WAP-900
WireFree
USER'S MANUAL

FCC Information

The Federal Communication Commission Radio Frequency Interference Statement includes the following paragraph:

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 communication.   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.

The user should not modify or change this equipment without written approval from company name. Modification could void authority to use this equipment.

For the safety reason, people should not work in a situation which RF Exposure limits be exceeded. To prevent the situation happening, people who work with the antenna should be aware of the following rules:

1.   Install the antenna in a location where a distance of 6.5 cm from the antenna may be maintained.

2.   While installing the antenna in the location, please do not turn on the power of wireless card.

3.   While the device is working, please do not contact the antenna.

Copyright

Trademarks

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Limited Warranty

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

About This Manual

WireFree WAP-900 User's Guide is first published by Planet Technology Corp. in 1999. This Revision is for WireFree WAP-900 Version 2.0, issued in August, 1999. The purpose of this manual is for the setup of the product WireFree WAP-900.

Revision

WireFree WAP-900 User's Guide
Part No.EM-WAP900
August,1999

Contents

Chapter 1 About WAP-900 Micro AP

WireFree WAP-900 is a Micro AP that acts as a Media Access Control (MAC) bridge between wired Local Area Networks, and one or more WireFree wireless networks.   Placed anywhere along an Ethernet LAN, WAP-900 allows wireless stations within its area of coverage to access transparently to the corporate network.   WireFree WAP-900, together with WireFree network adapter cards, enable you to build a variety of network configurations.

1-1 Features and Benefits

● **Protocol-independent networking functionality**

● **Access to the wired Ethernet LAN for mobile WireFree WL-2400/WL-3501 /WAP-900.**

● **GUI Utility support**

● **Roaming capability**

● **Seamless connectivity to wired Ethernet and PC network LANs augments existing networks quickly and easily**.

● **Omnidirectional antenna included.**

● **Wireless connection without the hassles and cost of cabling.**

● **Great flexibility to locate or move networked PCs**

1-2 Applications

WireFree products offer a fast, reliable, cost-effective solution, allowing clients to wirelessly access the network in applications such as following:

1. **Remote access to corporate network information**
   E-mail, file transfer and terminal emulation.

2. **Difficult-to-wire environments**
   Historical or old buildings, asbestos installations, and open area where wiring is difficult to employ.

3. **Frequently changing environments**
   Retailers, manufacturers and banks who frequently rearrange the workplace and change location.

4. **Temporary LANs for special projects or peak time**
   Trade shows, exhibitions and construction sites need temporary setup for a short time period. Retailers, airlines and shipping companies need additional workstations for a peak period. Auditors require workgroups at customer sites.

5. **Access to database for mobile workers**

    Doctors, nurses, retailers, white-collar workers need access to database while being mobile in the hospital, retail store or office campus.

6. **SOHO (Small Office and Home Office) users**

    SOHO users need easy and quick installation of a small computer network.

1-3 Product Kit

Each WAP-900 package comes with:

◆ **WAP-900** …………………………………………………… x 1

◆ **Antenna** (dipole, omni-directional)…………………………….. x 1
◆ **WAP-900 Access Point Utility Diskette** ……………………... x 1
◆ **WAP-900 User's Manual** CD-ROM………………………… x 1
◆ **A/C Power Cord** ……………………………………………….. x 1
◆ **Crossover RJ-45 Ethernet connector** …………..…………….. x 1

If any of the listed items are not included or found damaged, please contact your local dealer.
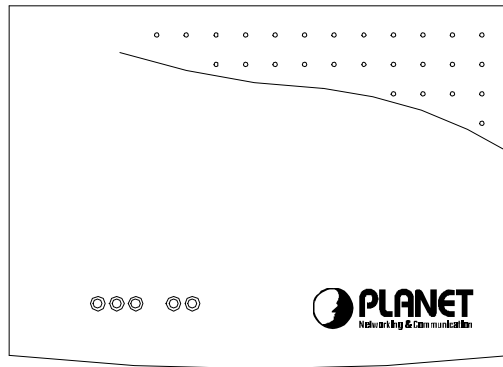
Chapter 2 Hardware Installation

2-1 System Requirements

Installation of WAP-900 requires:

1. An A/C power outlet (100~240V,50~60Hz) which will supply the power for the WAP-900 Access Point.

2. A 10Base-T (UTP) Ethernet cable drop (RJ-45 connector).

2-2 Mechanical Description

Front Panel:

The following is the description of each LED. (Left to Right)

: **Power**   The Power LED will assert when Power supply to the WAP-900 works normally.

: **(Wired) Ethernet Tx/Rx**   This LED asserts when power is on. It blinks when the WAP-900 is Tx/Rx data with the Ethernet.

: **Wireless LAN**   This LED asserts when power is on. It blinks when the WAP-900 is Tx/Rx data with wireless clients.

: **Alive Status**   This LED asserts when power is on. It indicates that the WAP-900 is working normally.

