WAP-1000

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.

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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-1000 User's Guide is first published by Planet Technology Corp. in 1999. This Revision is for WireFree WAP-1000 Version 2.0, issued in August , 1999. The purpose of this manual is for the setup of the product WireFree WAP-1000.

Revision

WireFree WAP-1000 User's Guide
Part No.EMWAP1KV2

Contents

Chapter 1 About WAP-1000 Access Point

WireFree WAP-1000 is an Access Point that performs as a transparent Media Access Control (MAC) bridge between wired Local Area Networks, and one or more WireFree wireless networks. Placed anywhere along an Ethernet LAN, WAP-1000 allows wireless stations in their coverage area to access transparently to the corporate network.   WireFree WAP-1000, together with WireFree network adapter cards, enables you to build a variety of network configurations.

1-1 Features and Benefits

- **Protocol-independent networking functionality**
- **Access for mobile WireFree WL-2400/WL-3501/WAP-900 users into the legacy wired Ethernet LAN.**
- **Web Management support**
- **Roaming capability**
- **Seamless connectivity to wired Ethernet and PC network LAN's augments existing networks quickly and easily**.
- **Supports point-to-point and point-to-multipoint access.**
- **Supports up to 2 Mbps data rate: T-1 line alternative/replacement that dramatically cuts costs.**
- **Supports a wide range of LAN NOS (Win95/98, NT, Netware client, DOS)**
- **Omnidirectional antenna included.**
- **Wireless connection without the hassles and cost of cabling.**
- **Greater flexibility to locate or move networked PC's**

1-2 Applications

WireFree products offer a fast, reliable, cost-effective solution for wireless client access to the network in applications like these:

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, airline 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**

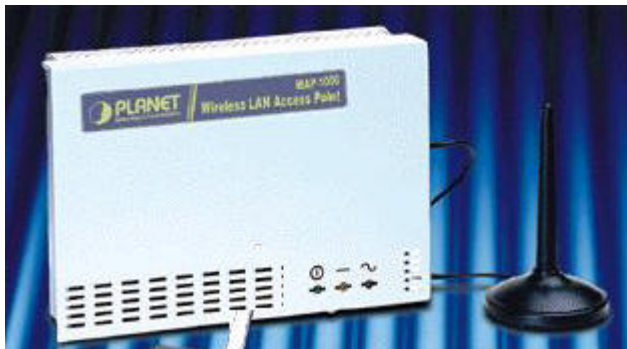   SOHO users need easy and quick installation of a small computer network.

7. **Inter-building connection**

   The wireless building-to-building network installs quickly, requires no monthly lease fees, and provides the flexibility to reconfigure easily.

1-3 Product Kit

Each WAP-1000 package comes with:

◆ **WAP-1000 Box**……………………………………………… x 1
◆ **Antenna** (dipole, omni-directional)………………………….. x 1

◆ **WAP-1000 User's Manual**   CD-ROM……………………… x 1
◆ **Power Adapter**…………………………………………………. x 1
◆ **A/C Power Cord**……………………………………………….. x 1
◆ **RS-232C Configuration Cable** ………………………….. x 1

If any of the listed items is not included or found damaged, please contact your local dealer.

Chapter 2 Hardware Installation

2-1 System Requirements

Installation of WAP-1000 requires:

1. An A/C power outlet (100~240V, 50~60Hz) which supplies the power for WAP-1000 Access Point.

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

Note: (*Only if you want to re-configure the WAP-1000 Access Point instead of using factory installed default configuration...*) A DOS-based PC with TCP/IP connection to the network or with an available RS-232C port to run the configuration program.

