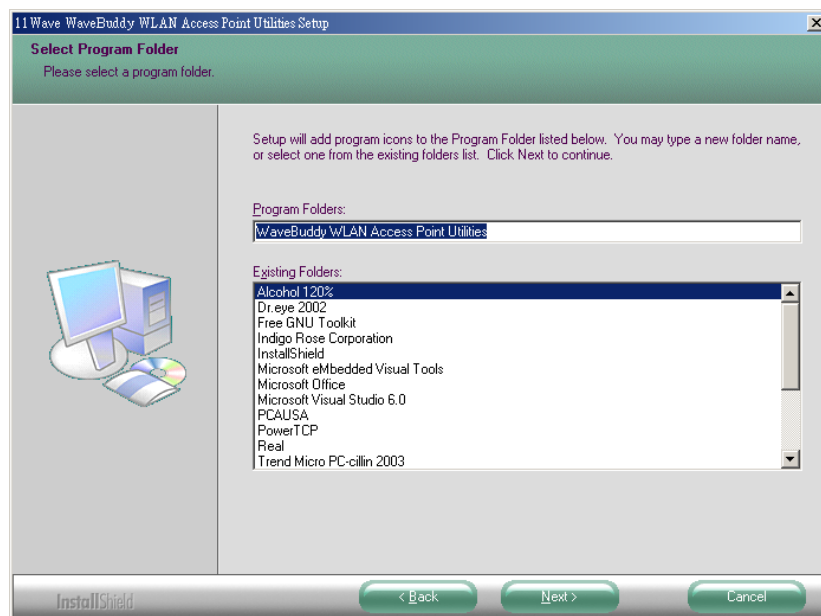
Step 3. Follow the installation instructions from the InstallShield Wizard by pressing the “**Next**” button.

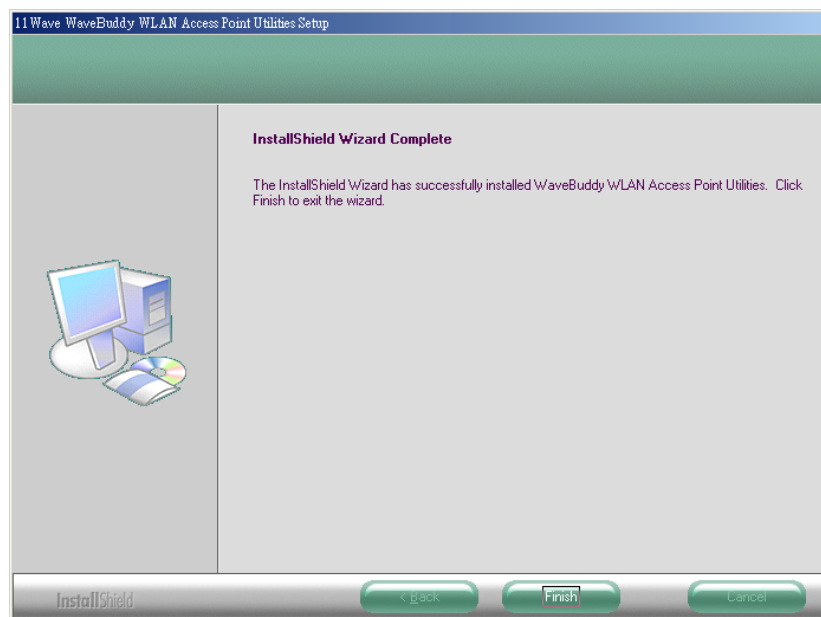
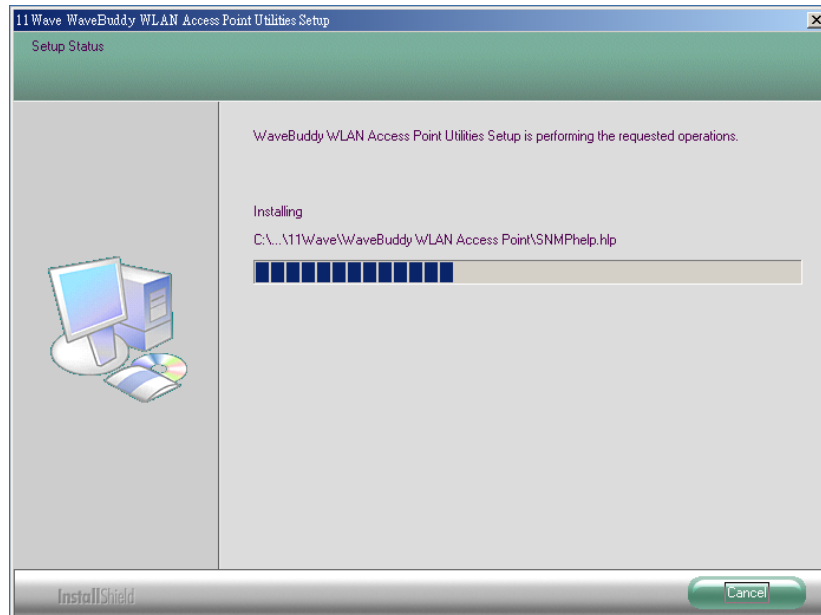


Step 4. Give the destination path where the application will be installed. To set the path of your choice, select “**Browse**” and click “**Next**”.



Step 5. Select a program folder and then select “**Next**”.

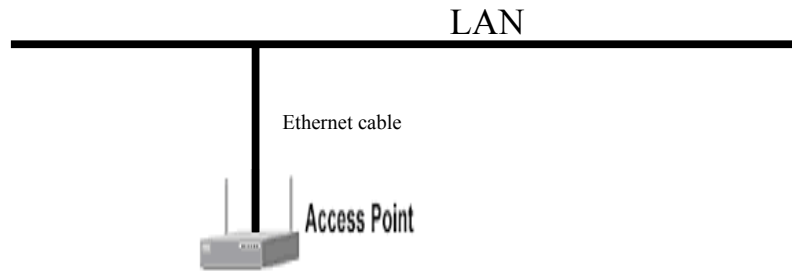




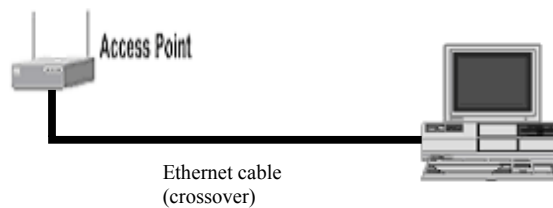
Step 6. Finish the installation. If prompted for reboot, select “Yes”.

3. Connect and operate the Access Point

- Adjust the Access Point antennas.
- Connect the Ethernet cable from the wired 10/100 Ethernet LAN to the Ethernet connector on the Access Point. (Make sure to do this before you apply power to the Access Point).



Note: When you connect the Ethernet cable from the wired 10/100 Ethernet network card of PC to the Ethernet connector on the Access Point, you must use **crossover** Ethernet cable.



- Connect the power supply adapter by inserting the power pack connector into the power receptacle on the back of the Access Point.
- Read the MAC address from the label on the bottom of the Access Point (for example: 00-0B-10-02-00-1C).
- From your system administrator obtain:
 The ESSID for your radio network.
 If not connected to a DHCP server, a unique IP address for the Access Point. If the Access Point is not on the same subnet as your PC, a default gateway address and subnet mask.

Note: The “Add New Hardware Wizard” automatically loads the Drivers when the USB cable connects to the Wireless-AP.

4. Associate an IP address with the Access Point

- If you are connected to a DHCP server and the DHCP Client button on the Access Point is enabled, the server will automatically assign an IP address when you connect the Access Point to your network. You must identify the assigned address by using the Find Access Point option in the SNMP Configuration Utility (SNMP Manager).
- If you are not connected to a DHCP server and the AP is on the same subnet as your PC, you can use the ARP/Ping commands to assign an IP Address to the AP. [The default IP address of the WaveBuddy-AP is 192.168.98.11 with a Subnet Mask of 255.255.255.0.](#)

Note: More detailed information is available in this User Guide, Section 4: “Setting the IP Address of the Access Point”.

Section 4. Setting the IP Address of the Access Point

The first step in using the WaveBuddy-AP is to set its IP Address. [The default IP address of the WaveBuddy-AP is 192.168.98.11 with a Subnet Mask of 255.255.255.0.](#) This procedure can be done through the Ethernet/Wireless port by using a combination of ARP/Ping commands and the SNMP Configuration Utility application (SNMP Manager), or by using the network DHCP server. It also can be done through the USB port by using the DFU Utility application (AP Utility)

4.1 Using the Ethernet Port/Wireless Port

You can set the AP IP Address using the ARP/Ping commands or by using the network DHCP server.

4.1.1 Using ARP/Ping commands

In order to set the AP IP Address you first need to know the AP MAC Address (the MAC Address of the AP is indicated on the back of the AP board). Follow the steps below to give the AP a temporary IP Address at the beginning (Step A) and then save the IP Address through the SNMP Configuration Utility application (SNMP Manager)(Step B).

Step A:

1. Connect an Ethernet station and the AP on the same subnet. The simplest way to accomplish that is to connect the AP 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 AP must correspond to the Subnet mask.
2. Open an 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 192.168.98.33 00-0B-10-02-00-1C
3. Ping the AP, using its new IP Address.

For example: ping 192.168.98.33

If you get a ping reply, then the IP Address has been temporarily set. In order to set it permanently you need to proceed to Step B without powering off the AP.

Step B:

1. Open the SNMP Configuration Utility application (SNMP Manager).
2. Connect to the AP by selecting the "Connect to Access Point" option under the "File" menu. Type the IP Address of the AP (which has been temporarily set in Step A) in the panel which appears, type "**public**" at the Community field, select "**Administrator**" in the Authority combo-box and then press OK. The AP Configuration application will inform you that the AP has been found and that all the configuration values have been successfully retrieved.

3. Select the **Setup | Bridge | IP Configuration**. Type the IP Address of Step A in the configuration window that appears. Confirm the validity of the other values (MAC Address and IP Mask), and select the Primary Port that determines the AP's MAC Address and IP Address and press "OK".
4. Save the configuration by selecting **File | Download Changes**. The IP Address of the AP has now been set permanently.

4.1.2 DHCP client

If DHCP client is enabled, the IP Address field displays the IP Address that was dynamically assigned to the AP by the network DHCP server. The IP Mask field displays the IP Mask utilized by the network DHCP server. Select the Primary Port, which is the interface that determines the DHCP server, and press "OK". If the network server failed to give an IP Address to the AP, then the AP IP Address is the default one.

4.2 Using the USB Port

This procedure requires the use of the DFU Utility application (AP Utility) that can be used only through the USB port. When you connect the WaveBuddy-AP to the USB port for the very first time, the operating system will automatically detect the device since the driver has been already installed during the installation process.

Plug the USB cable to the WaveBuddy-AP USB port. Run the DFU Utility application and select the "Configuration" button (Figure 4-1).

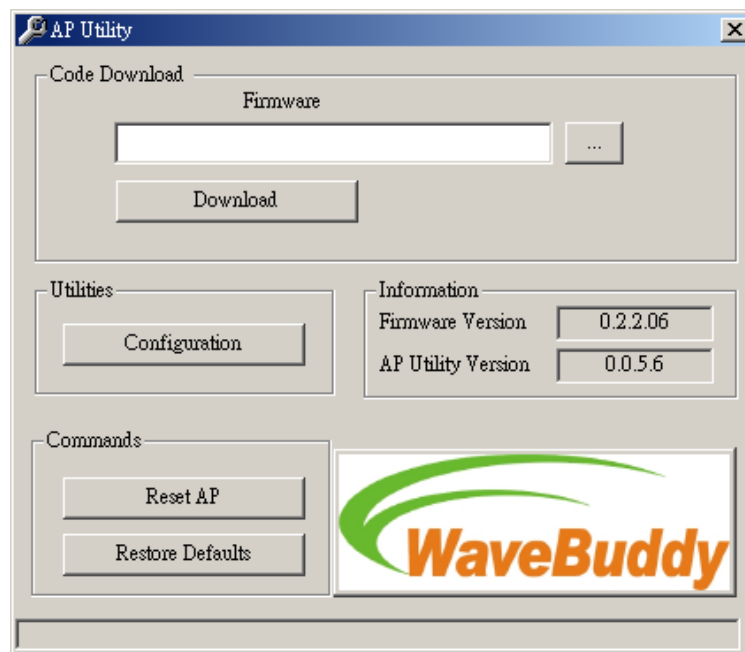


Figure 4-1. DFU Utility application (AP Utility)

In the window that appears, press the “Get” button if you want to view the current IP Address (Figure 4-2). If you want to set a new IP Address, first select the parameter “Eth_IP_Address”, then press the “Modify” button and then type the new IP Address that appears in the window. Press the “Set” button for the changes to take effect.

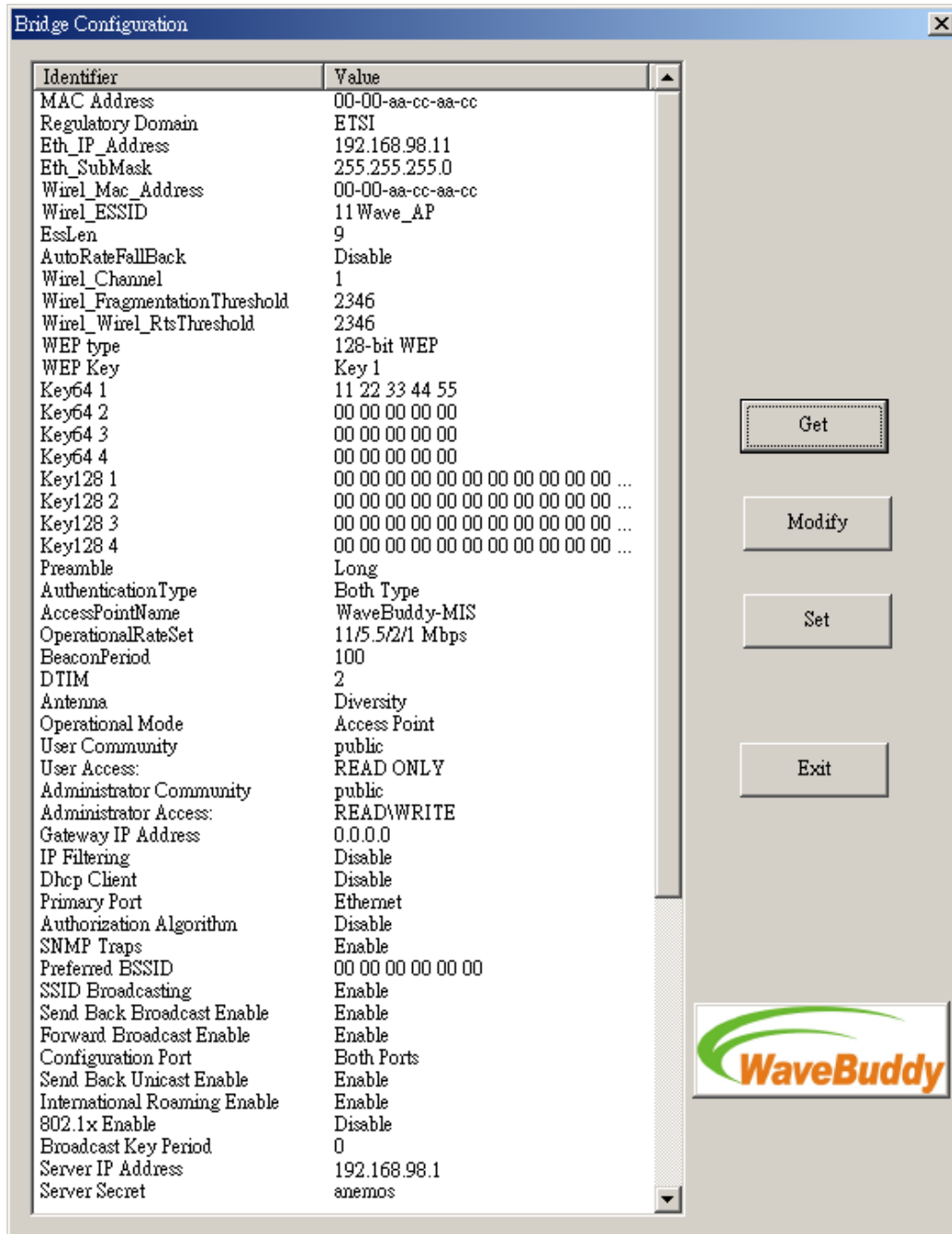


Figure 4-2. Bridge Configuration

Section 5. Access Point Configuration

The WaveBuddy-AP configuration can be done either through the Ethernet/Wireless port by using the SNMP Configuration Utility (SNMP Manager) application and Web Browser, or through the USB port by using the DFU Utility application (AP Utility).

5.1 Using the SNMP Configuration Utility application

Before using the SNMP Configuration Utility (SNMP Manager) application for configuring the WaveBuddy-AP, verify that the WaveBuddy-AP's IP Address has been set following the procedure described in the Section 4 "Setting the IP Address of the Access Point". [The default IP address of the WaveBuddy-AP is 192.168.98.11 with a Subnet Mask of 255.255.255.0.](#)

5.1.1 Connecting to the Access Point

On the window task bar, choose **Start | Programs | WaveBuddy WLAN Access Point Utilities | SNMP Configuration Utility** to open the application.