: **Link Status**   This LED is always asserted when the WAP-900 works as an Access Point. When the WAP-900 works as station Adapter, this LED blinks only when the WAP-900 is talking with its host Access Point.
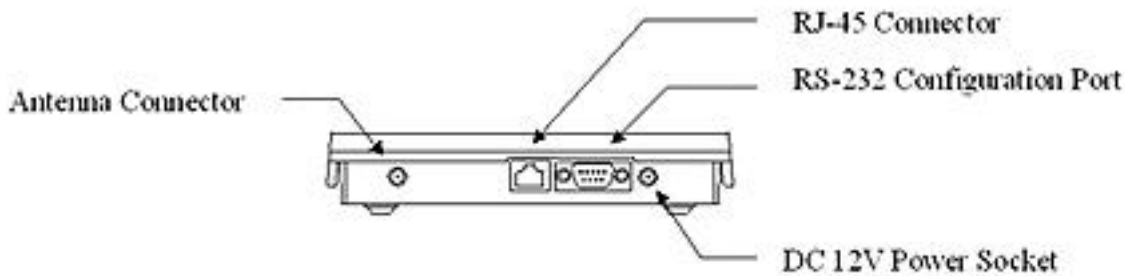
Side Panel:

Fig 2.1 Mechanical Instruction of WAP-900 Access Point

2-3 Micro AP Installation

Please follow these procedures when setting up hardware:

1. Site Selection

Choose a proper place for your WAP-900 Micro AP.

In general, the best location to place your WAP-900 Micro AP is the center of your wireless coverage, with line of sight to all your mobile stations.

2. Attach the Antenna

Connect the antenna on the Antenna connector of your WAP-900 Micro AP. Proper antenna placement will improve the WAP-900's performance. Try to place the antenna in the position that can best cover its BSS. Normally, the higher you place the antenna, the better the performance will be.

3. Connect the Ethernet Cable

WAP-900 can be connected to the 10 Base-T Ethernet network.   Connect your UTP Ethernet cable to the RJ-45 connector of the WAP-900 Micro AP.

a. To set the WAP-900 in the Station Adapter Mode, connect the WAP-900 to a computer with a normal RJ-45 cable.   Your PC must be with an Ethernet port for the WAP-900 to work as a Station Adapter.

b. To connect the WAP-900 to a hub, use the "crossover" RJ-45 Ethernet cable included in the product kit.

Caution: Do not use the "crossover" RJ-45 Ethernet cable when configuring the WAP-900 as a Station Adapter.   Connect the Micro AP to a computer by using a normal RJ-45 cable.

4. Connect the Power Cable

Connect the power adapter cable to the DC12V Power Socket of the WAP-900. ONLY USE the power adapter supplied with the WireFree WAP-900. Otherwise, the product may be damaged.

Chapter 3 How to Configure Micro AP

The WAP-900 Micro AP can be configured over Ethernet network, simply using a RJ-45 cable. You may either connect the WAP-900 to a HUB, or to the Ethernet port on your PC station. Then, run the WAP-900 Utility, and you can configure the WAP-900 remotely.

3-1 Using the Utility

The WAP-900 can be configured using the utility enclosed in the product kit.   Please follow the instructions shown in the next two sections.

3-1-1 Installation of Utility

1. Insert the **WireFree WAP-900 Utility Diskette** into the floppy drive, and then execute
    A:\ setup.exe.   The following window will pop-up, then click "**OK**" to proceed.
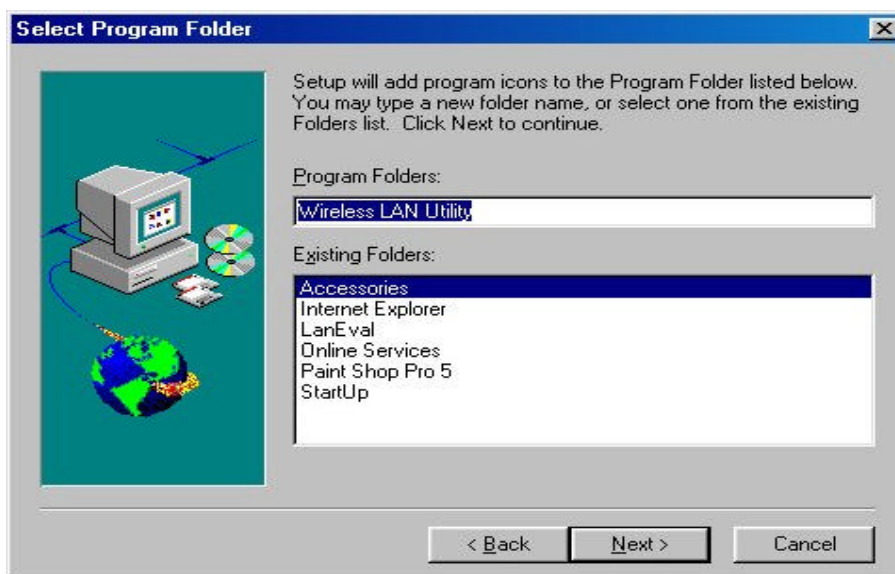

Fig 3.1 Step1 of the Wireless LAN Utility setup.