2-2 Mechanical Description

Front Panel:
Side Panel:

⓪ : Power
— : (Wired) Ethernet Tx/Rx
∿ : Wireless LAN Tx/Rx

Antenna Connector

DC 5V Power Socket

RS-232C Configuration Port

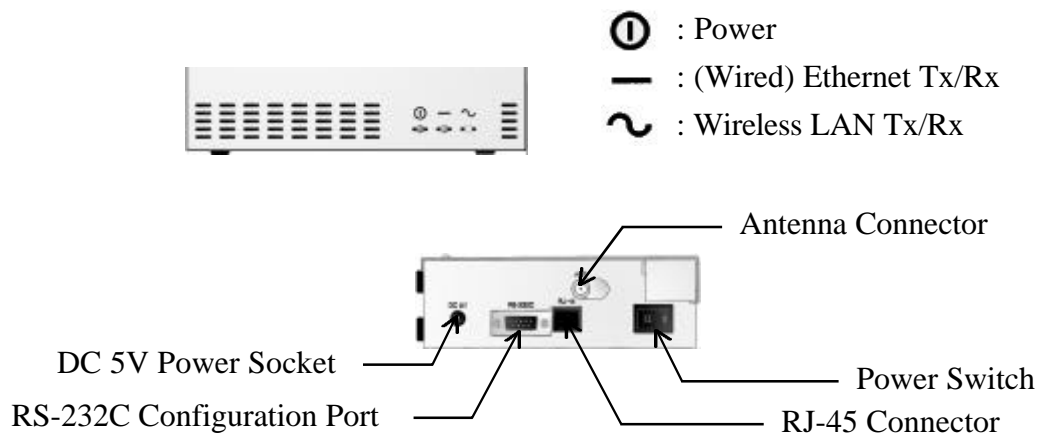Power Switch

RJ-45 Connector

Fig2-1 Mechanical Instruction of WAP-1000 Access Point

2-3 WAP-1000 Hardware Installation

Please follow these procedures for setting up hardware:

1. Site Selection

Choose a proper placement for your WAP-1000 Access Point. The Site Survey and Access Point Browser utility will help you with site selection.

In general, the best location to place your WAP-1000 Access Point in your site 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-1000 Access Point. Proper antenna placement shall improve the WAP-1000 performance. Try to place the antenna in the position that can best cover its BBS. Normally, the higher you place the antenna, the better the performance will be.

3. Connect the Ethernet Cable

WAP-1000 can be connected to the 10Base-T Ethernet network. Connect your UTP Ethernet cable to the RJ-45 connector of WAP-1000 Access Point.

4. Connect the Power Cable

Connect the power adapter cable to the DC5V Power Socket of WAP-1000 and turn the power on. USE ONLY the power adapter, which supplied with WireFree WAP-1000. Otherwise, the product may be damaged.

Chapter 3 Using the Start-up Configuration

The WAP-1000 Access Point can be connected to your **configuration station** either via RS-232C direct connection by using the RS-232C Configuration Cable (supplied) or a null-modem cable (See Fig3.1) or anywhere through TCP/IP connection.
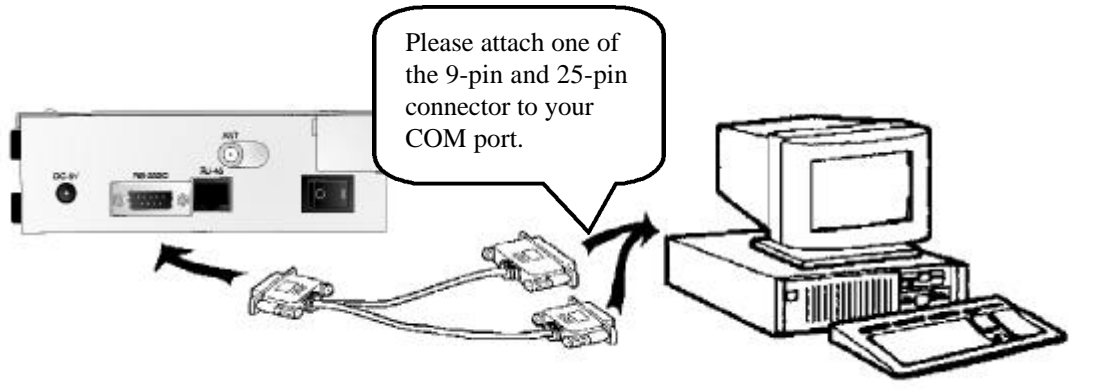

Fig3.1   Connecting RS-232C Configuration Cable

3-1 Terminal Mode

➢ WAP-1000 can be configured via either RS-232 or RJ-45.