File menu: The File Menu contains the following options:

- **Connect to Access Point** - Using this option you can directly connect with the AP. First, type its IP Address in the panel that appears (Figure 5-1). Then, type the appropriate password in the Community field (see *Section 5.1.2 • Setup menu • Authorization option*. The default password is "[public](#)"). Finally, you have to select either User or Administrator Authority in the Authority combo-box. User Authority allows you to view but not to set or save changes to the AP Configuration, while Administrator Authority allows you to either view or set changes to the AP Configuration. Press "OK" to finish.

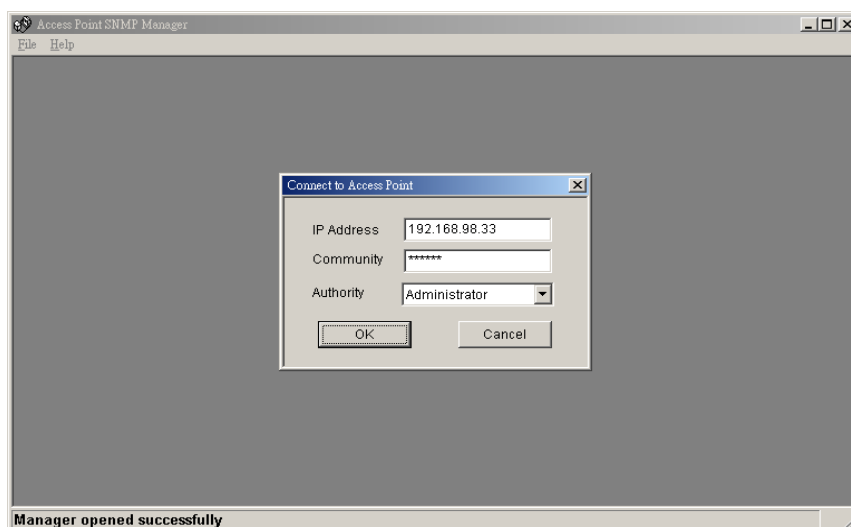


Figure 5-1. Connecting to the Access Point

- **Find Access Point** - This option allows you to find and connect with an AP without the necessity of knowing its IP Address. Choose this option in order to find the APs available for connection (Figure 5-2). Select one of the available APs and press “Connect”. Figure 5-1 appears indicating the IP Address of the selected AP and prompting you to select Authority and to write the appropriate password at the community field. Then press “OK”.

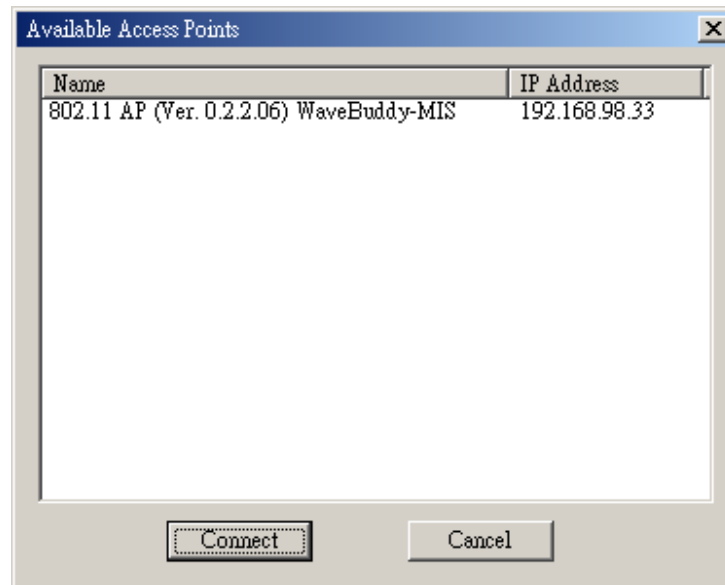


Figure 5-2. Find the available Access Points

In case of a successful connection to the AP, the following window appears (Figure 5-3). Press “OK”.

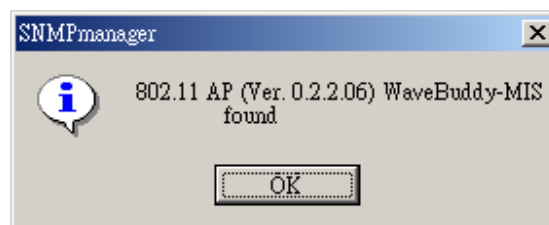


Figure 5-3. Access Point found

In case of an unsuccessful connection you receive the following message (Figure 5-4):

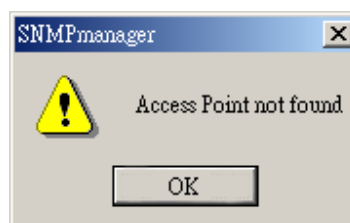


Figure 5-4. Access Point not found

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.

- **Firmware Upgrade** – Please refer to Section 6 “Access Point Firmware Upgrade” for more details.
- **Exit** - Terminates the application.

Help menu: Provides on-line help about the application.

5.1.2 Configuring the Access Point

When the connection has been successfully established, you will get a message in the left bottom corner indicating as “Get Configuration done” and on the right bottom corner as the “IP Address” of the connected AP.

File menu: The file menu contains the following enabled options:

- **Close Connection AP** - Terminates the connection with the AP.
- **Download Changes** - When all the desired values of the parameters have been set you are able to download the changes (save the changes) to the AP by selecting this option.
- **Refresh** - Renews the display.
- **Options** - Defines the polling interval according to which the AP Configuration polls the AP in order to update the statistics and the Associated Stations List.
- **Exit** - Terminates the connection with the AP and exits the application.

Setup menu: As soon as the connection has been established, you are able to start viewing or setting the AP parameters. Under the “Setup” menu, there are the following submenus (Figure 5-5):

- **Bridge** - Under the “Bridge” submenu, there are two options:

IP Configuration: By choosing this option the window of Figure 5-5 appears. The “IP Address” and “IP Mask” can be modified through “IP Configuration”, if DHCP client is not enabled. If DHCP client is enabled the IP Address field displays the IP Address that was dynamically assigned to the AP by the network DHCP server and the IP Mask field displays the IP Mask utilized by the network DHCP server.

Additionally you have to select the Primary Port, which is the interface that determines the DHCP server. Also, you can select which port (Ethernet Port and/or Wireless Port) will be used for the AP configuration.

If you make any changes, you need to select “Download Changes” under the “File” menu in order to save them.

Table 5-1. Bridge IP Configuration Parameters

Parameters	Description
MAC Address	Unique 48-bit, hard-coded Media Access Control address known as the station identifier.
IP Address	Network-assigned Internet Protocol address of the Access Point.
IP Mask	Four sets of three digits that divide a network into subnetworks.

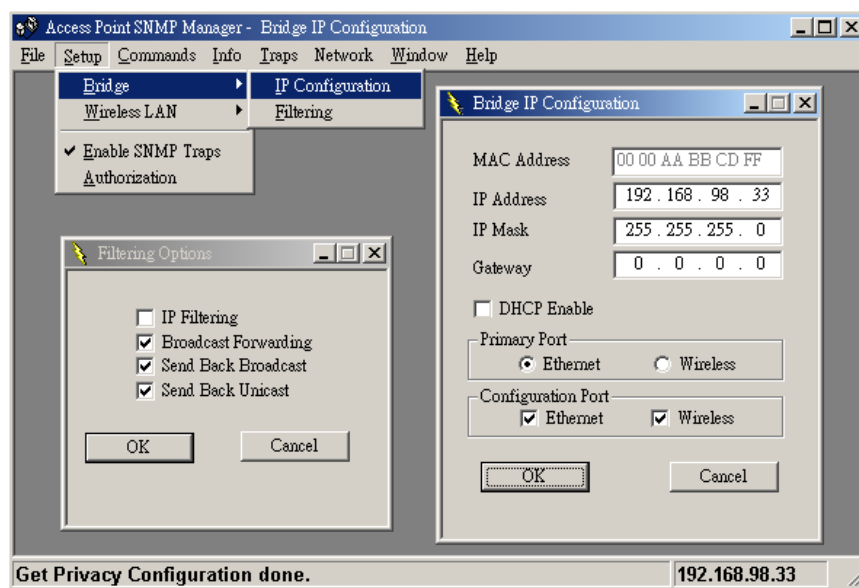


Figure 5-5. Bridge IP Configuration and Filter Options

Filtering: Under this window you can set the filtering options that the AP will use (Figure 5-5).

IP Filtering: Only the IP protocol packets will pass through the WLAN and any other protocol will be filtered out.

Broadcast Forwarding: The AP should not forward broadcast traffic to the air.

Send Back Broadcast: The AP should not send back to the air broadcast traffic received from the air.

Send Back Unicast: The AP should not send back to the air unicast traffic received from the air.

- **Wireless LAN** - Under this submenu the following three options are available (Figure 5-6).

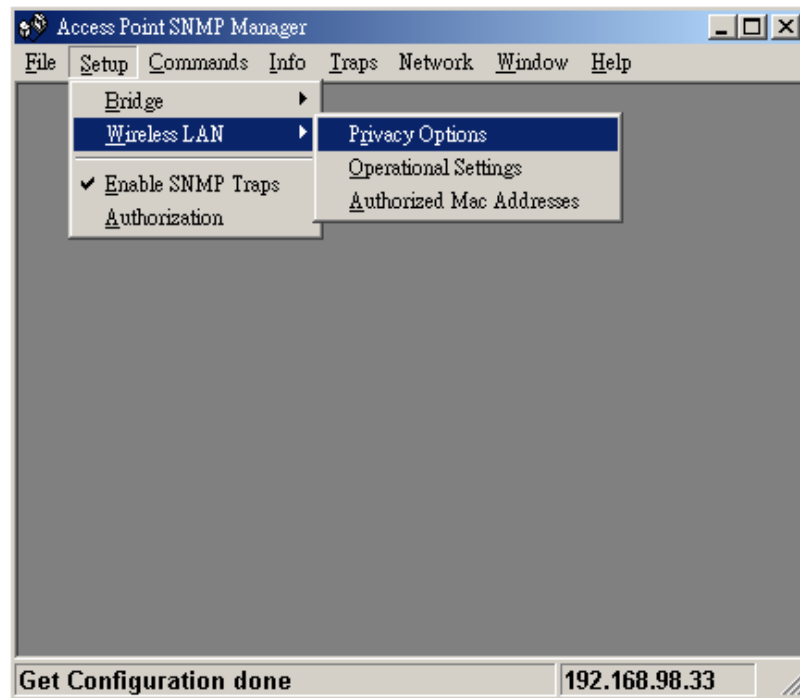


Figure 5-6. Access Point SNMP Wireless LAN menu and submenu

Privacy Options: By choosing this option you may download the encryption key values using the Wireless Equivalent Privacy (WEP) Option Window (Figure 5-7). Write the values and press “Set” to download (WEP key is write-only, so it is not possible to retrieve the key values). There are four 5 Hex digit encryption keys available if you select 64bit WEP and there are four 13 Hex digit encryption keys available if you select 128bit WEP. The key is enabled only if you select it in the “Default key” option. Enable the WEP (Wired Equivalent Privacy) option in order to activate WEP encryption for transmissions between the stations and the AP. WEP is an authentication algorithm that protects authorized Wireless LAN users against eavesdropping.

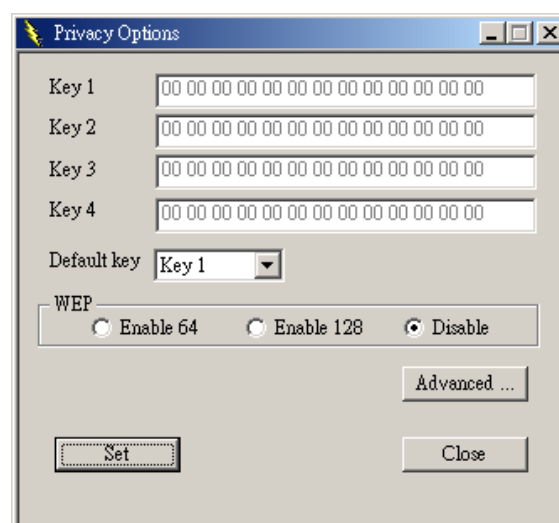


Figure 5-7. Wireless Privacy Option Window

Notes: The Authentication type must be the same on the Wireless Station and on the AP. All shared keys on the Wireless Station must be the same as those on the AP with which the client station is associated.

If you press the Advanced button on Figure 5-7, the following four options are available (Figure 5-8).

Figure 5-8. Advanced Wireless Privacy Options

- ◆ **802.1X Enable:** Enable, Disable, Mixed Environment.
When using *Enable*, then it is activated the 802.1X support of the AP and the stations that will try to connect to this AP must support 802.1X as well.
When using *Disable*, then the AP does not support 802.1X and then the default keys are used for the encryption/decryption of the packets.
When using *Mixed Environment*, then you can have APs or stations that support 802.1X and APs or stations that do not support 802.1X. For the Aps or the stations that do not support 802.1X must use Shared Key Authentication in order to connect to this AP. If Open System authentication algorithm is used then the communication would not be possible.
- ◆ **Broadcast Key Period:** Set the time in seconds for the broadcast key renewal.
- ◆ **Server IP Address:** Set the IP address of the Radius Server.
- ◆ **Server Secret:** Set the password used between the AP and the Radius Server.

Operational settings: Using this option you can either view or modify the Wireless LAN parameters of the AP (Figure 5-9). These parameters are described below:

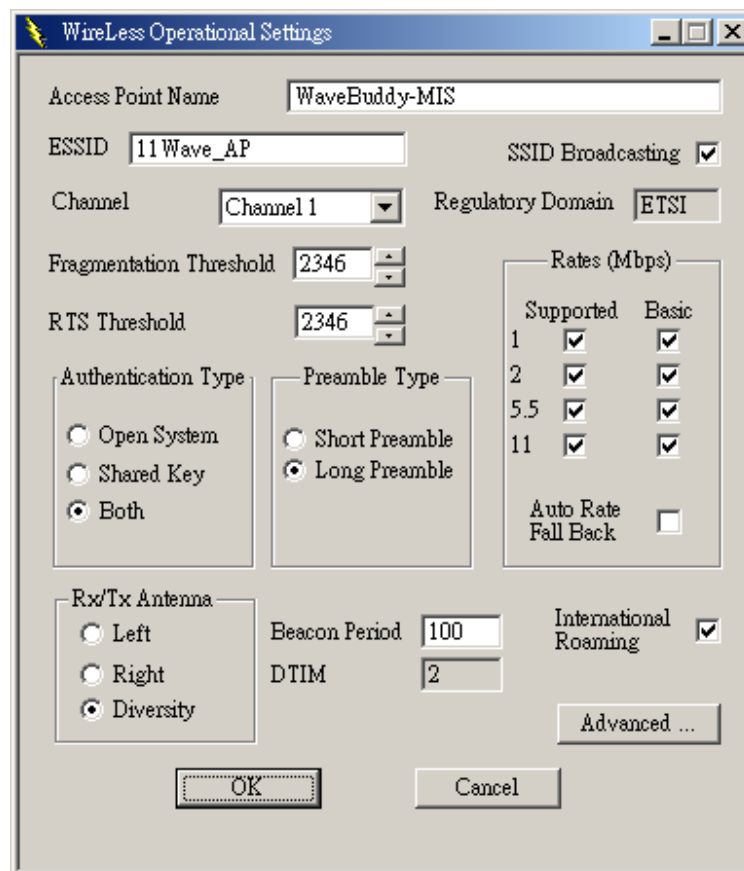


Figure 5-9. Wireless Operational Settings

ESSID: It is an ASCII string up to 32 characters used to identify a WLAN that prevents the unintentional merging of two co-located WLANs. The ESSID value must be the same in all stations and AP in the extended WLAN. Select the ESSID to be used.

SSID Broadcasting: When checked the AP broadcasts the ESSID to the stations, if not checked then the stations must know the AP ESSID in advance.

Channel: There are 14 channels available. The channels differ from country to country. Select the channel to be used.

Fragmentation Threshold: The size at which packets will be fragmented. Choose a setting within a range of 256 to 2346 bytes.

RTS Threshold: Minimum packet size to require an RTS (Request To Send). For packets smaller than this threshold, an RTS is not sent and the packet is transmitted directly to the WLAN. This is the option for the RTS Threshold activation.

Authentication Type: Select Open System, Shared Key, or Both

Open System: With this setting any station in the WLAN can associate with an AP and receive and transmit data (null authentication).

Shared Key: With this setting only stations using a shared key encryption identified

by the AP are allowed to associate with it.

Both: With this setting stations communicate with the AP either with or without data encryption.

Preamble Type (Short/Long): Preamble is the first subfield of PPDU, which is the appropriate frame format for transmission to PHY (Physical layer). There are two options, Short Preamble and Long Preamble. The Short Preamble option improves throughput performance.

Rate: By default the unit adaptively selects the highest possible rate for transmission. Select the basic rates to be used among the following options 1/2/5.5/11 Mbps.

Auto Rate Fall Back: When this is enabled the transmission rate is the optimum rate. In case of obstacles or interference, the system will automatically fall back.

Beacon Period: Set the Beacon Period parameter, which specifies the duration between Beacon packets (milliseconds). The range for the Beacon Period is between the range 20-1000 with a typical value of 100.

DTIM: The value of this field is already set and cannot be modified Determines at which interval the AP will send its broadcast traffic. Default value is 2 Beacons.

International Roaming: Enabled/Disabled International Roaming, which moving seamlessly from one AP coverage area to another with no loss in connectivity.

Regulatory Domain: The value of this field is already set and cannot be modified.