2. Click on the "**Next**" button to go to the next window.

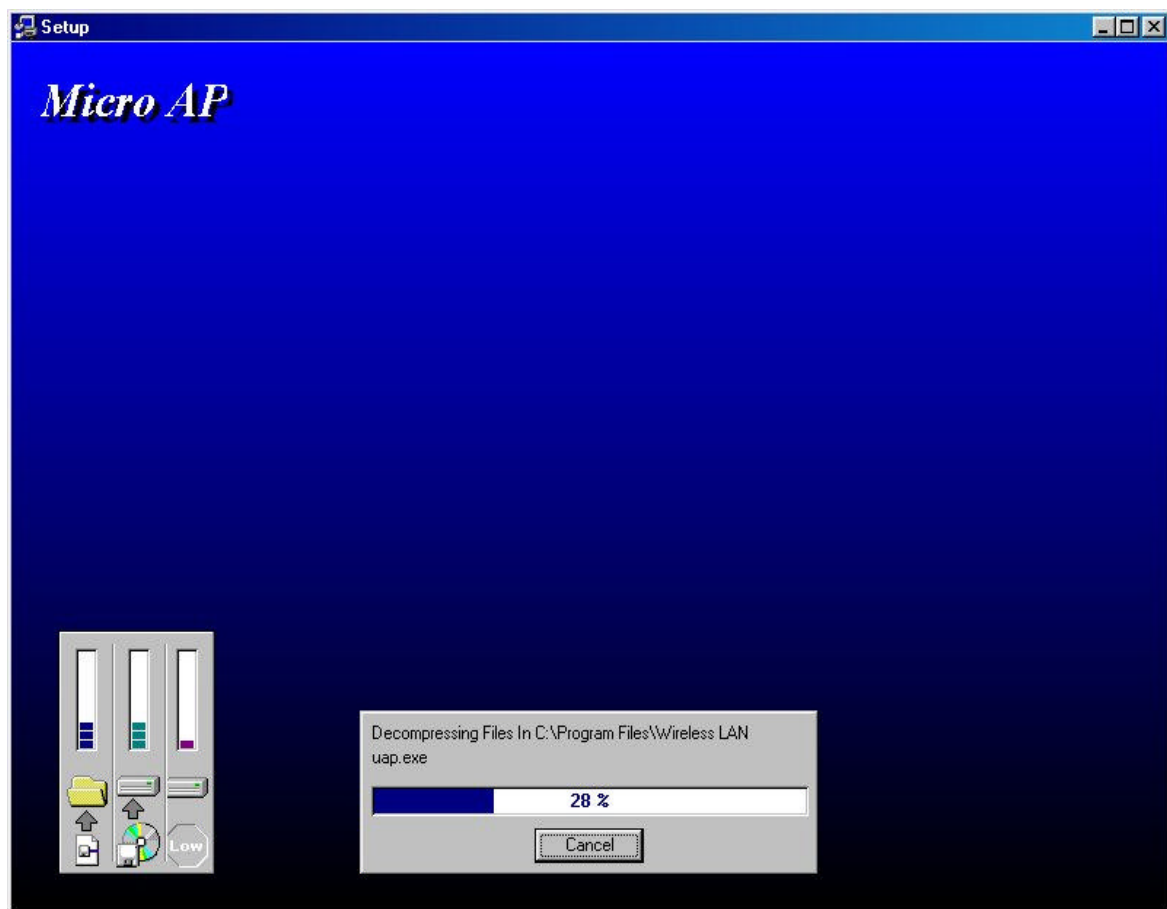*Fig 3.2 Step2 of the Wireless LAN Utility setup.*

Fig 3.3 Step3 of the Wireless LAN Utility setup.

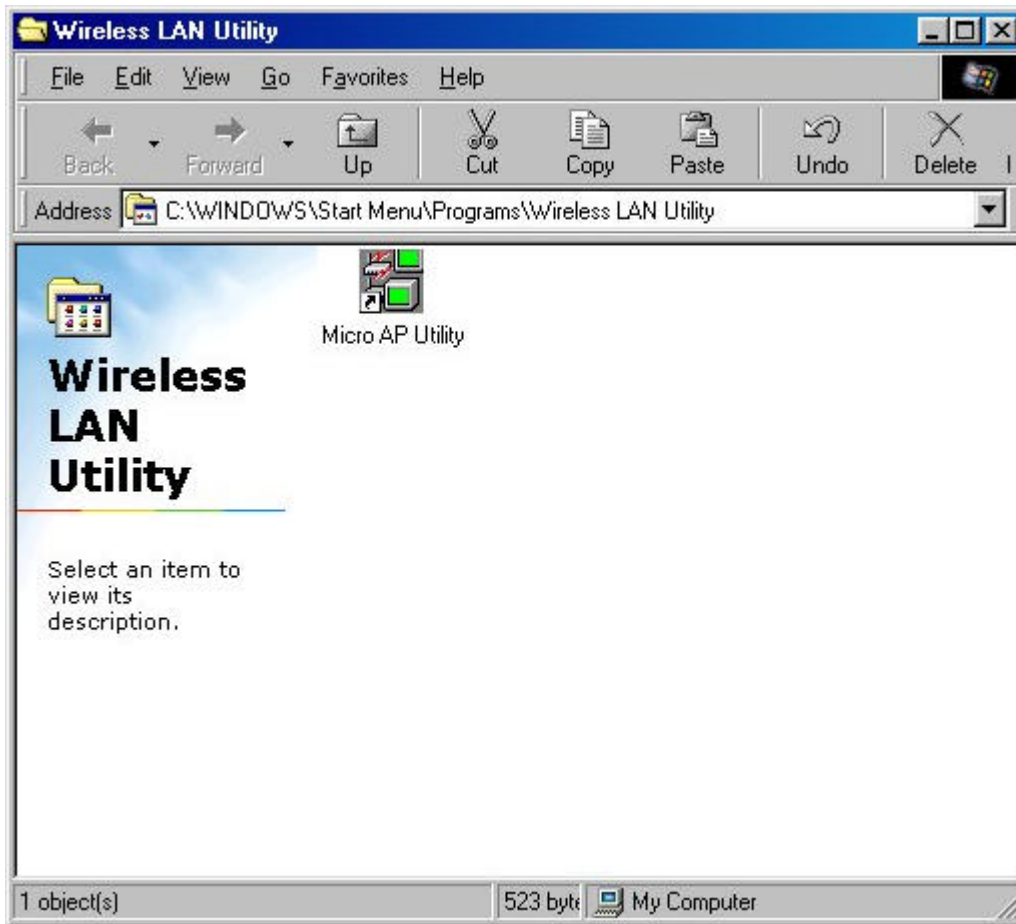The Micro AP Utility has been successfully installed.