➢ Configure the WAP-1000 Access Point via the RS-232 cable for the first time.
   Procedures are listed as follows:

a. Connect WAP-1000 and your PC with the RS-232 cable.

b. Turn on the power of WAP-1000 and your PC.

c. Run Terminal Program in Windows 95/98, NT or any operation system that installs Terminal Program.   The parameter setting should be as follows:
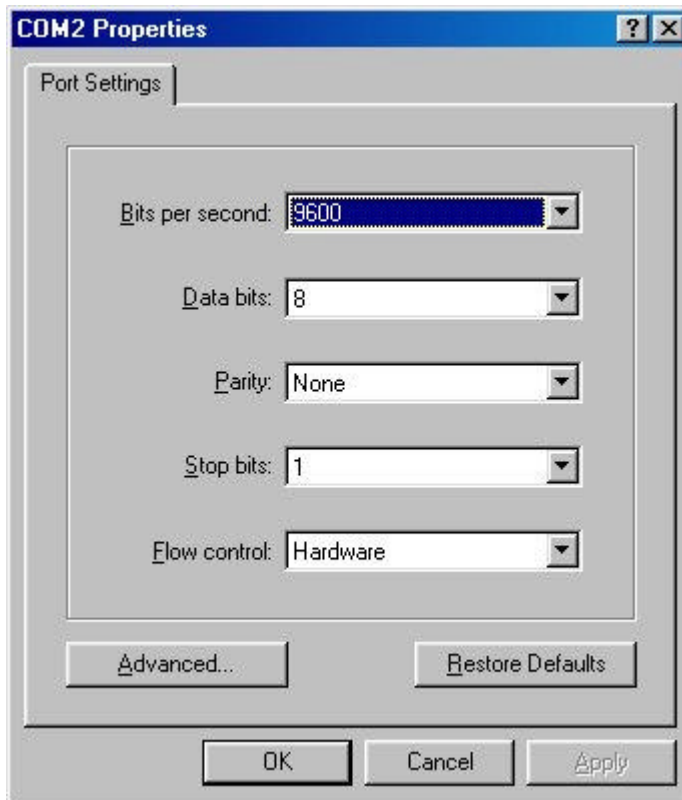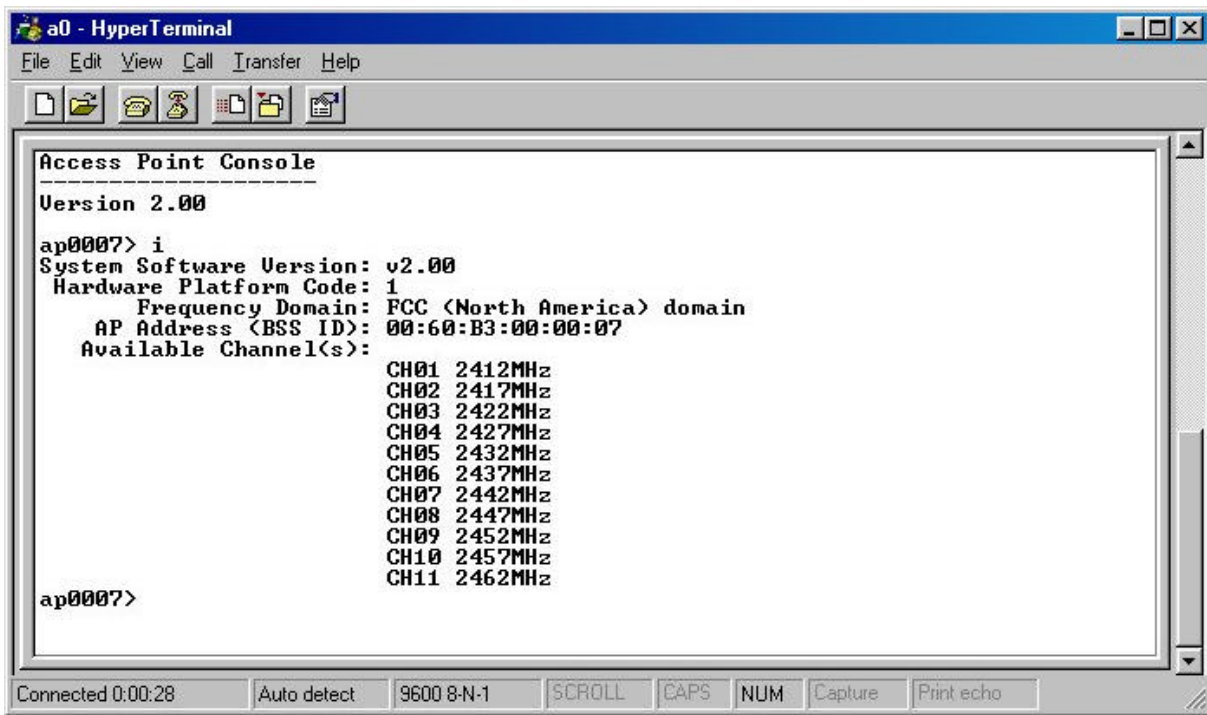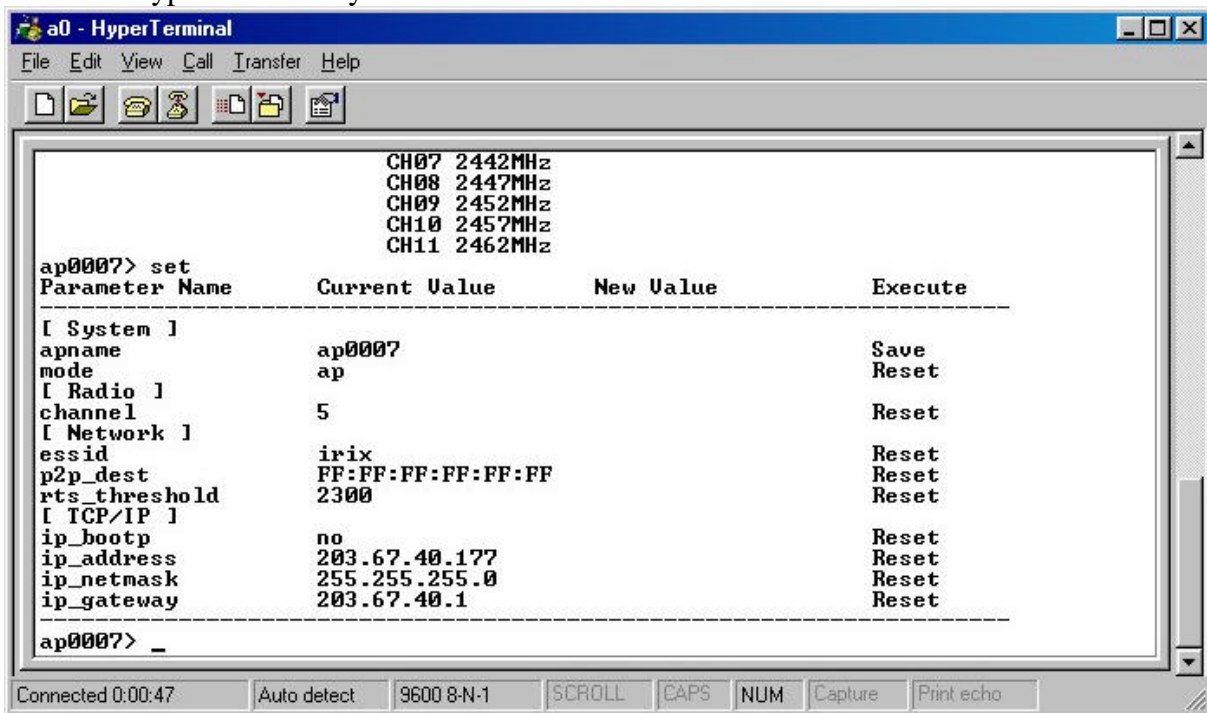
Baud Rate = 9600 BPS