If you press the Advanced button on Figure 5-9 the following four operational modes are available (Figure 5-10). For each mode you can either view or modify the Wireless LAN parameters of the Wireless Operational Settings window.

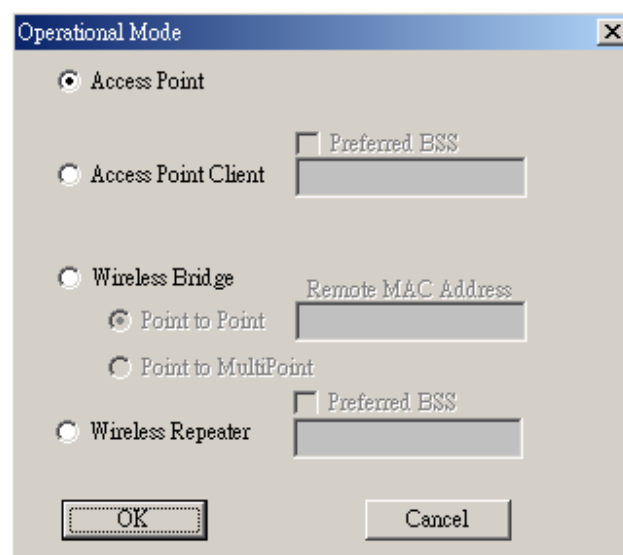


Figure 5-10. Operational Modes

- ◆ **Access Point:** This mode provides access from Wireless Stations to Wired LANs

and from Wired LANs to Wireless Stations. Furthermore, Wireless Stations within the range of the AP device may communicate with each other via the AP.

◆ **Access Point Client:** This mode allows the connection of one or more remote LANs with a central LAN, creating thus an extended single virtual LAN (Figure 5-11). In this way, any station of the Remote LAN can successfully communicate with any station of the central LAN, as if all of them belonged to the same physical LAN. Wireless Stations can't be associated with AP Clients. The AP conducts the designated traffic to the appropriate Wired or Wireless Station.

Preferred BSS: It is enabled if you select the **Access Point Client** option. BSS corresponds to the MAC Address of the desired Wireless device ("Access Point" mode) that you want to link.

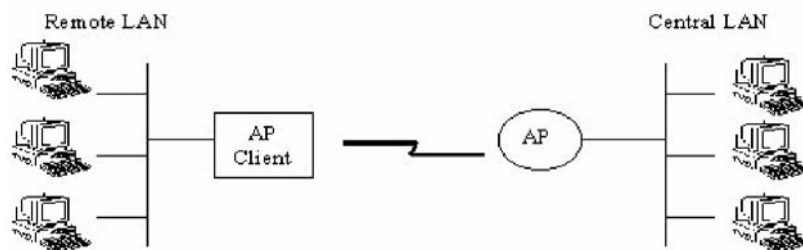


Figure 5-11. Access Point Client environment

◆ **Wireless Bridge:** This mode (Figure 5-12) enables a wireless connection between two or more Wired LANs. Two types of connections are possible:

Point to Point: The Wireless Bridge can communicate with a specific Remote MAC Address.

– **Remote MAC Address:** It is enabled if you select Point-to-Point option. It corresponds to the MAC Address of the Wireless Bridge of the Remote LAN.

Point to Multipoint: The Wireless Bridge can communicate with any Wireless Bridge available in the same channel. When the Authorization Algorithm (see the next menu - Authorized MAC Address), is enabled, the Wireless Bridge can communicate with any Wireless Bridge whose MAC Address exists in the Authorization Table.

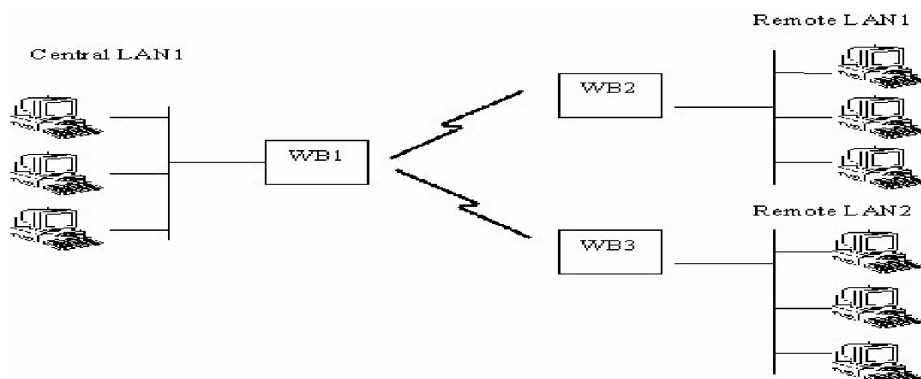


Figure 5-12. Wireless Bridge environment

◆ **Wireless Repeater:** This mode is used in order to increase the coverage area of an ESS (Figure 5-13). The Wireless Repeater starts acting as an AP after it has associated itself with another AP (Parent AP). From that point on, STAs can get associated to it and the user can configure the device with the utilities available (SNMP Manager, AP Utility).

The Wireless Repeater can be configured with the AP Configuration through the wireless STAs associated to it or the PCs in the Wired LAN behind the Parent AP.

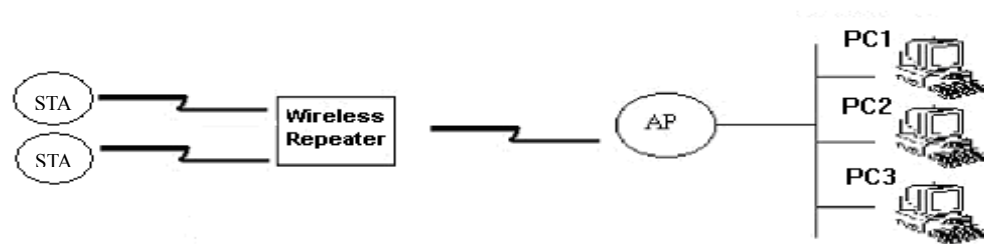


Figure 5-13. Wireless Repeater Mode

Authorized MAC Address - For security reasons the AP has the ability to associate with authorized MAC Addresses stations, if the Authorization Table option is enabled (Figure 5-14). Thus, under the Authorized MAC Address option you may press the following buttons.

No	Mac Address
1	00-0B-10-00-01-01
2	00-0B-10-00-01-02
3	00-0B-10-00-01-03
4	00-0B-10-00-01-04
5	00-0B-10-00-01-05
6	00-0B-10-00-01-06
7	00-0B-10-00-01-07
8	00-0B-10-00-01-08
9	00-0B-10-00-01-09
10	00-0B-10-00-01-0A

Buttons: Load file, Download, Get, Save, Close

Authorization Table: ☒ Enable

Mode: ☐ Allow Mode, ☒ Deny Mode

Figure 5-14. Authorized MAC Addresses

The “**Load file**” button is for loading a file with the MAC Addresses that can be associated with the AP (Authorized MAC Addresses).

The txt file must have one MAC address at a line and with the following format:
000B1002001C not 00-0B-10-02-00-1C or 00 0B 10 02 00 1C.

The “**Download**” button in order to download the Authorized MAC Address to the AP.

The “**Get**” button in order to get from the AP the Authorized MAC Addresses.

If the “**Authorization Table Enable**” is enabled, the AP allows any authorized stations to get associated to it.

Allow Mode: Only allow stations with MAC listed below to authenticate with the AP.

Deny Mode: Only deny stations with MAC listed below to authenticate with the AP.

Save: Pressing this button will save all the changes to the AP.

- **Enable SNMP traps** - Using this option you can either enable or disable SNMP traps, which are messages displayed in the right bottom corner of the main window indicating that an action related to the AP took place. Permitted messages are:

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 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 the AP starts up.

- **Authorization** - Using this option (Figure 5-15) the Administrator can change the passwords used in the community field of the “Connect to AP” window (Figure 5-1) for the User and the Administrator Authority.

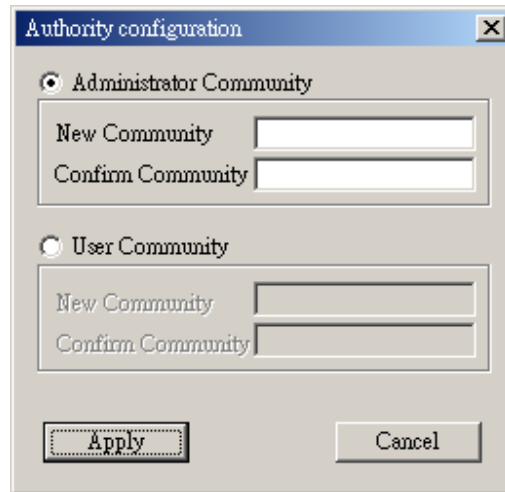


Figure 5-15. Authority Configuration window

Commands menu: Under this menu there are two options.

- **Reset Device** - You can reset the AP. This action takes place after a user makes configuration changes in order to initiate the changes.
- **Restore Defaults** - You can restore the factory **default** values of the AP.

Info menu: This menu lets you view Wireless and Ethernet statistics.

- **Wireless statistics** - This option reports the statistics concerning the unit's Wireless activity (Figure 5-16).

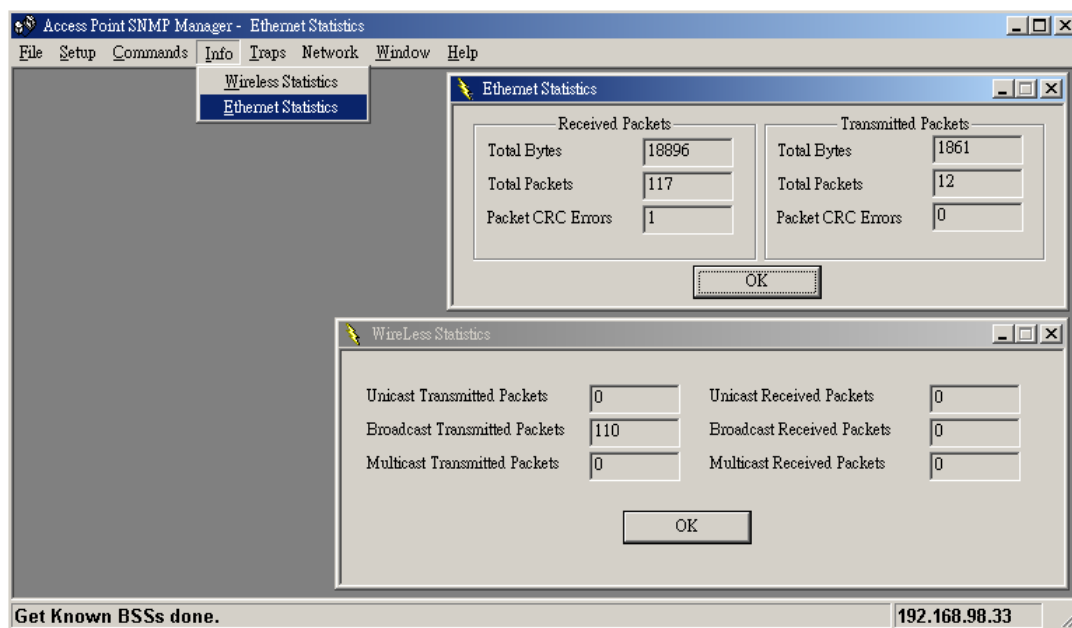


Figure 5-16. Wireless Statistics and Ethernet Statistics

The meaning of each field name is given in the following table.

Table 5-2. Wireless Statistics

Field	Description
Unicast Transmitted Packets	The number of unicast packets successfully transmitted
Broadcast Transmitted Packets	The number of broadcast packets transmitted
Multicast Transmitted Packets	The number of multicast packets transmitted
Unicast Received Packets	The number of unicast packets that were successfully received
Broadcast Received	The number of broadcast packets that were successfully received
Multicast Received	The number of multicast packets that were successfully received

- **Ethernet statistics** - This option reports the statistics concerning the unit's Ethernet port activity (Figure 5-16).

The meaning of each field name is given in the following table.

Table 5-3. Ethernet Statistics

Field	Description
<i>Received Packets:</i>	
Total Bytes	The number of bytes in the frames that were received
Total Packets	Total number of received packets
Packet CRC Errors	The number of packets with CRC Errors
<i>Transmitted Packets:</i>	
Total Bytes	The number of bytes in the frames that were transmitted
Total Packets	Total number of transmitted packets
Packet CRC Errors	The number of packets with CRC Errors

Traps menu: Provides information for trap messages

- **View Record** - You can see additional information for every Trap Message (Figure 5-17).

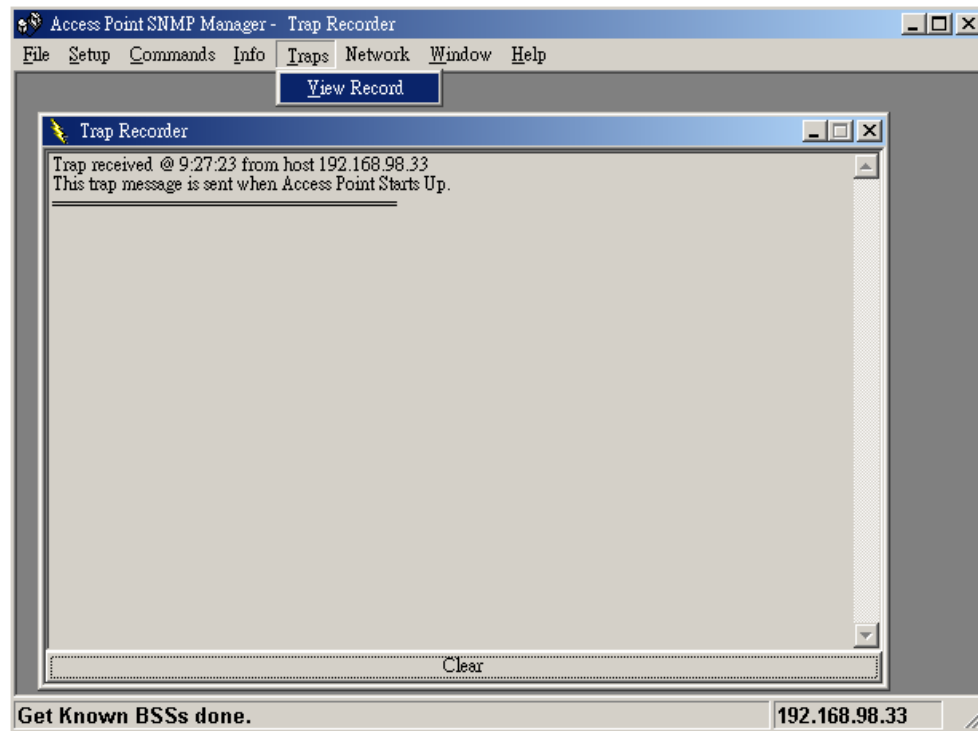


Figure 5-17. Trap Record

Network menu: Provides information about the Network.

- **Associated Stations** - Using this option you can view the MAC Addresses of the Associated stations with the AP (Figure 5-18).

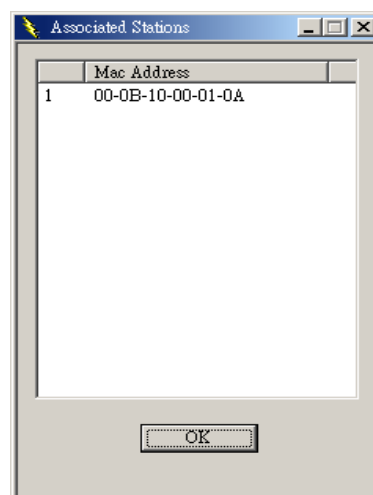


Figure 5-18. Associated Stations

- **KnownBSSs** - Using this option you can view the features (SSID, MAC address, etc.) of the adjacent AP (Figure 5-19).

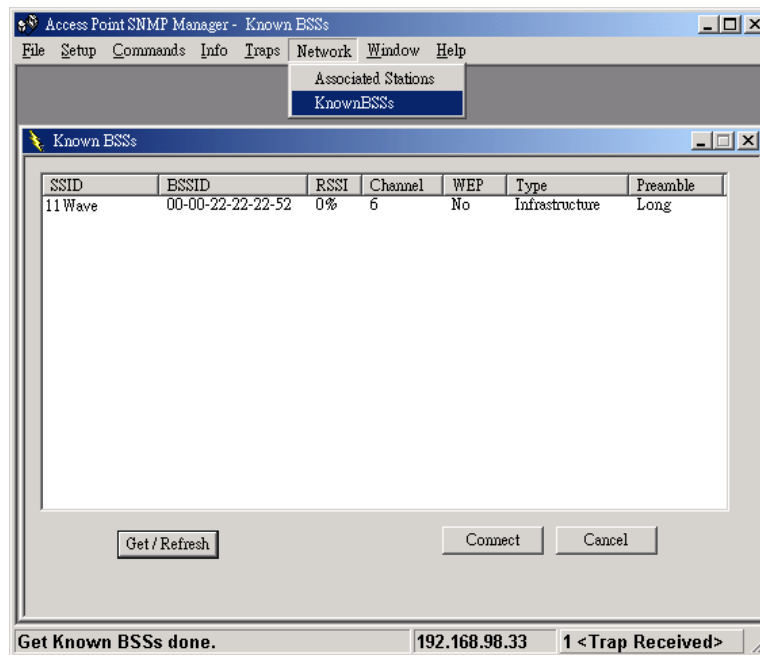


Figure 5-19. KnownBSSs Window

Window menu: Under this menu there are the following options

- **Cascade** - All opened windows are arranged on the desktop in a cascade fashion.
- **Tile** - All open windows are visible on the desktop.