Fig 3.4 Step 4 of the Wireless LAN Utility setup.

3-1-2   Using the WireFree WAP-900 Utility

➢ Execute the installed Micro AP Utility, the program will automatically detect all the WAP-900s over the Ethernet network with a RJ-45 cable or over serial port with a RS-232 cable.   Or, the Micro APs will be detected via wireless network.
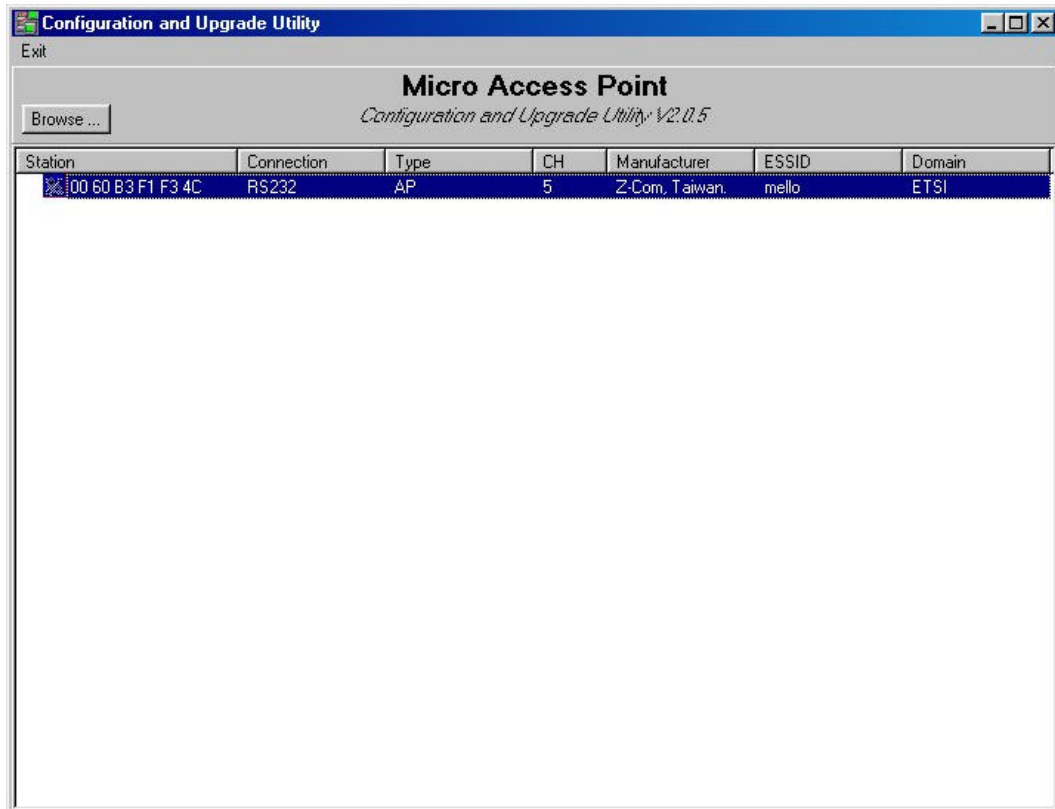

Fig 3.5. The Configuration and Upgrade Utility window

➢ Among all the detected WAP-900s, select and double click the WAP-900 you want to configure, the "Information" dialog box will appear as follows:

➢ The Information dialog box includes 4 items: **Password**, **Configuration**, **Access Control** and **Firmware Information**.

Password:

The password is required to configure the WAP-900 (default value is **1234**).   This password only allows network managers to change the settings for the WAP-900.   Click "**Change**" if you want to change the password.   It is suggested to change the password for your network security.

Fig. 3.6 Change Password dialog box

Configuration:

In the **Mode** item, select either the station mode (Ad-hoc without Access Point or Infrastructure with Access Point), or the stand alone AP mode.

channel:	Select the channel number as your operating radio channel. (Default setting: the channel 1)
essid:	Input an ESS ID for your Micro AP. (Default setting: ANY). If you want to enable "Roaming", the ESSID for each WAP-900 must be set as the same.
repeating:	The micro-AP can serve wireless LAN access point (AP) function as well as **repeating** IEEE 802.11 wireless LAN traffic. If the repeating feature is enabled, the micro-AP utilizes a well designed algorithm to select a non-loop repeating path for each destination address among a group of micro-APs.

Click "**Modify**" to save all the changed parameters.

Access Control:

Using Access Control, users can decide which wireless devices are allowed to connect to the WAP-900 by controlling the MAC address of each client.   Click "**Edit**" and the Access Control dialog box will show up.   The Access Control dialog box includes two options: **Allow to Access** and **Deny to Access**.