d. When the setting is successfully completed, a window shows up.
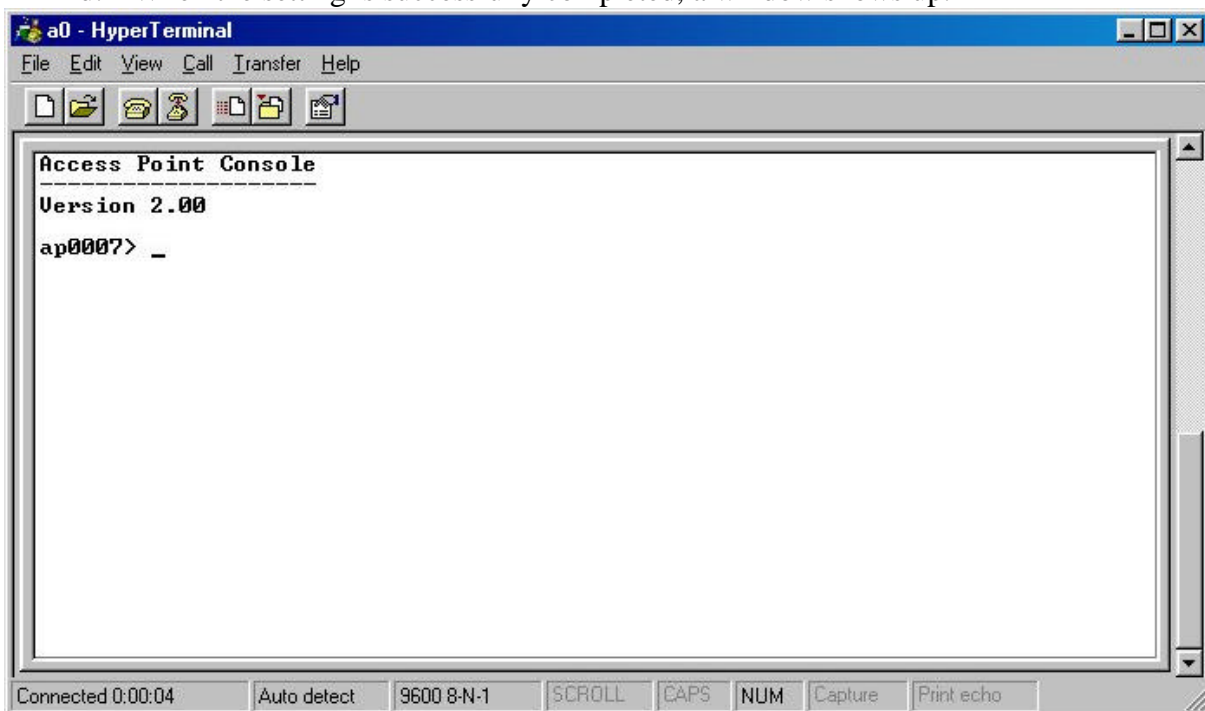
i. Type "**info**" and the associated parameters shows up such as MAC address and Domain (FCC North America, IC Canada,ETSI Europe, MKK Japan, etc)

```
Access Point Console
--------------------
Version 2.00

ap0007> i
System Software Version: v2.00
 Hardware Platform Code: 1
       Frequency Domain: FCC (North America) domain
     AP Address (BSS ID): 00:60:B3:00:00:07
     Available Channel(s):
                       CH01 2412MHz
                       CH02 2417MHz
                       CH03 2422MHz
                       CH04 2427MHz
                       CH05 2432MHz
                       CH06 2437MHz
                       CH07 2442MHz
                       CH08 2447MHz
                       CH09 2452MHz
                       CH10 2457MHz
                       CH11 2462MHz

ap0007>
```