Help menu: Provides on line help about the application.

5.1.3 Reset the AP by manual

If User forgot User password or User WLAN Access Point has locked up. User can reset it to factory defaults by performing the following steps:

1. Power off the WLAN Access Point.
2. Push in the reset button located on the back of the WLAN Access Point.
3. While holding in the button, apply power to the AP.
4. The Access Point will start to load the default settings.
5. Wait for about 5 seconds. Release the Push Button. Then the Access Point will restart with the factory default settings.

5.2 Using Web Browser

Before using Web Browser for configuring the WaveBuddy-AP, verify that the WaveBuddy-AP's IP Address has been set following the procedure described in the Section 4 "Setting the IP Address of the Access Point". You need to assign your computer a Static IP address within the

same range as the WaveBuddy-AP's IP address for the purpose of configuration of the WaveBuddy-AP. The default IP address of the WaveBuddy-AP is **192.168.98.11** with a Subnet Mask of **255.255.255.0**.

5.2.1 Connecting the WaveBuddy-AP To Your Network

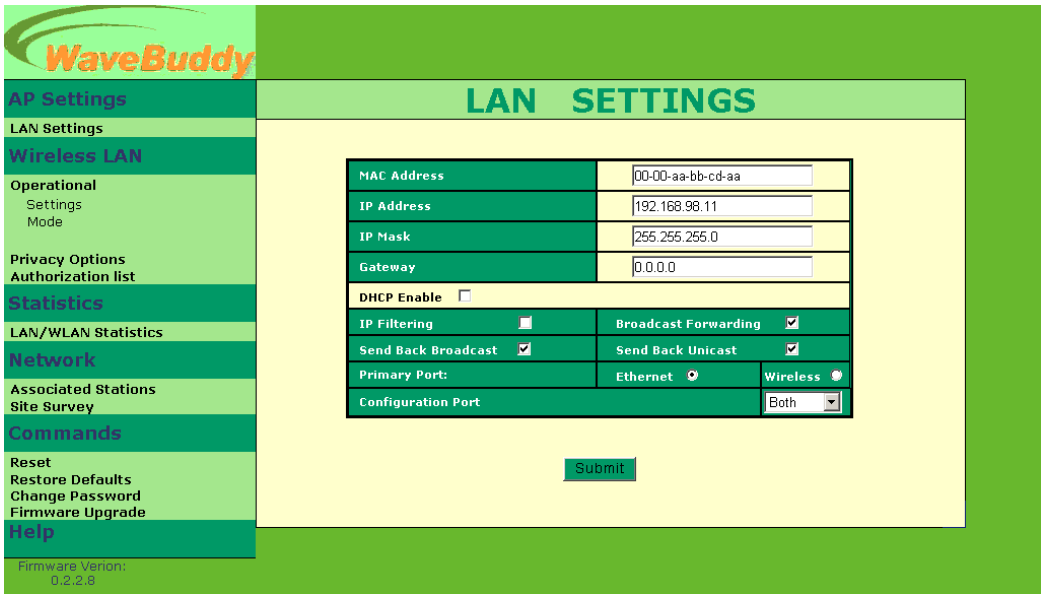
Open your Web browser and type **<http://192.168.98.11>** into the URL address box. Then press the **Enter** or **Return** key and it will link to login page. Type the appropriate password in the Password field. (The default password is "**public**"). Then press "Submit" linking to the configuration menu.



Figure 5-20. WaveBuddy AP Login

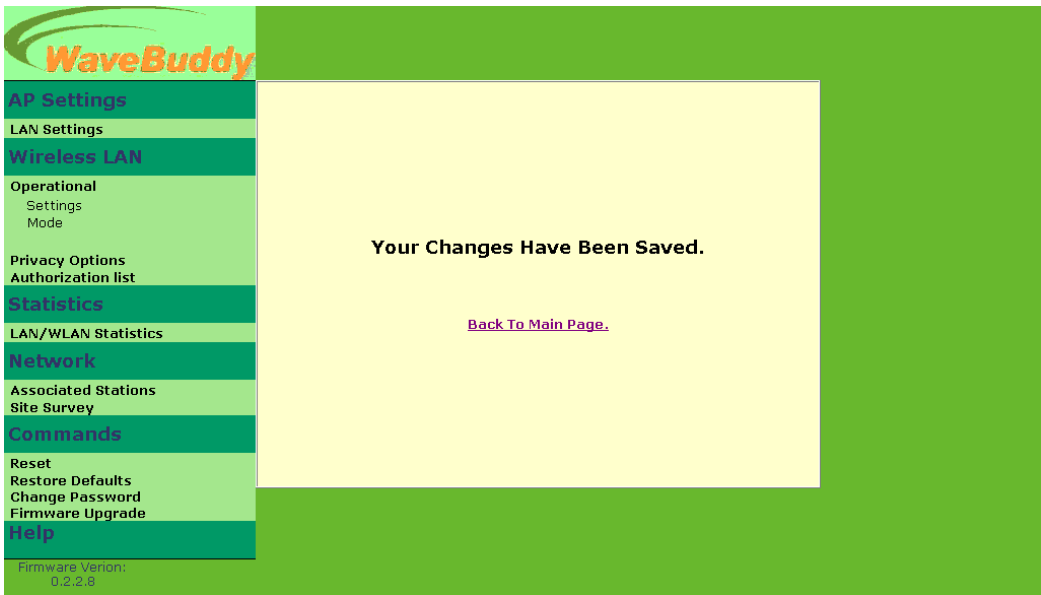
AP Settings: Provides information and setting about the LAN.

- **LAN Settings** - You can either view or modify IP configuration and Filtering options in this page (Figure 5-21). For more details referring to *Section 5.1.2 • Setup Menu • Bridge*). Then, press "Submit" to change your modify, and it will link to the message page to show you that your changes have been saved. Once you modify any setting of AP, you must re-login into AP Configuration Menu by pressing "Back to Main Page" (Figure 5-22).



The image shows the WaveBuddy LAN Settings page. On the left is a navigation menu with the following items: AP Settings, LAN Settings, Wireless LAN, Operational (with sub-items Settings and Mode), Privacy Options, Authorization list, Statistics, LAN/WLAN Statistics, Network, Associated Stations, Site Survey, Commands, and Help. Below the menu, it says 'Firmware Version: 0.2.2.8'. The main content area is titled 'LAN SETTINGS' and contains a form with the following fields: MAC Address (00-00-aa-bb-cd-aa), IP Address (192.168.98.11), IP Mask (255.255.255.0), Gateway (0.0.0.0), DHCP Enable (checkbox), IP Filtering (checkbox), Broadcast Forwarding (checkbox), Send Back Broadcast (checkbox), Send Back Unicast (checkbox), Primary Port (radio buttons for Ethernet and Wireless), and Configuration Port (dropdown menu set to Both). A 'Submit' button is at the bottom of the form.

Figure 5-21. LAN Setting



The image shows the WaveBuddy confirmation message page. The left navigation menu is identical to the previous figure. The main content area displays the message 'Your Changes Have Been Saved.' followed by a link 'Back To Main Page.'.

Figure 5-22.

Wireless LAN: Provides information and setting about the Wireless LAN parameters.

- **Operational Settings** - In this page you can either view or modify the Wireless LAN parameters of the AP (Figure 5-23). You can refer to *Section 5.1.2* • *Setup menu* • *Wireless LAN* • *Operational Settings* for more detailed descriptions. Press “Submit” to save your changes, and then press ”Back to Main page” to re-login Configuration Menu.



WaveBuddy

WLAN OPERATIONAL SETTINGS

Access Point Name	WaveBuddy_MIS
ESSID	11Wave_AP
Channel	Channel 1
Regulatory Domain	ETSI
Autorate FallBack	☐
Preamble Type	Long Preamble
Authentication Type	Both
Fragmentation Threshold	2346
RTS Threshold	2346
Rx/Tx Antenna	Diversity
Beacon Period	100
DTIM	2
SSID Broadcasting	☐
International Roaming	☒
Rates: 1 Mb/sec	2 Mb/sec
5.5 Mb/sec	11 Mb/sec
Basic	Basic
Basic	Basic

Figure 5-23. WLAN Operational Settings

- Operational Mode** - You can either view or modify the Wireless LAN parameters of the Wireless Operational Settings window for each mode in this page(Figure 5-24).Refer to *Section 5.1.2 • Setup menu • Wireless LAN • Operational Settings* for more detailed descriptions. Press “Submit” to save your changes, and then press “Back to Main page” to re-login Configuration Menu. When you press “SITE SURVEY”, it will link to the Site Survey page (Refer to *Section 5.2.1 • Network • Site Survey, Figure 5-29*).



WaveBuddy

WLAN OPERATIONAL MODE

Access Point	☐		
Access Point Client	☐	Preferred BSS	00-00-00-00-00-00
Wireless Bridge	Point to Point	Remote MAC Address	00-00-00-00-00-00
	Point to Multipoint		
Wireless Repeater	☐	Preferred BSS	00-00-00-00-00-00

[SITE SURVEY](#)

Figure 5-24. WLAN Operational Mode

- **Privacy Options** - By choosing this option you may modify the encryption key values using the Wireless Equivalent Privacy (WEP) Options page (Figure 5-25). Write the values and press “Submit” to change (WEP key is write-only, so it is not possible to retrieve the key values). There are four 5 Hex digit encryption keys available if you select 64bit WEP and there are four 13 Hex digit encryption keys available if you select 128bit WEP. The key is enabled only if you select it in the “Default key” option. Enable the WEP (Wired Equivalent Privacy) option in order to activate WEP encryption for transmissions between the stations and the AP. WEP is an authentication algorithm that protects authorized Wireless LAN users against eavesdropping.

Figure 5-25. WLAN Privacy Options

For more detailed descriptions of 802.1X Options, you can refer to *Section 5.1.2 • Setup menu • Wireless LAN • Privacy Options*.

- **Authorization List** - For security reasons the AP has the ability to associate with authorized MAC Addresses stations, if the Authorization Table option is enabled. If the “**Authorization Table**” is enabled, the AP allows any authorized stations to get associated to it. And you can select **Allow** or **Deny** mode with MAC listed below to access device (Figure 5-26).

No	Mac Address
1	000B0012001C
2	000B0012001D
3	000B0012001E
4	000B0012001F
5	
6	
7	
8	
9	
10	

1~10

Authorization Table: Disable ☐ Enable ☒

☐ Only deny PCs with MAC listed below to access device
☒ Only allow PCs with MAC listed below to access device

Submit

Figure 5-26. Authorization List

Statistics: Provides information about the LAN/WLAN Statistics.

- **LAN/WLAN Statistics** - This page lets you view Ethernet and Wireless statistics (Figure 5-27). You can refer to Table 5-2 and Table 5-3 for the meaning of each field name.

Received Packets		Transmitted Packets	
Ethernet Statistics			
Total Bytes	52786	Total Bytes	233498
Total Packets	562	Total Packets	730
Packet CRC Errors	0	Packet CRC Errors	0
Wireless Statistics			
Unicast Packets	0	Unicast Packets	0
Broadcast Packets	0	Broadcast Packets	63
Multicast Packets	0	Multicast Packets	0

Figure 5-27. Statistics

Network: Provides information about the Network.

- **Associated Stations** - In this page you can view the MAC Addresses of the Associated stations with the AP (Figure 5-28).

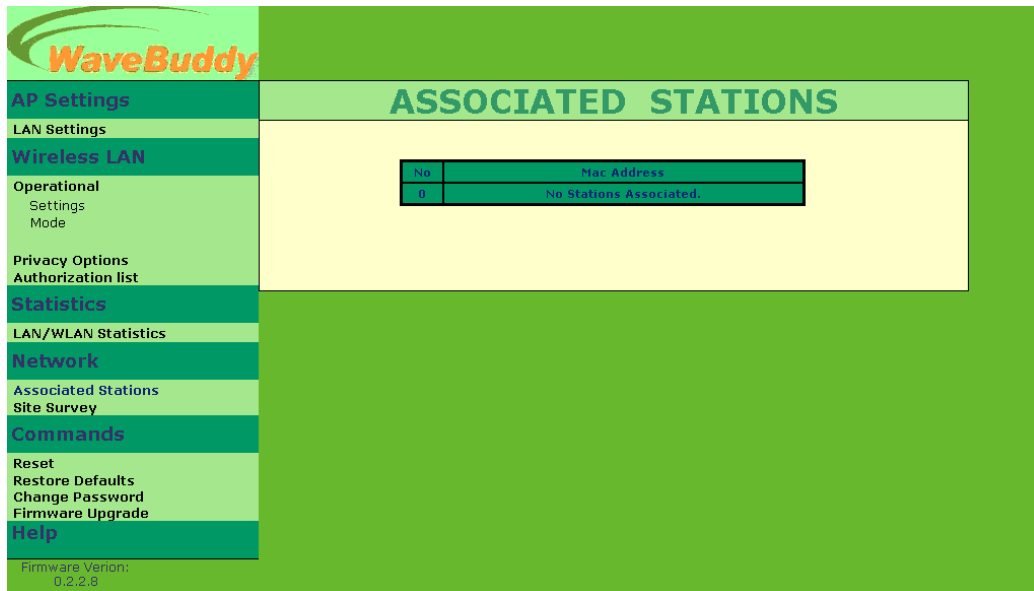


Figure 5-28. Associated Stations

- **Site Survey** – In this page, you can view the features (SSID, MAC address, etc.) of the adjacent AP. You also can select operational mode in this page. (Refer to *Section 5.1.2 • Setup menu • Wireless LAN • Operational Settings* for more detailed descriptions.).

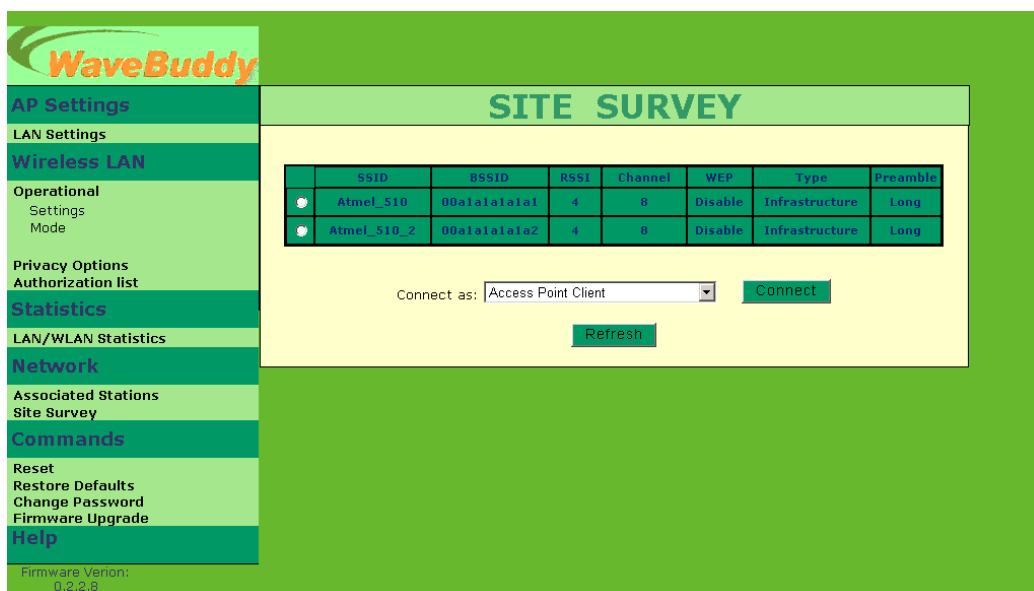
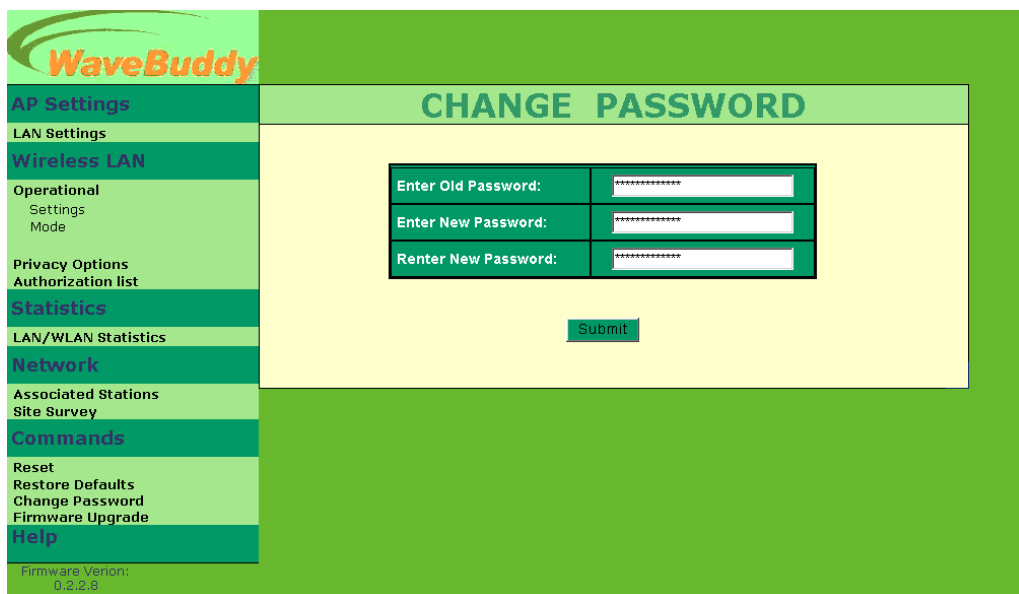


Figure 5-29. Site Survey

Commands:

- **Reset** - You can reset the AP. This action takes place after a user makes configuration changes in order to initiate the changes.
- **Restore Defaults** - You can restore the factory **default** values of the AP.
- **Change Password** – You can change the default password to a new password (Figure 5-30).