Fig 3.7 Access Control Table

Firmware Information:

The Firmware Information item displays **Manufacturer**, **Product**, **Machine Model** as well as **Firmware Version**.   Users can get the newest firmware from Planet's web site and upgrade the WAP-900 by clicking the "**Upgrade**" icon.   You must type in the directory of the new firmware in the "Firmware File Name" field.
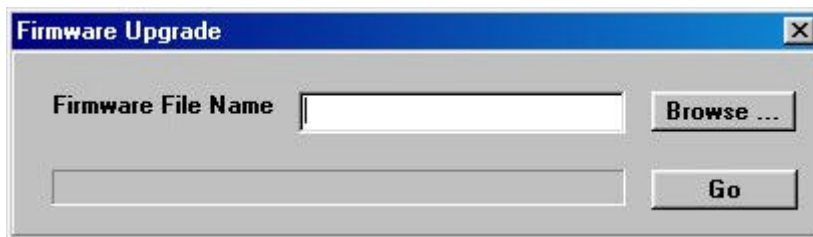

Fig 3.8 Firmware Upgrade

Click "**Modify**" to complete WAP-900 configuration and WAP-900 will reset automatically.

Chapter 4 Troubleshooting

- *The WAP-900 cannot be configured using the RS-232 direct connection*

  Probable Causes & Solution:

  a. Check the RS-232C cable to make sure there are no physical connection problems with the WAP-900 or the configuration station.

  b. Make sure the COM port number (i.e., COM1 or COM2) of your configuration station is correct and functioning normally.

- *The WAP-900 cannot be configured using the Ethernet connection*

  Probable Causes & Solution:

  a. Make sure the Ethernet connection to your configuration station is intact.

  b. Be sure to use a crossover UTP RJ-45 cable to connect the WAP-900 to the hub. You can also use a normal RJ-45 cable to connect the WAP-900 to the Ethernet NIC.

- *WireFree mobile users do not have roaming capabilities on WAP-900s*

  Probable Causes & Solution:

  a. Make sure all the WAP-900s in the ESS, in which WireFree mobile users can roam, are configured to the same ESS ID.

  b. Make sure all the WAP-900s in the ESS are operating on the same radio channel.

  c. Make sure the WireFree mobile users are configured to the right ESS ID.

➤ **How to obtain further assistance:**

  a. Direct your questions to **support@planet.com.tw**

  b. Planet's technical support hot-line is:

    Tel: +886-2-22199518
    Fax: +886-2-22199528

  Direct any of your questions to the sales support department.

  c. Check Planet's Web Site at **www.planet.com.tw** for FAQ and updated information.

Appendix A Using the Terminal Program

The WAP-900 Micro AP can be connected to your **configuration station** via Terminal Program using a RS-232 cable (Sync Type), or the Micro AP utility program using a RJ-45 cable or a RS-232 cable.

Fig a-1   Connecting the RS-232 cable

1. Connect the WAP-900 to your PC with the RS-232 cable.
2. Turn on the power of your PC.
3. Run Terminal Program in Windows 95/98, NT or any operation system that installs Terminal Program, and then configure the WAP-900.   The parameters required are shown as follows:

<div align="center">Baud Rate = 19200 BPS</div>

AT command list:

Command	Adminstrator Only	Description
AT#999	No	Display the status of administrator mode. 1: In the administrator mode 0: Not in the administrator mode
AT#999=1/*passwd*	-	Enter the administrator mode. A password is required. (Default password is 1234)
AT#999=0	-	Leave the administrator mode.
AT#PW*old*/*new*	Yes	Change administrator's password from *old* to *new*. The password can be any ASCII string of any its length within 10 characters.
ATI0	No	Display the station ID (MAC address).
ATI1	No	Display the firmware version.
ATI2	No	Display the manufacturer ID.
ATI3	No	Display the model ID.
ATN1	Yes	Change the micro-AP to function in the Infrastructure (BSS) Station Mode.
ATN2	Yes	Change the micro-AP to function in the Ad-hoc (IBSS) Station Mode.
ATN3	Yes	Change the micro-AP to function in the AP Mode without the repeating function.
ATN4	Yes	Change the micro-AP into AP Mode with the repeating function.
ATN	No	Display the current mode of the adapter.
ATESSID=""	Yes	Set the ESS ID (a.k.a., SSID) as ANY (null string). ANY is a special ID, meaning the station can join any BSS regardless of its ESS ID.
ATESSID="*string*"	Yes	Set the ESS ID as the *string* provided. The ESS ID can be any ASCII string of any its length within 32 characters.
ATESSID	No	Display the current ESS ID.

Command	Adminstrator Only	Description
ATC=*number*	**Yes**	**Set the radio channel for Ad-hoc STA and AP Mode.** *number*: **e.g. 1~11 (FCC/IC)**
ATC	**No**	**Display the current radio channel.**
AT&F	**No**	**Restore the configurations to default values.**
AT&W	**Yes**	**Save the configuration on the adapter.**
ATZ	**No**	**Reset the micro-AP.**

Note**: If you've changed any parameters, including the administrator's password or the default values (AT&F), you must save it (AT&W) and reset the WAP-900 (ATZ) for the new configurations to take effect.**

I. Using it as the AP Mode

1. Connect the micro-AP to your 10BAST-T network (hub) with a RXD/TXD crossover UTP cable.   Use the crossover RJ-45 connector included in the product kit.

2. Power on the micro-AP.   Configure it to operate in the AP mode (ATN3), set the ESS ID (ATESSID=*"string"*, don't specify a null string ESS ID (ANY) to the micro-AP while it is in the AP Mode), and set the radio channel (ATC=*number*).

3. Save the configuration (AT&W) and reset the micro-AP (ATZ).

4. The micro-AP is now acting as an IEEE 802.11 wireless LAN access point.

II. Using it as the Station Mode

1. Connect the computer's 10BASE-T network outlet to the micro-AP with exactly the same UTP cable that you've used to connect the hub. (Simply treat the micro-AP as a hub.)