The screenshot shows the WaveBuddy web interface. On the left is a navigation menu with the following items: AP Settings, LAN Settings, Wireless LAN, Operational (with sub-items Settings and Mode), Privacy Options, Authorization list, Statistics, LAN/WLAN Statistics, Network, Associated Stations, Site Survey, Commands (with sub-items Reset, Restore Defaults, Change Password, and Firmware Upgrade), and Help. At the bottom of the menu, it says 'Firmware Version: 0.2.2.8'. The main content area has a green header with the 'WaveBuddy' logo and a title 'CHANGE PASSWORD'. Below the title is a form with three input fields: 'Enter Old Password:', 'Enter New Password:', and 'Reenter New Password:', each followed by a masked password field (displayed as asterisks). A 'Submit' button is located below the input fields.

Figure 5-30. Change Password

- **Firmware Upgrade** – Refer to *Section 6.2*.

Help: Provides on line help about the application (Figure 5-31).

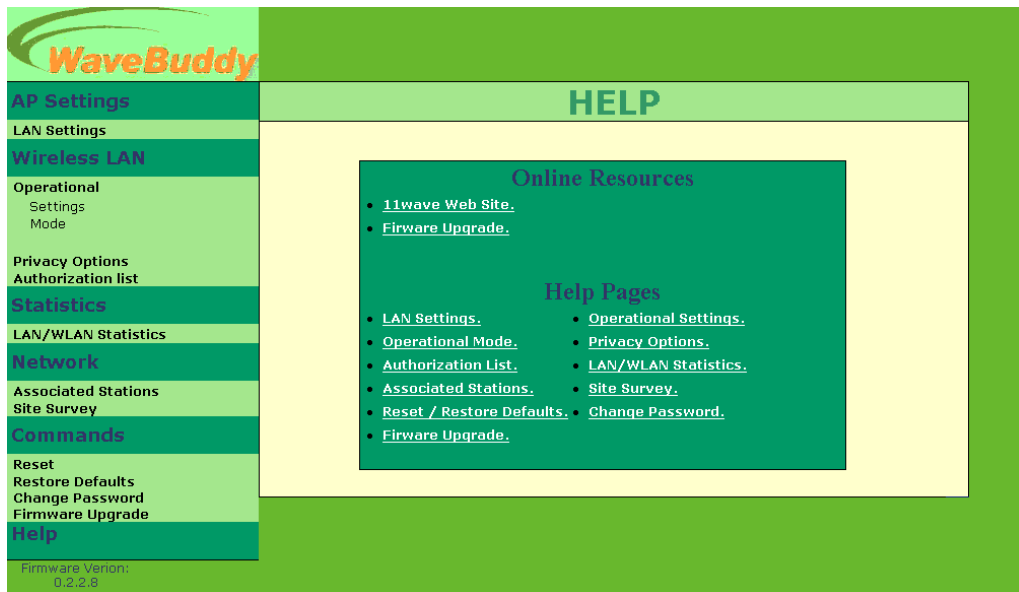


Figure 5-31. Help

5.3 Using the DFU Utility application

This procedure requires the use of the DFU Utility application (AP Utility) that can be used only through the USB port. When you connect the WaveBuddy-AP to the USB port for the very first time, the operating system will automatically detect the device since the driver has already been installed during the installation process.

If you want to view or change the WaveBuddy-AP parameters you have to plug the USB cable to the AP USB port and then run the AP Utility and select the “**Configuration**” button (Figure 5-32).

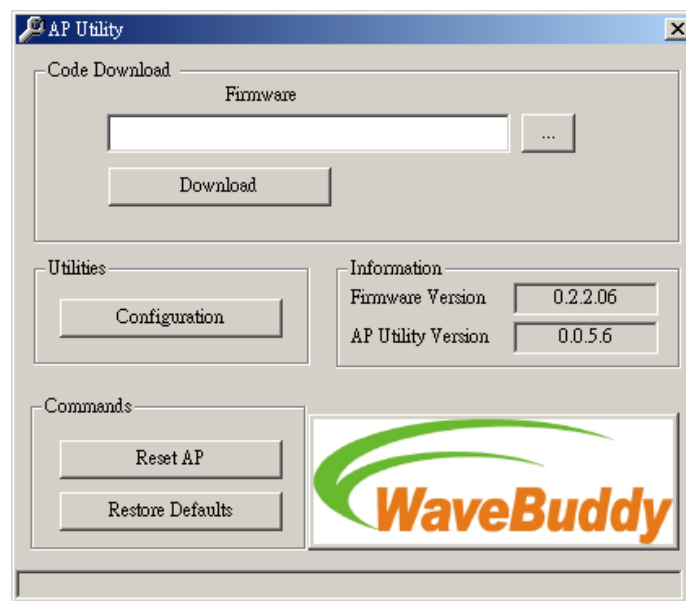


Figure 5-32. DFU Utility application (AP Utility)

Under the window (Figure 5-33) that appears, you may press the following buttons:

The **“Get”** button in order to view the current parameters of the AP (Figure 5-33).

The **“Modify”** button in order to set new values to the pre-selected parameters.

The **“Set”** button to download any changes to the AP.

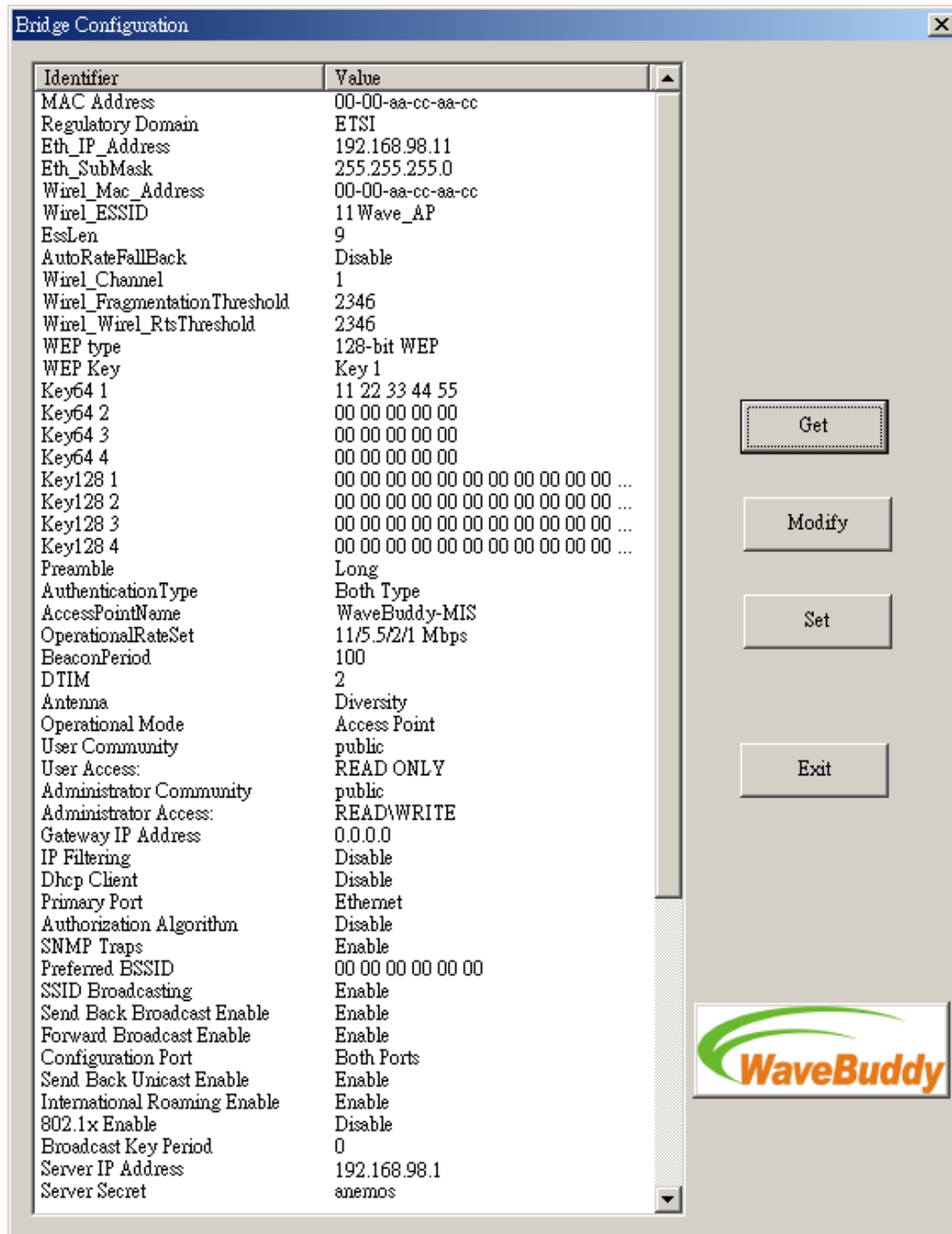


Figure 5-33. Bridge Configuration

The parameters shown in Figure 5-33 are described below:

MAC Address: (*Read Only*) The MAC Address of the AP. Unique 48-bit, hard-coded Media Access Control address known as the station identifier.

Regulatory Domain: (*Read Only*) You need to select the Regulation Domain among the following options, FCC, ETSI, SPAIN, DOC, FRANCE, MKK, and MKK1.

Eth_IP_Address: The IP Address of the AP. Network-assigned Internet Protocol address of the AP.

Eth_SubMask: The Ethernet station and the AP must be on the same subnet. The IP Address for the AP must correspond to the Subnet Mask. Subnet Mask consists of four sets of three digits that divide a network into subnetworks.

Wirel_MAC_Address: (*Read Only*) Specifies the BSSID and must be the same with the Ethernet MAC Address.

Wirel_ESSID: Select the ESSID to be used. The ESSID (up to 32 printable ASCII characters) of the unit is a string used to identify a WLAN. The ID prevents the unintentional merging of two co-located WLANs.

EssLen: (*Read Only*) The length of the ESSID (number of characters).

AutoRateFallback: Select Enable or Disable. When this is enabled the transmission rate is the optimum rate. In case of obstacles or interference, the system will automatically fall back.

Wirel_Channel: Select the channel to be used. The channels differ from country to country. There are 14 channels available.

Wirel_Fragmentation Threshold: The size at which packets will be fragmented. Choose a setting within a range of 256 to 2346 bytes. This is the option for the Fragmentation Threshold activation.

Wirel_Rts_Threshold: Minimum packet size to require an RTS (Request To Send). For packets smaller than this threshold, an RTS is not sent and the packet is transmitted directly to the WLAN. This is the option for the RTS Threshold activation.

WEP type: The Wired Equivalent Privacy Algorithm (64 or 128 bits).

WEP Key: The WEP Key if the WEP option is enabled in order to activate WEP encryption for transmissions between the stations and the AP.

WEP Keys 64/128 #1 - #4: The default key that will be used. May be edited only if WEP type is 64 bits or 128 bits.

Preamble Type: Select Short or Long Preamble Type. Preamble is the first subfield of PPDU, which is the appropriate frame format for transmission to PHY (Physical layer). There are two options, Short Preamble and Long Preamble. The Short Preamble option improves throughput performance.

Authentication Type: Select Open System or Shared Key Authentication Type.

- **Open System:** With this setting any station in the WLAN can associate with an AP and receive and transmit data (null authentication).
- **Shared Key:** With this setting only stations using a Shared Key encryption identified by the AP are allowed to associate with it.
- **Both:** With this setting stations communicate with or without data encryption.

AccessPointName: Type the AP's name.

Operational Rate Set: By default the unit adaptively selects the highest possible rate for transmission. In case of obstacles or interference, the system will step down. Select the basic rates to be used among the following options: 1/2 Mbps, 1/2/5.5/11 Mbps.

Beacon Period: Set the Beacon Period parameter, which specifies the duration between Beacon packets (milliseconds). The range for the Beacon Period is between the range 20-1000 with a typical value of 100.

DTIM: (*Read Only*) Set the DTIM period. Determines at which interval the AP will send its broadcast traffic. Default value is 2 Beacons.

Antenna: Set the Antenna among the following options Left, Right or Diversity, to determine which antennas are used for reception and transmission.

Operational Mode: Set one of the following operational modes for the AP.

- Access Point
- Access Point Client
- Wireless Bridge (Wireless Bridge can be used in Point to Point or Point to Multipoint configurations)
- Wireless Repeater

For more information on each mode of operation see paragraph 5.1.3, Configuring the AP.

User Community: Indicates the user's password. The default password is "public"

User Access: Indicates the user's access rights. The user can read but not set or change the AP's parameters.

Administrator Community: Indicates the administrator's password. The default password is "public".

Administrator Access: Indicates the Administrator's access rights. The administrator can read and also set or save changes to the AP's parameters.

Gateway IP Address: Network Gateway

IP Filtering: Enable/Disable the possibility to allow only IP protocol packets to pass through the WLAN and any other protocol packets filtered out.

DHCP client: Enable/Disable automatic IP Address assignment by the DHCP server

Primary Port: The interface that determines the DHCP server (Ethernet Port/Wireless Port).

Authorization Algorithm: Enable/Disable the association with authorized MAC Addresses stations.

SNMP traps: Enabled/Disabled SNMP traps, which are the messages indicating the actions related to the AP that have taken place. Preferred BSSID: Remote MAC Address for connection, in AP Client or Wireless Bridge Operational modes.

Preferred BSSID: It is enabled only if you select the Access Point Client option. BSSID corresponds to the MAC Address of the desired Wireless device ("Access Point" mode) that you want to link.

SSID Broadcasting: When checked the AP broadcasts the ESSID to the stations, if not checked then the stations must know the AP ESSID in advance.

Send Back Broadcast Enable: The AP should not send back to the air broadcast traffic received from the air.

Forward Broadcast Enable: The AP should not forward broadcast traffic to the air.

Configuration Port: You can select which port (Ethernet Port and/or Wireless Port) will be used for the AP configuration.

Send Back Unicast Enable: The AP should not send back to the air unicast traffic received from the air.

International Roaming Enable: Enabled/Disabled International Roaming, which moving seamlessly from one AP coverage area to another with no loss in connectivity.

802.1X Enable: Enable, Disable, Mixed Environment.

When using *Enable*, then it is activated the 802.1X support of the AP and the stations that will try to connect to this AP must support 802.1X as well.

When using *Disable*, then the AP does not support 802.1X and then the default keys are used for the encryption/decryption of the packets.

When using *Mixed Environment*, then you can have APs or stations that support 802.1X and APs or stations that do not support 802.1X. For the APs or the stations that do not support 802.1X must use Shared Key Authentication in order to connect to this AP. If Open System authentication algorithm is used then the communication would not be possible.

Broadcast Key Period: Set the time in seconds for the broadcast key renewal.

Server IP Address: Set the IP address of the Radius Server.

Server Secret: Set the password used between the AP and the Radius Server.

Section 6. Access Point Firmware Upgrade

The WaveBuddy-AP firmware upgrade can be done either through the Ethernet port/Wireless port by using the SNMP Configuration Utility (SNMP Manager) application, and any current Web Browser, or through the USB port by using the DFU Utility application (AP Utility).

6.1 Using the SNMP Configuration Utility application

Before using the SNMP Configuration Utility for upgrading the firmware of the WaveBuddy-AP, verify that the AP IP Address has been set-up following the procedure described in the section “Setting the IP Address of the Access Point” (Section 4).

On the window task bar, choose **Start | Programs | WaveBuddy WLAN Access Point Utilities | SNMP Configuration Utility** to open the application. Choose **File | Firmware Upgrade**, the following window (Figure 6-1) appears.

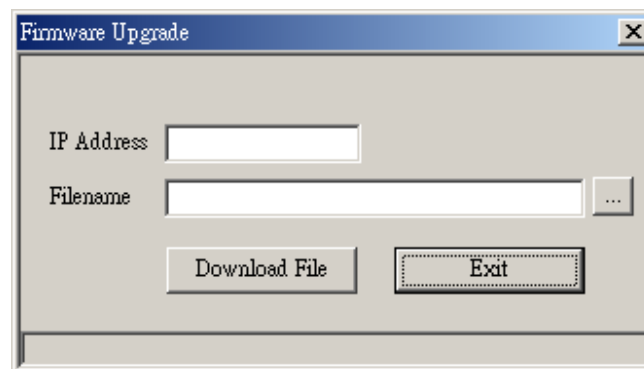


Figure 6-1. Firmware Upgrade

Type the IP Address of the AP in the first edit box of the panel. Then, browse for the appropriate file (e.g. bridge.rom) by pressing the “Browse (three dots)” button. Finally press the “download” button to download the firmware (Figure 6-2).

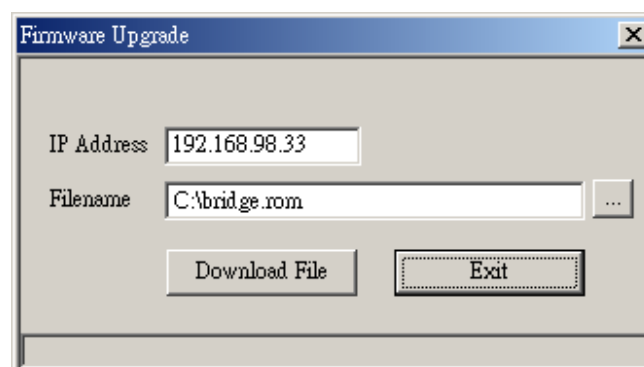


Figure 6-2. The IP Address, browse for the file bridge.rom and download

The Firmware download procedure will be completed successfully if a message in the left bottom corner appears as “Firmware download has been completed”. If you receive the message “Timed Out”, in the left bottom corner, during the “firmware download” procedure, you need to check if the AP 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 AP. If you receive the message “Flash Programming in progress” during the firmware download procedure you **should not power off** the AP. 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.

6.2 Using Web Browser

Open your Web browser and type **http://192.168.98.11** into the URL address box. Then press the **Enter** or **Return** key. You need to assign your computer a Static IP address within the same range as the WaveBuddy-AP’s IP address for the purpose of configuration of the WaveBuddy-AP. The default IP address of the WaveBuddy-AP is **192.168.98.11** with a Subnet Mask of **255.255.255.0**.

Press Commands > Firmware Upgrade of the left window, it will link to firmware upgrade page, then browse for the appropriate file (e.g. bridge.rom) by pressing the “Browse...” button. Finally press the “Upgrade” button to download the firmware. (Figure 6-3)

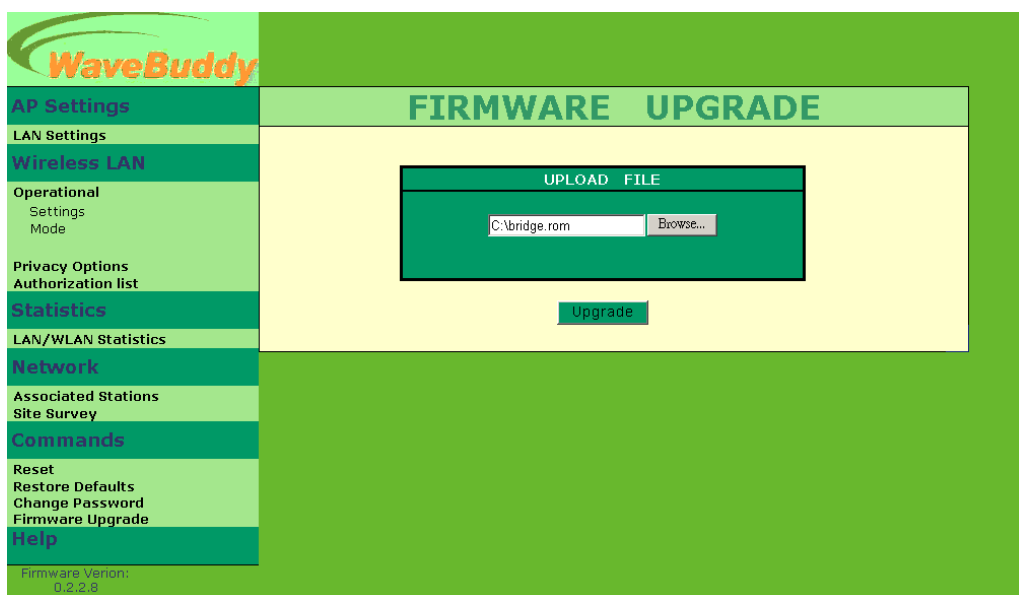


Figure 6-3. Firmware Upgrade

6.3 Using the DFU Utility application

First of all you have to plug the USB cable and then run the DFU Utility application (AP Utility).

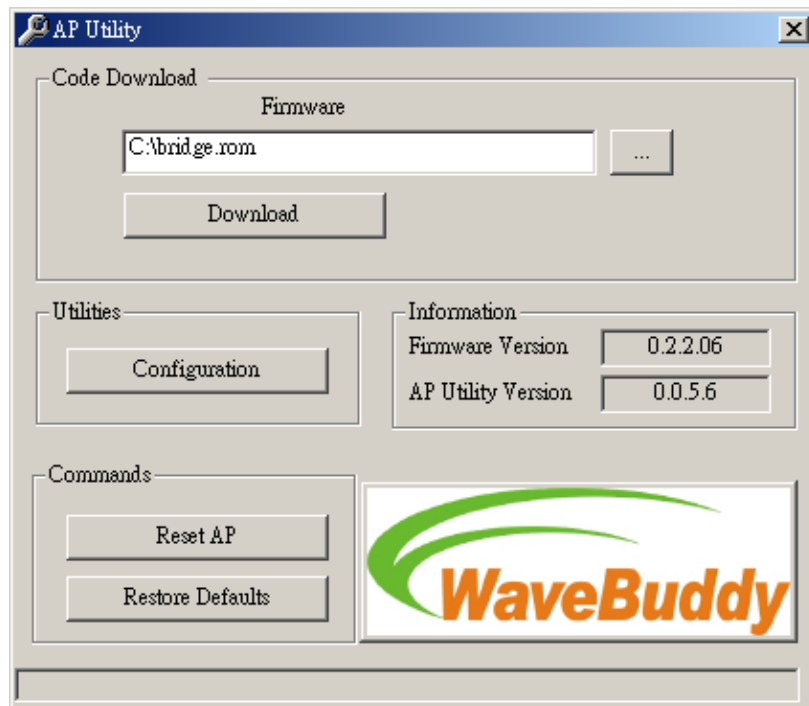


Figure 6-4. DFU Utility application

In Figure 6-4 select the appropriate file bridge.rom, by pressing the “Browse (three dots)” button. Finally press the “Download” button. 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) (Figure 6-5, Figure 6-6).

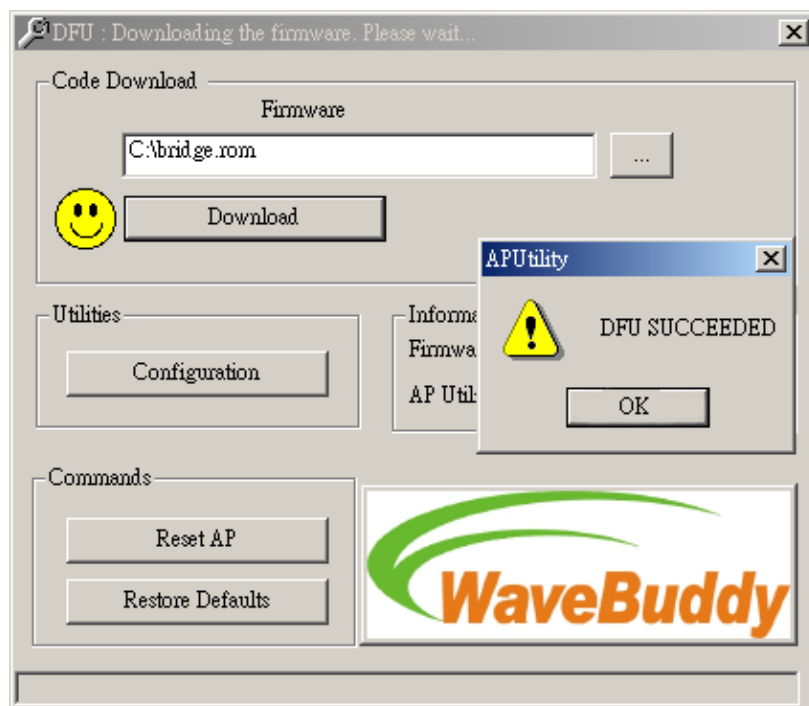


Figure 6-5. DFU succeeded

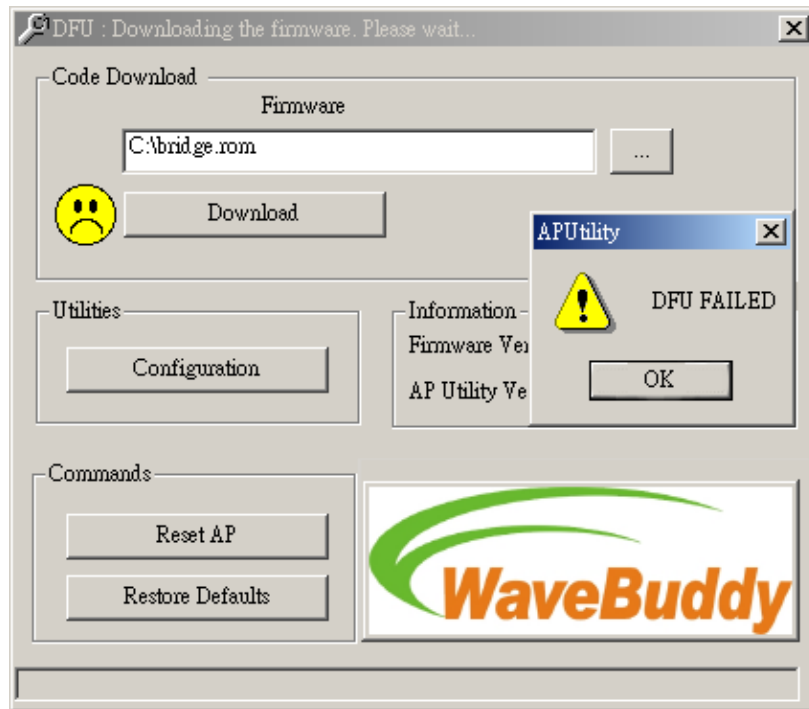


Figure 6-6. DFU failed

Appendix A

15.21

CAUTION: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Prohibition of co-location

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

15.105 Federal Communications Commission (FCC) Requirements, Part 15

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 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.

Caution Statement of the FCC Radio Frequency Exposure

This Wireless LAN radio device has been evaluated under FCC Bulletin OET 65C and found compliant to the requirements as set forth in CFR 47 Sections 2.1091, 2.1093, and 15.247(b)(4) addressing RF Exposure from radio frequency devices. The radiation output power of this Wireless LAN device is far below the FCC radio frequency exposure limits. Nevertheless, this device shall be used in such a manner that the potential for human contact during normal operation—as a mobile device but use in a body-worn way is strictly prohibit. When using this device, a certain separation distance between antenna and nearby persons has to be kept to ensure RF exposure compliance.

Regulatory information / Disclaimers

Installation and use of this Wireless LAN device must be in strict accordance with the instructions included in the user documentation provided with the product. Any changes or modifications (including the antennas) made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment. The manufacturer is not responsible for any radio or television interference caused by unauthorized modification of this device, or the substitution of the connecting cables and equipment other than manufacturer specified. It is the responsibility of the user to correct any interference caused by such unauthorized modification, substitution or attachment. Manufacturer and its authorized resellers or distributors will assume no liability for any damage or violation of government regulations arising from failing to comply with these guidelines.

MPE Statement (Safety Information)

Your device contains a low power transmitter. When device is transmitted it sends out Radio Frequency (RF) signal.

Safety Information

CAUTION: To maintain compliance with FCC's RF exposure guidelines, this equipment should be installed and operated with minimum distance 20 cm between the radiator and your body. Use on the supplied antenna. Unauthorized antenna, modification, or attachments could damage the transmitter and may violate FCC regulations.

Appendix B: Glossary

A

Access Point - An internetworking device that seamlessly connects wired and wireless networks together.

Ad-Hoc Mode - A client setting that provides independent peer to peer connectivity in a wireless LAN. An alternative setup is where PCs communicate with each other through an access point.

B

Bandwidth - The transmission capacity of a given facility, in terms of how much data the facility can transmit in a fixed amount of time; expressed in bits per second (bps).

Bit - A binary digit. The value - 0 or 1-used in the binary numbering system. Also, the smallest form of data.

BSS - Stands for **Basic Service Set**. An Access Point associated with several stations.

D

Default Gateway - The routing device used to forward all traffic that is not addressed to a station within the local subnet.

DHCP server and client - DHCP stands for Dynamic Host Configuration Protocol. This protocol is designed to automatically load parameters for the TCP/IP network, including the IP address, host name, domain name, netmask, default gateway, and name server address. The machine that provides this service is called the DHCP server, and its client computers are called DHCP clients. If client computers support DHCP, a TCP/IP configuration is not needed on each client computer.

Diversity Antennas - An intelligent system of two antennas that continually senses incoming radio signals and automatically selects the antenna best positioned to receive it.

Domain - A subnetwork comprised of a group of clients and servers under the control of one security database. Dividing LANs into domains improves performance and security.

Driver - A workstation or server software module that provides an interface between a network interface card and the upper-layer protocol software running in the computer; it is designed for a specific NIC, and is installed during the initial installation of a network compatible client or server operating system.

DSSS (Direct-Sequencing Spread-Spectrum) - DSSS operate over the radio airwaves in the unlicensed ISM band (industrial, scientific, medical). DSSS uses a radio transmitter to spread data packets over a fixed range of frequency band.

E

Encryption - A security method that applies a specific algorithm to data in order to alter the data's appearance and prevent other devices from reading the information.

Ethernet - The most widely used LAN access method that is defined by the IEEE 802.3 standard. Ethernet is normally a shared media LAN meaning all devices on the network segment share total bandwidth. Ethernet networks operate at 10Mbps using CSMA/CD to run over 10Base T cables.

ESS - Stands for Extended Service Set. More than one BSS can be configured as an Extended Service Set. An ESS basically a roaming domain.

F

Firmware - Program that is inserted into programmable read-only memory (programmable read-only memory), thus becoming a permanent part of a computing device.

Fragmentation Threshold Value - Indicates how much of the network resources is devoted to recovering packet errors. The value should remain at its default setting of 2,432. If you experience high packet error rates, you can decrease this value but it will likely decrease overall network performance. Only minor modifications of this value are recommended.

Fragmentation - Breaking a packet into smaller units when transmitting over a network medium that cannot support the original size of the packet.

I

IEEE - The Institute of Electrical and Electronics Engineers.

IEEE 802.11 - The IEEE standard that specifies a carrier sense media access control and physical layer specifications for 1 and 2 megabit per second wireless LANs.

IEEE 802.11b - The IEEE standard that specifies a carrier sense media access control and physical layer specifications for 5.5 and 11 megabit per second wireless LANs.

IEEE 802.3 - The IEEE standard that specifies carrier sense media access control and physical layer specifications for Ethernet LANs.

Infrastructure Mode - A client setting providing connectivity to an Access Point. As compared to Ad-Hoc Mode where PCs communicate directly with each other clients set in infrastructure Mode all pass data through a central Access Point. The Access Point not only mediates Wireless network traffic in the immediate neighborhood but also provides communication with the wired network.

IP Address - An IP address is a 32-bit number that identifies each sender & receiver of information that is sent across the Internet. An IP address has two parts: the identifier of a particular network on the Internet and one identifier of a particular device (which can be a server or a workstation within that network).

IRQ - Interrupt ReQuest, A hardware interrupt on a PC. There are 16 IRQ lines used to signal the CPU that peripheral event has started or terminated. In most cases, two devices cannot use the same line.

ISM band - The FCC and their counterparts outside of the U.S. have set aside bandwidth for unlicensed use in the ISM (Industrial, Scientific and Medical) band. Spectrum in the vicinity of 2.4 GHz, in particular, is being made available worldwide. This presents a truly revolutionary

opportunity to place convenient high-speed wireless capabilities in the hands of users around the globe.

L

LAN - A local area network (LAN) is a group of computers and associated devices that share a common communications line and typically share the resources of a single processor or server within a small geographic area (for example, within an office building).

M

MAC Address - 12-digit hexadecimal number that identifies a networking product on the network.

Mbps (Megabits per second) - One million bits per second; unit of measurement for data transmission.

N

Network - A system that transmits any combination of voice, video and/or data between users.

Node - A network junction or connection point, typically a computer or work station.

O

Open System - Is when the sender and the recipient do not share a secret key. Each party generates its own key-pair and asks the receiver to accept the (usually randomly) generated key. Once accepted, this key is used for a short time only; then a new key is generated and agreed upon.

P

Packet - A unit of data routed between an origin and a destination in a network.

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

Plug and Play - The ability of a computer system to configure expansion boards and other devices automatically without requiring the user to turn off the system during installation.

R

Roaming - The ability to use a wireless device and be able to move from one access point's range to another without losing the connection.

RTS/CTS Threshold Value - Should remain at its default setting of 2,347. A preamble is a signal used to synchronize the transmission timing between two or more systems. A series of transmission pulses is sent before the data to indicate that "someone is about transmit data." This

ensures that systems receiving the information correctly when the data transmission starts.

S

Shared Key - Is when both the sender and recipient share a secret key. Both units use this key for an extended length of time, sometimes indefinitely. Any eavesdropper that discovers the key may decipher all packets until the key is changed.

Signal Strength - The signal level indicates the strength of the signal as received at the wireless network interface.

SNMP (Simple Network Management Protocol) - A standard network protocol that can be used to manage networks locally, or worldwide via the Internet.

SSID (Service Set Identifier) - Is the unique name shared among all points in a wireless network. The SSID must be identical for all points in the network. It is case sensitive and must not exceed 32 characters.

Static IP Address - A permanent IP address that is assigned to a node in an IP or a TCP/IP network.

Subnet - A subnet is a logical sub-division of a Local Area Network that has been divided by means of routers or gateways. A subnet may include multiple LAN segments. Each subnet is identified by the Subnet Mask.

T

TCP/IP (Transmission Control Protocol/Internet Protocol) - The basic communication language or protocol of the Internet. It can also be used as a communications protocol in a private network (either an intranet or an extranet). When you are set up with direct access to the Internet, your computer is provided with a copy of the TCP/IP program just as every other computer that you may send messages to or get information from also has a copy of TCP/IP.