2. Power on the micro-AP and configure the adapter to function in the Station Mode (ATN1 or ATN2: Infrastructure or Ad-hoc), choose the proper ESS ID and radio channel (radio channel is required if you're using the Ad-hoc mode).

3. Save the configuration (AT&W) and reset the micro-AP (ATZ).

4. The computer can now use the IEEE 802.11 wireless LAN.

Appendix B Network Configuration and Planning

WireFree supports the same network configuration options of the legacy Ethernet LANs as defined by the IEEE 802 standard committee.

WireFree can be configured as:

◆ Ad-Hoc for departmental or SOHO LANs

◆ Infrastructure for enterprise LANs

◆ LAN-Interconnection for point-to-point link as a campus backbone.
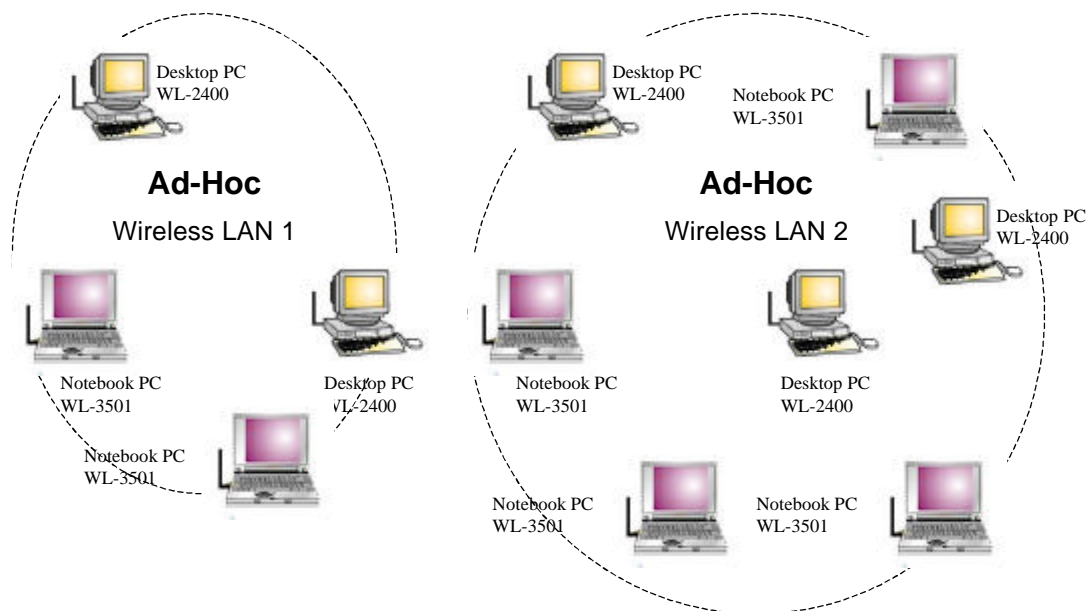
B-1 Network Topology

◆ **Ad-Hoc**

Fig b-1. An Example of Ad-Hoc Wireless LAN

An Ad-Hoc wireless LAN is a group of computers, each equipped with one WireFree adapter, connected as an independent wireless LAN.   Computers in a specific Ad-Hoc wireless LAN must be configured at the same radio channel.

Ad-Hoc wireless LAN is applicable at a departmental scale for a branch or SOHO operation.
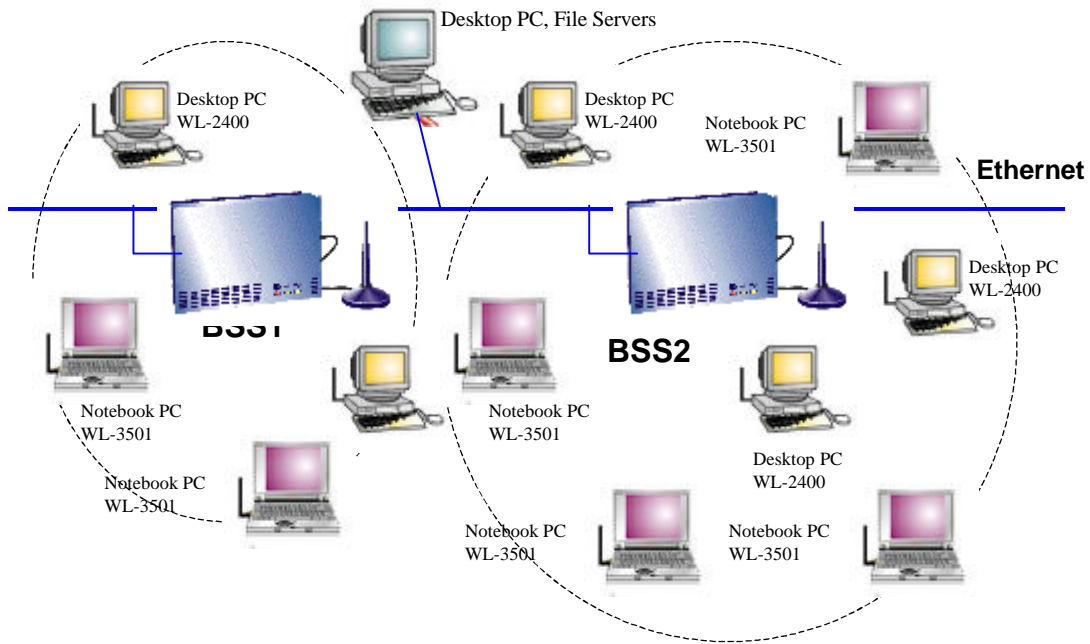
◆ **Infrastructure**

Fig b-2. An Example of Infrastructure Wireless LAN

WireFree provides access to a wired LAN for wireless workstations.   An integrated wireless and wired LAN is called an Infrastructure configuration.   A group of WireFree PC users and a WAP-900 Access Point construct a Basic Service Set (BSS).   Each WireFree PC in the BSS can talk to any computer in the wired LAN infrastructure via the WAP-900 Access Point.

Infrastructure configuration not only extends the accessibility of a WireFree PC to the wired LAN, but also doubles the effective wireless transmission range for 2 WireFree PCs.   Since WAP-900 is able to forward data within its BSS, the effective transmission range in an infrastructure LAN is **doubled**.
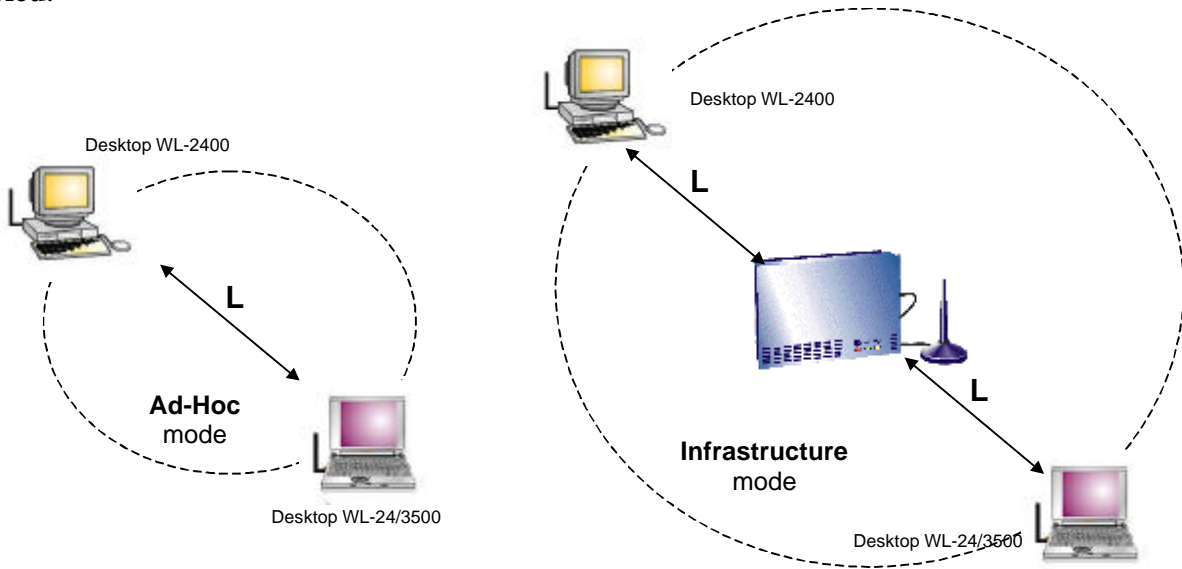

Fig b-3. The effective Transmission Range

BSS ID is, in essence, the ID of each independent WAP-900.   All WireFree PCs configured without roaming options in the independent BSS must be configured with the BSS ID of the WAP-900.   Check your WAP-900 for its BSS ID or use the Access Point Browser Utility program described in the next section, "Roaming".

Infrastructure is applicable in an enterprise scale for wireless access to central databases, or wireless access for mobile workers.

B-2 Roaming

An Infrastructure configuration also supports roaming capability for mobile workers.   More than one BSS can be configured to be an Extended Service Set (ESS).   On account of a continuous connection to the network, users **within an ESS** can roam freely.   All WireFree PCs and WAP-900s within one ESS must be configured with the same ESS ID and at the same radio channel.
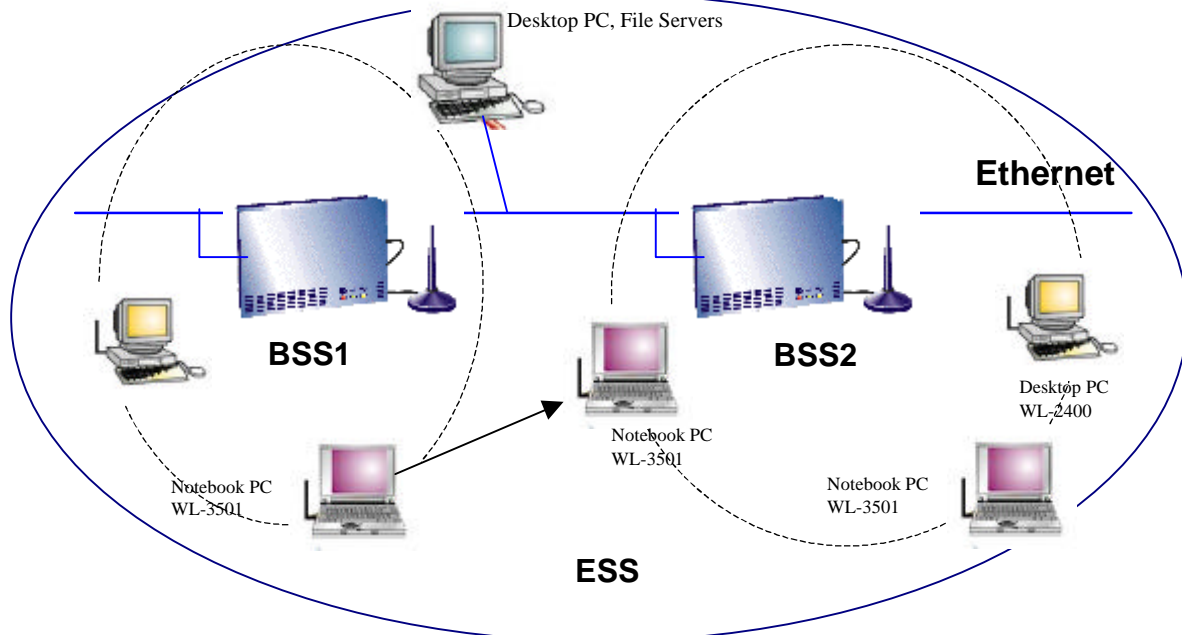