Throughput - The amount of data moved successfully from one place to another in a given time period.

Tx Rate - Transmission Rate.

W

WEP (Wired Equivalent Privacy) - 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 LAN medium that does not employ cryptographic techniques to enhance privacy.

Windows workgroup - A Windows workgroup can consist of either wireless or wired network connections or a combination of the two. Usually a Windows workgroup consists of members who are related because of a shared function, e.g. members of the same department. For a Windows workgroup it is not relevant where the workgroup participants are located, since the members of a Windows workgroup are identified by their workgroup name only.

WaveBuddy WLAN Access Point

Quick Installation Guide & Configuration

§ Package Contents

Please make sure that you received the following with:

- ◆ One WaveBuddy WLAN Access Point (WaveBuddy-AP)
- ◆ One Software Tools CD (Drivers and User Guide on CD)
- ◆ One USB cable
- ◆ One Ethernet cable (crossover)
- ◆ One power adapter

§ System Requirements

For configuration through USB:

- ◆ Operating System: Windows 98/98se/Me/2000/XP
- ◆ Desktop PC or notebook PC with USB port

For configuration through Ethernet:

- ◆ Operating System: Windows 95/98/98se/Me/2000/XP, Windows® NT 4.0
- ◆ Desktop PC or notebook PC connected on a LAN

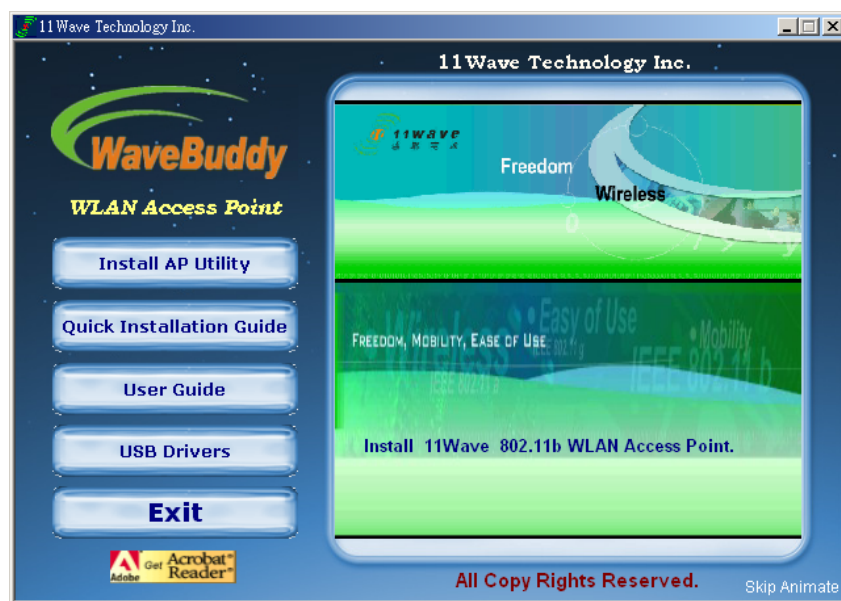
§ Installation Overview

This section provides a quick step-by-step guide on how to install your WaveBuddy-AP. Please follow the steps described below and refer to the User Guide for more details.

1. Power on the computer.

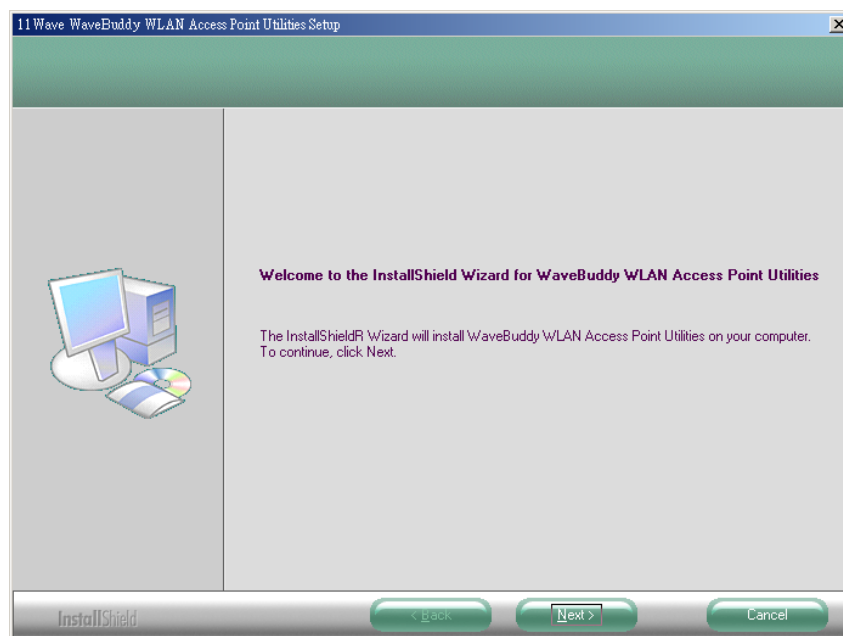
2. Install the drivers and application:

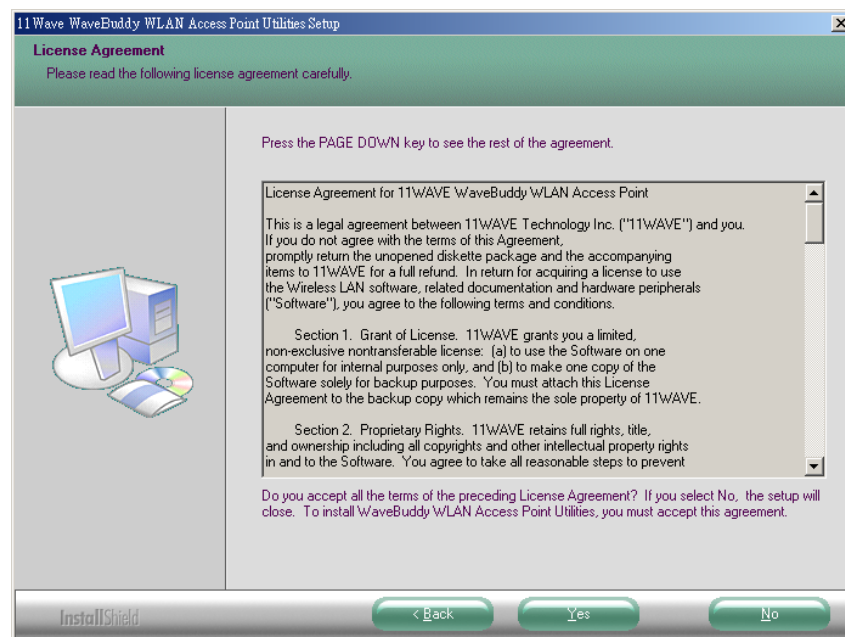
Step 1. Insert the given Installation CD into your CD-ROM driver. Unless you have deactivated the autorun feature of the window, the screen shown as below should appear automatically. If this screen doesn't appear automatically, you can access the installation by clicking the *Autorun* button and choosing *Run*. In the drop-down box provided type *D:\Autorun.exe* (where D: is the letter of your CD-ROM drive). Alternately, double-click "My Computer" and double-click the *Autorun.exe* icon in the folder that appears or browse your CD-ROM drive and go to *D:\WLAN Access Point\AP Utility* and click on the *Setup.exe*.



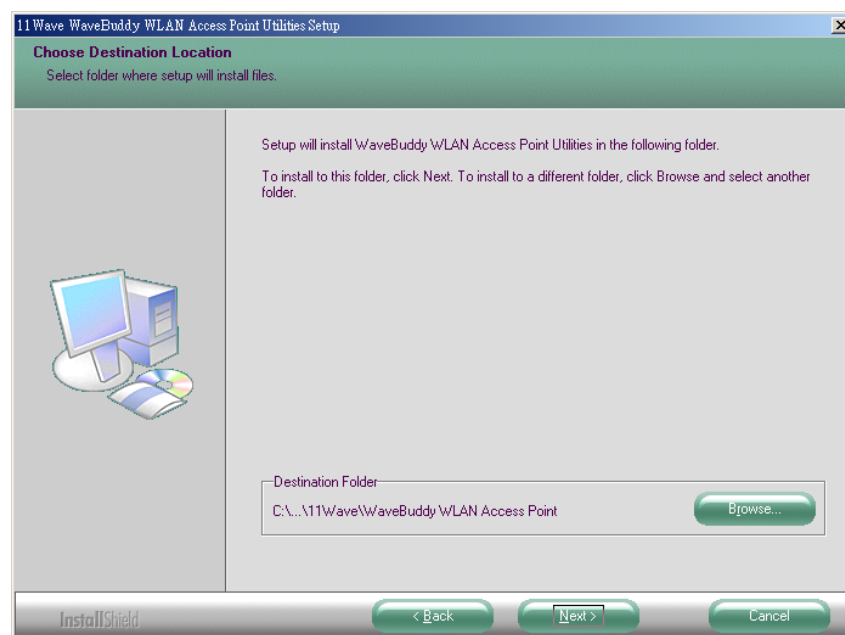
Step 2. Click the “Install AP Utility” button to start the driver and utility installation process.

Step 3. Follow the installation instructions from the InstallShield Wizard by pressing the “Next” button.

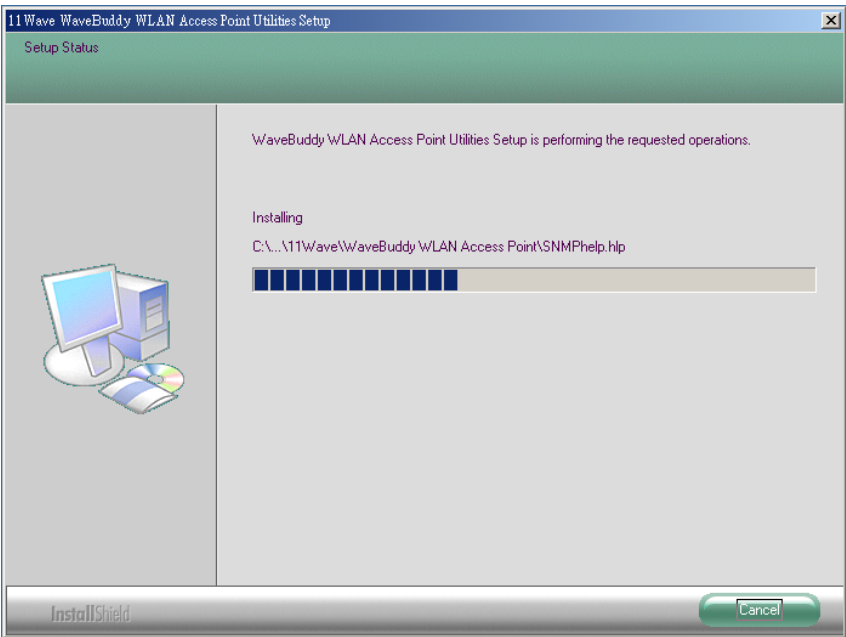
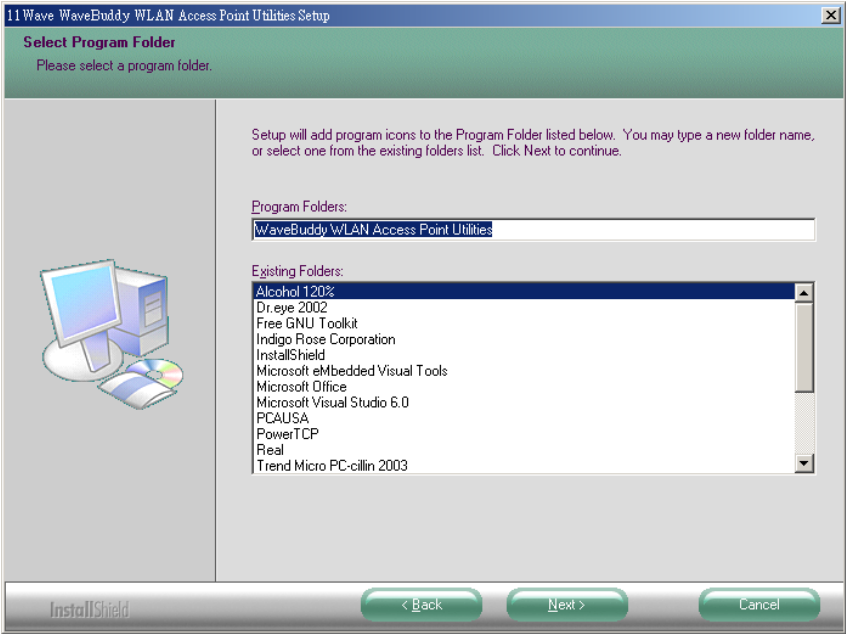


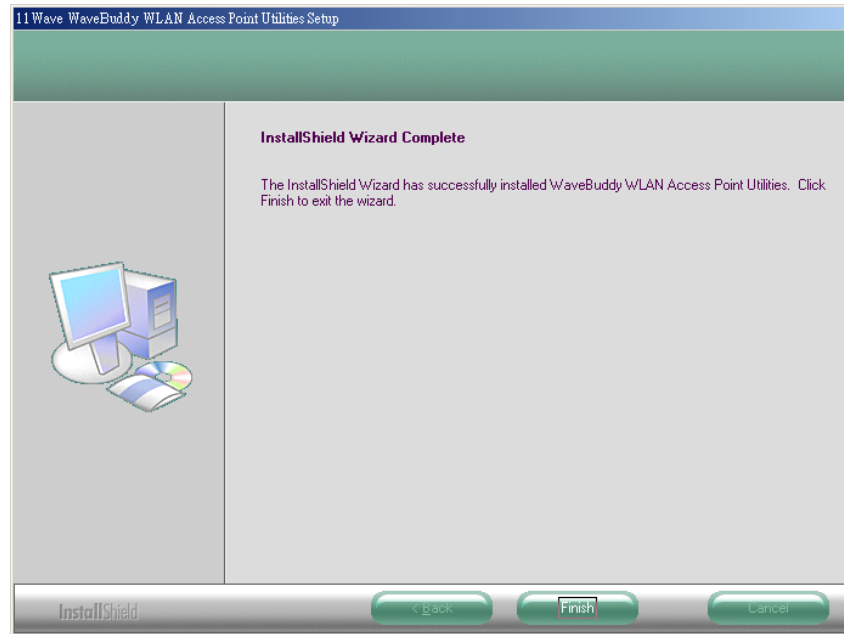


Step 4. Give the destination path where the utility will be installed. To set the path of your choice, select “**Browse**” and click “**Next**”.



Step 5. Select a program folder and then select “Next”.





Step 6. “Finish” the installation. If prompted for reboot, select **“Yes”**.



Refer to Section 4 and 6 of the User Guide for more details on setting the IP address of the WaveBuddy-AP and configuration respectively. Section 6 of the User Guide provides all the instructions on how to upgrade the firmware of the WaveBuddy-AP.

§ Quick Configuration Using Web Browser

1. Connect the power adapter to the receptor at the back panel of the WaveBuddy-AP and then plug the other end of the power adapter to a wall outlet or power strip. The Power LED will turn ON to indicate proper operation.
2. Using a Cross-Over Ethernet cable to connect the WaveBuddy-AP to the computer. The Link LED light will illuminate to indicate a proper Ethernet connection.
3. You need to assign your computer a Static IP address within the same range as the WaveBuddy-AP's IP address for the purpose of configuration of the WaveBuddy-AP. The default IP address of the WaveBuddy-AP is **192.168.98.11** with a Subnet Mask of **255.255.255.0**.
4. **Open your Web browser** and type **http://192.168.98.11** into the URL address box. Then press the **Enter** or **Return** key and it will link to login page. Type the appropriate password in the Password field. (The default password is **“public”**). Then press **“Submit”** linking to the configuration menu.

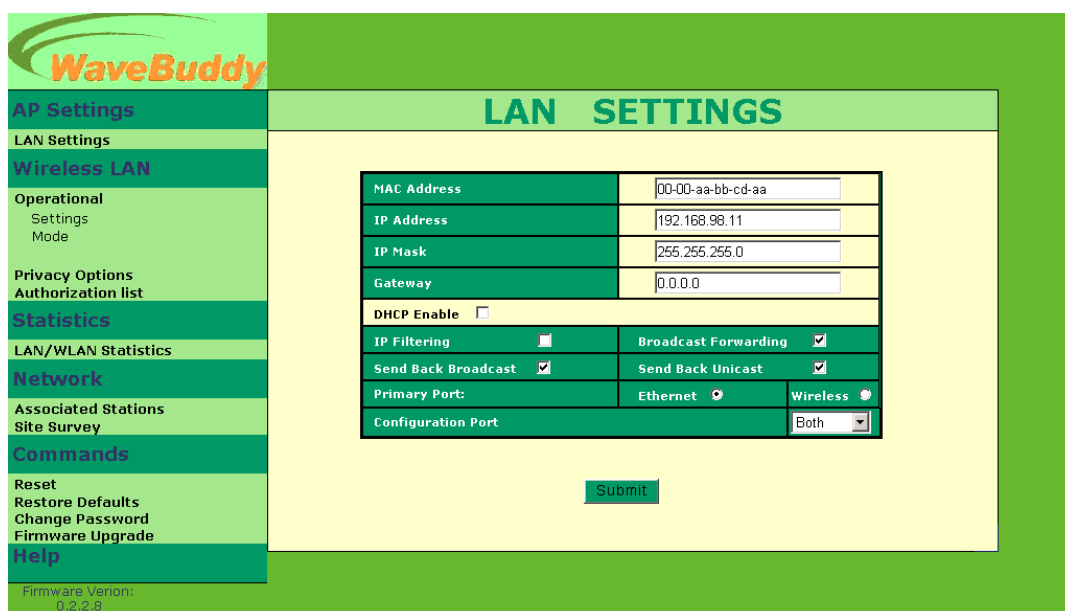


11wave Access Point

Password:

AP Settings: Provides information and setting about the LAN.

- **LAN Settings** - You can either view or modify IP configuration and Filtering options. For more details referring to WaveBuddy WLAN Access Point User Guide [Section 5.1.2](#) • [Setup Menu](#) • [Bridge](#).



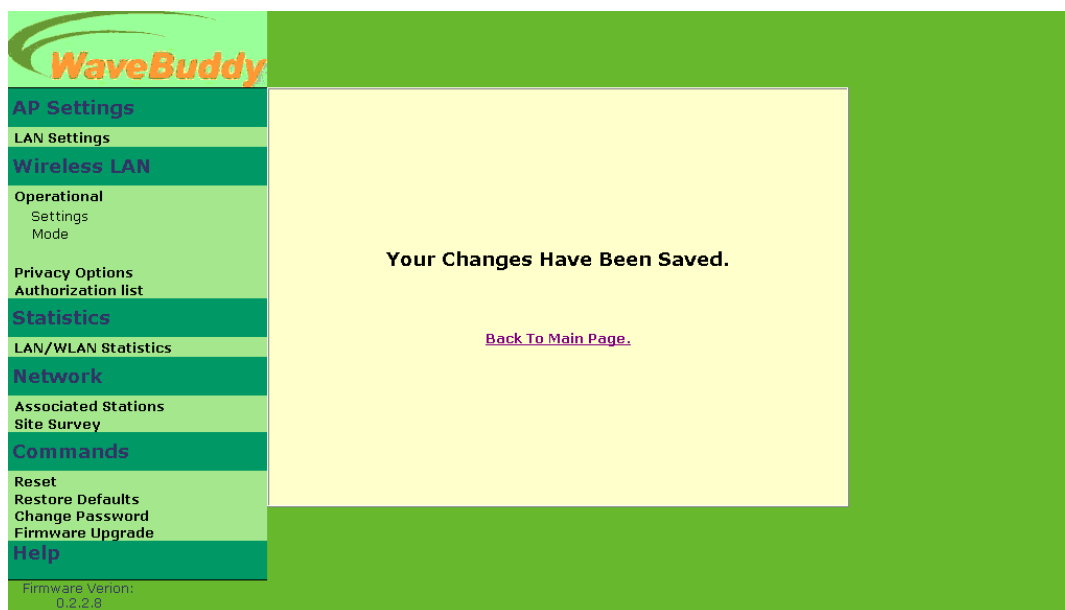
WaveBuddy

LAN SETTINGS

MAC Address	00-00-aa-bb-cd-aa	
IP Address	192.168.98.11	
IP Mask	255.255.255.0	
Gateway	0.0.0.0	
DHCP Enable ☐		
IP Filtering ☐	Broadcast Forwarding ☒	
Send Back Broadcast ☒	Send Back Unicast ☒	
Primary Port:	Ethernet ☒	Wireless ☐
Configuration Port	Both	

Firmware Version: 0.2.2.8

Then, press “**Submit**” to change your modify, and it will link to the message page to show you that your changes have been saved. **Note:** Once you modify any setting of WaveBuddy-AP, you must re-login by pressing “**Back to Main Page**”.



Wireless LAN: Provides information and setting about the Wireless LAN parameters.

- **Operational Settings** - In this page you can either view or modify the Wireless LAN parameters of the WaveBuddy-AP. You can refer to WaveBuddy WLAN Access Point User Guide [Section 5.1.2 • Setup Menu • Wireless LAN • Operational Settings](#) for more detailed descriptions. Press “**Submit**” to save your changes, and then press “**Back to Main page**” to re-login Configuration Menu.

The screenshot shows the WaveBuddy web interface with the "WLAN OPERATIONAL SETTINGS" page. The sidebar menu is identical to the previous screenshot. The main content area is yellow and contains a table of settings:

Access Point Name	WaveBuddy_MIS		
ESSID	11Wave_AP		
Channel	Channel 1		
Regulatory Domain	ETSI		
Autorate FallBack	☐		
Preamble Type	Long Preamble		
Authentication Type	Both		
Fragmentation Threshold	2346		
RTS Threshold	2346		
Rx/Tx Antenna	Diversity		
Beacon Period	100		
DTIM	2		
SSID Broadcasting	☐		
International Roaming	☒		
Rates: 1 Mb/sec	2 Mb/sec	5.5 Mb/sec	11 Mb/sec
Basic	Basic	Basic	Basic

At the bottom of the settings table is a green "Submit" button.

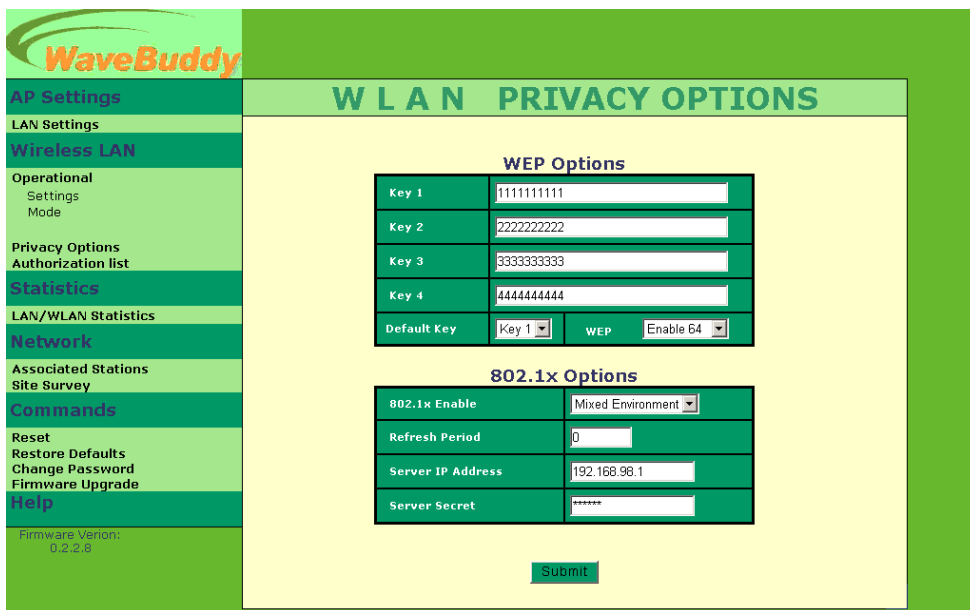
- **Operational Mode** - You can either view or modify the Wireless LAN parameters of the Wireless Operational Settings window for each mode in this page. Refer to WaveBuddy WLAN Access Point User Guide [Section 5.1.2 • Setup Menu • Wireless LAN • Operational Settings](#) for more detailed descriptions. Press “**Submit**” to save your changes, and then press “**Back to Mail page**” to re-login Configuration Menu. When you press “**SITE SURVEY**”, it will link to the Site Survey page (Refer to WaveBuddy WLAN Access Point User Guide [Section 5.2.1 • Network • Site Survey](#)).

WLAN OPERATIONAL MODE			
Access Point	☐		
Access Point Client	☐	Preferred BSS	00-00-00-00-00-00
Wireless Bridge	☐	Remote MAC Address	00-00-00-00-00-00
	☐		
Wireless Repeater	☐	Preferred BSS	00-00-00-00-00-00

[SITE SURVEY](#)

Firmware Version: 0.2.2.8

- **Privacy Options** - By choosing this option you may modify the encryption key values using the Wireless Equivalent Privacy (WEP) Options page. Write the values and press “**Submit**” to change (WEP key is write-only, so it is not possible to retrieve the key values). There are four 5 Hex digit encryption keys available if you select 64bit WEP and there are four 13 Hex digit encryption keys available if you select 128bit WEP. The key is enabled only if you select it in the “Default key” option. Enable the WEP option in order to activate WEP encryption for transmissions between the stations and the AP. WEP is an authentication algorithm that protects authorized Wireless LAN users against eavesdropping.



WaveBuddy

WLAN PRIVACY OPTIONS

WEP Options

Key 1	1111111111
Key 2	2222222222
Key 3	3333333333
Key 4	4444444444
Default Key	Key 1 WEP Enable 64

802.1x Options

802.1x Enable	Mixed Environment
Refresh Period	0
Server IP Address	192.168.98.1
Server Secret	*****

AP Settings
 LAN Settings
Wireless LAN
 Operational
 Settings
 Mode
 Privacy Options
 Authorization list
Statistics
 LAN/WLAN Statistics
Network
 Associated Stations
 Site Survey
Commands
 Reset
 Restore Defaults
 Change Password
 Firmware Upgrade
Help
 Firmware Version:
 0.2.2.8

For more detailed descriptions of 802.1x Options, you can refer to WaveBuddy WLAN Access Point User Guide [Section 5.1.2 • Setup Menu • Wireless LAN • Privacy Options](#).

- **Authorization List** - For security reasons the AP has the ability to associate with authorized MAC Addresses stations. You can select **Allow** or **Deny** mode with MAC listed below to access device, if the “**Authorization Table**” is enabled.



WaveBuddy

AUTHORIZATION LIST

No	Mac Address
1	000B0012001C
2	000B0012001D
3	000B0012001E
4	000B0012001F
5	
6	
7	
8	
9	
10	

1~10

Authorization Table: Disable ☒ Enable ☐

☐ Only **deny** PCs with MAC listed below to access device
☒ Only **allow** PCs with MAC listed below to access device

AP Settings
 LAN Settings
Wireless LAN
 Operational
 Settings
 Mode
 Privacy Options
 Authorization list
Statistics
 LAN/WLAN Statistics
Network
 Associated Stations
 Site Survey
Commands
 Reset
 Restore Defaults
 Change Password
 Firmware Upgrade
Help
 Firmware Version:
 0.2.2.8

Statistics: Provides information about the LAN/WLAN Statistics.

- **LAN/WLAN Statistics** - This page lets you view Ethernet and Wireless statistics. You can refer to WaveBuddy WLAN Access Point User Guide > Table 5-2 and Table 5-3 for the meaning of each field name.



AP Settings

LAN Settings

Wireless LAN

Operational

Settings

Mode

Privacy Options

Authorization list

Statistics

LAN/WLAN Statistics

Network

Associated Stations

Site Survey

Commands

Reset

Restore Defaults

Change Password

Firmware Upgrade

Help

Firmware Version:

0.2.2.8

STATISTICS

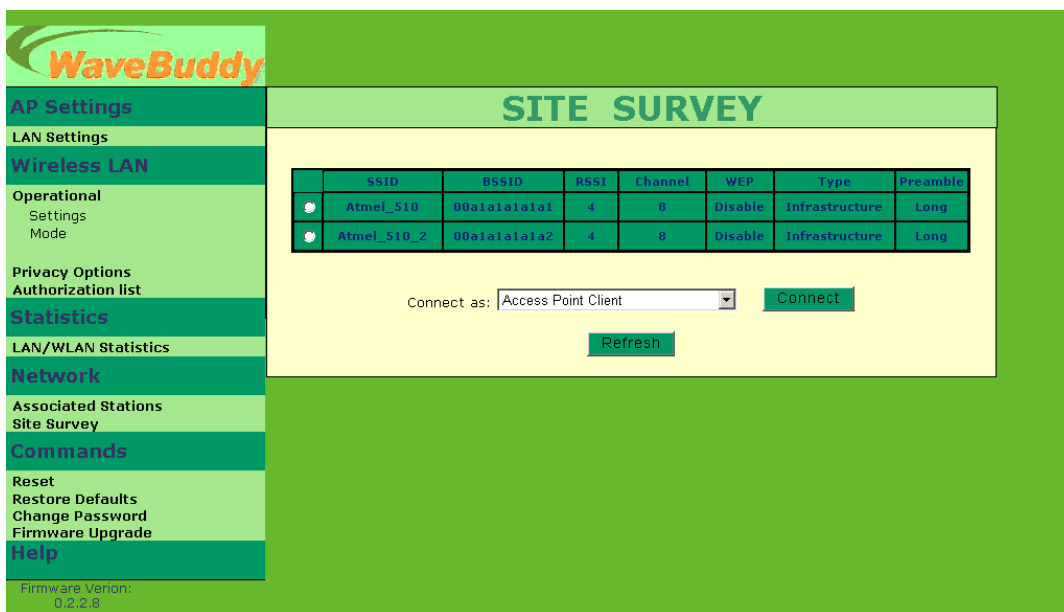
Received Packets		Transmitted Packets	
Ethernet Statistics			
Total Bytes	52786	Total Bytes	233498
Total Packets	562	Total Packets	730
Packet CRC Errors	0	Packet CRC Errors	0
Wireless Statistics			
Unicast Packets	0	Unicast Packets	0
Broadcast Packets	0	Broadcast Packets	63
Multicast Packets	0	Multicast Packets	0

Network: Provides information about the Network.

- **Associated Stations** - In this page you can view the MAC Addresses of the Associated stations with the AP.

					
AP Settings LAN Settings Wireless LAN Operational Settings Mode Privacy Options Authorization list Statistics LAN/WLAN Statistics Network Associated Stations Site Survey Commands Reset Restore Defaults Change Password Firmware Upgrade Help	ASSOCIATED STATIONS <table> <tr> <th>No</th><th>Mac Address</th></tr> <tr> <td>0</td><td>No Stations Associated.</td></tr> </table>	No	Mac Address	0	No Stations Associated.
No	Mac Address				
0	No Stations Associated.				
Firmware Version: 0.2.2.8					

- **Site Survey** – In this page, you can view the features (SSID, MAC address, ..., etc.) of the adjacent AP. You also can select operational mode in this page. (Refer to WaveBuddy WLAN Access Point User Guide [Section 5.1.2 • Setup Menu • Wireless LAN • Operational Settings](#) for more detailed descriptions.).



WaveBuddy

AP Settings

LAN Settings

Wireless LAN

Operational
Settings
Mode

Privacy Options
Authorization list

Statistics

LAN/WLAN Statistics

Network

Associated Stations
Site Survey

Commands

Reset
Restore Defaults
Change Password
Firmware Upgrade

Help

Firmware Version:
0.2.2.8

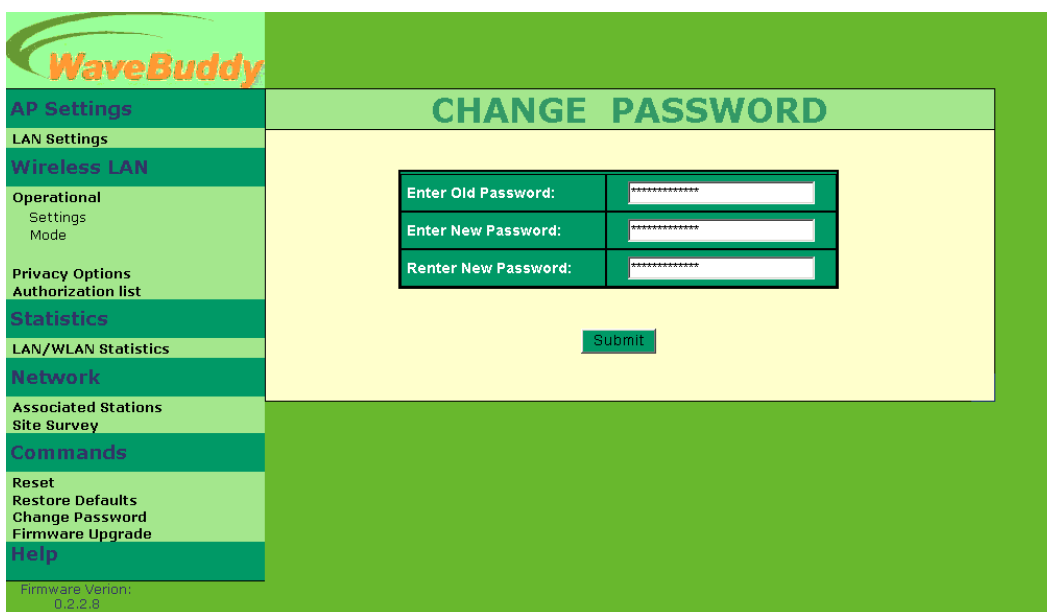
SITE SURVEY

	SSID	BSSID	RSSI	Channel	WEP	Type	Preamble
☐	Atmel_510	00a1a1a1a1a1	-4	8	Disable	Infrastructure	Long
☐	Atmel_510_2	00a1a1a1a1a2	-4	8	Disable	Infrastructure	Long

Connect as:

Commands:

- **Reset** - You can reset the AP. This action takes place after a user makes configuration changes in order to initiate the changes.
- **Restore Defaults** - You can restore the factory **default** values of the AP.
- **Change Password** –You can change the default password.



WaveBuddy

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Help

Firmware Version:
0.2.2.8

CHANGE PASSWORD

Enter Old Password:

Enter New Password:

Reenter New Password:

- **Firmware Upgrade** – Refer to WaveBuddy WLAN Access Point User Guide [Section 6.2](#).

Help: Provides on line help about the application.



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HELP

Online Resources

- 11wave Web Site.
- Firmware Upgrade.

Help Pages

- LAN Settings.
- Operational Mode.
- Authorization List.
- Associated Stations.
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- Firmware Upgrade.
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