*Fig b-4. Roaming in an Extended Service Set (ESS)*

Before setting up an ESS for roaming, it is helpful to improve the performance by choosing an appropriate feasible the radio channel and right places for Access Points.   WireFree provides *Site Survey* and *Access Point Browser* utilities for the above purposes.

Site Survey and Access Point Browser are functions of the WireFree Utility program (WLU), which can be found in the WL-2400 / WL-3501 Driver and Utility Diskette.   Before utilizing Site Survey and Access Point Browser, a PC with a WireFree WL-2400 / WL-3501 adapter and Utility program must be installed is necessary.   For details on WLU, check the chapter on "WireFree Utility-WLU" in the WL-2400 / WL-3501 User's Manual.

B-3 Network Planning

➢ **When will you use the WAP-900 to function in the Station Adapter mode?**

When you want to use the wireless access to the 10 Base-T network via the WAP-900, use a normal RJ-45 cable to connect the WAP-900 to your PC, and set the WAP-900 to function in the Station Adapter mode (either the Infrastructure or the Ad-Hoc mode).

(back panel of micro-AP)

The "**long cable**": ordinary UTP cable

⇦ Your computer's RJ-45 port
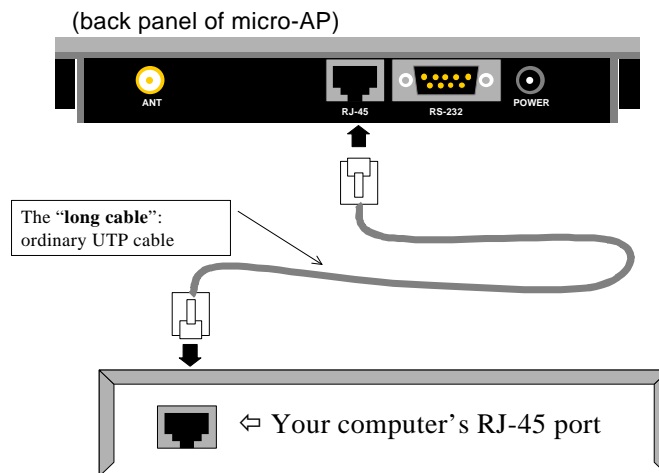
➢ **When will you use the WAP-900 without the repeating mode?**

Do not enable the repeating function when you have only one WAP-900, or when there are more than two separate networks, each with a WAP-900 Micro AP.

➢ **When will you use the WAP-900 with the repeating mode?**

Enable the repeating function in a situation that the two Access Points' coverage areas cannot cover and an intermediary WAP-900 is needed to broaden the area of coverage.

Appendix C Specifications

WireFree WAP-900 Micro AP	
Wired Interface	Ethernet, 10BaseT
Wireless Interface	WireFree Wireless LAN
Frequency Band	2.412~2.462 GHz (FCC, Canada) 2.422~2.462 GHz (ETSI) 2.484 (Japan)
RF Technology	Spread Spectrum Direct Sequence (DSSS)
Channels	12 channels
Output Power	50 mW

Appendix D Glossary

Access Point ↻ w An internetworking device that seamlessly connects wired and wireless networks.

Ad-Hoc ↻ w An Ad-Hoc wireless LAN is a group of computers each with WireFree adapters, connected as an independent wireless LAN.

Backbone ↻ w The core infrastructure of a network. The portion of the network that transports information from one central location to another central location where it is unloaded onto a local system.

Base Station ↻ w In mobile telecommunications, a base station is the central radio transmitter/receiver that maintains communications with the mobile radio telephone sets within its range. In cellular and personal communications applications, each cell or microcell has its own base station; each base station in turn is interconnected with other cells' bases.

Bridge ↻ w An internetworking function that incorporates the lowest 2 layers of the OSI network protocol model.

BSS ↻ w BSS stands for "Basic Service Set". It is an Access Point and all the WireFree PCs that associated with it.

ESS ↻ w ESS stands for "Extended Service Set". More than one BSS is configured to become Extended Service Set. WireFree mobile users can roam between different BSSs in an ESS.

Ethernet ↻ w A popular local area data communications network, originally developed by Xerox Corp., that accepts transmission from computers and terminals. Ethernet operates on a 10 Mbps baseband transmission rate, using a shielded coaxial cable or over shielded twisted pair telephone wire.

Infrastructure ↻ w An integrated wireless and wired LAN is called an Infrastructure configuration.

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

Roaming - A WireFree mobile user moves around an ESS and enjoys a continuous connection to

the Infrastructure network.

RTS Threshold – Transmitters contending for the medium may not be aware of each other. RTS/CTS mechanism can solve this " Hidden Node Problem". If the packet size is smaller than the preset RTS Threshold size, the RTS/CTS mechanism will NOT be enabled.