ii. Type "**set**" and system status will come out as a list.


```
                       CH07 2442MHz
                       CH08 2447MHz
                       CH09 2452MHz
                       CH10 2457MHz
                       CH11 2462MHz
ap0007> set
Parameter Name      Current Value      New Value      Execute
-------------------------------------------------------------
[ System ]
apname              ap0007                            Save
mode                ap                                Reset
[ Radio ]
channel             5                                 Reset
[ Network ]
essid               irix                              Reset
p2p_dest            FF:FF:FF:FF:FF:FF                  Reset
rts_threshold       2300                              Reset
[ TCP/IP ]
ip_bootp            no                                Reset
ip_address          203.67.40.177                     Reset
ip_netmask          255.255.255.0                     Reset
ip_gateway          203.67.40.1                       Reset
-------------------------------------------------------------
ap0007> _
```
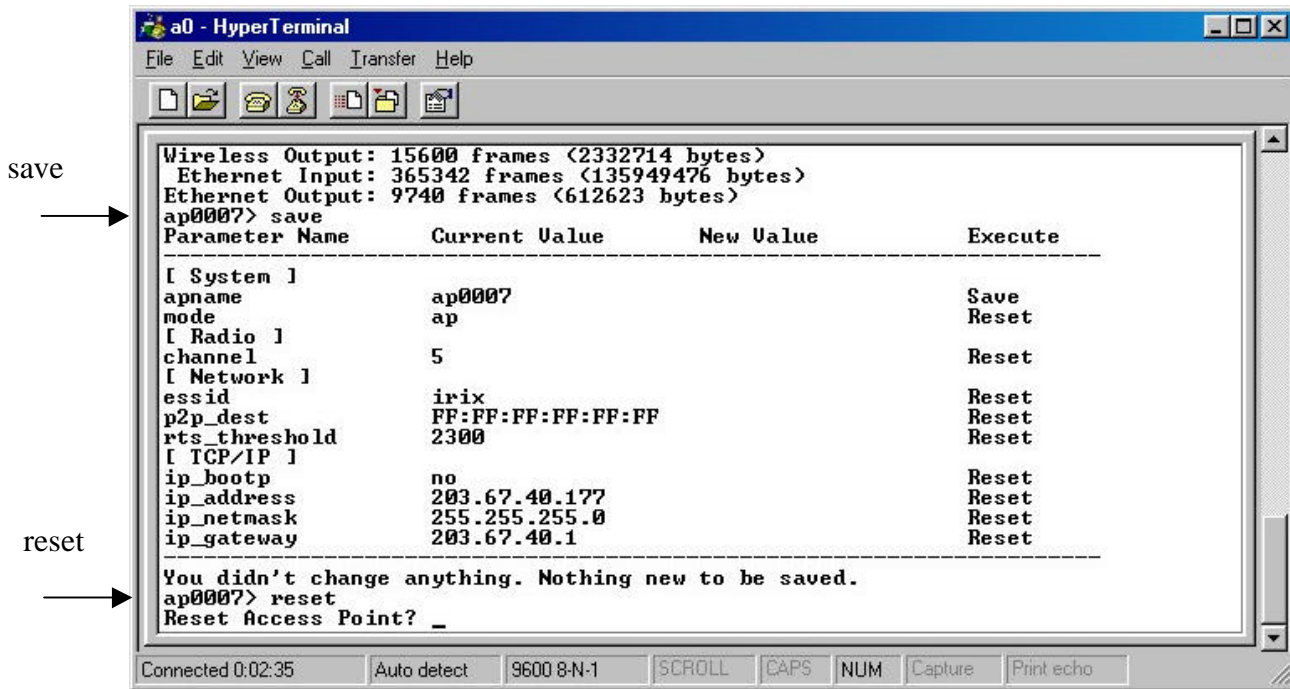
apname: Set a **hostname** for WAP-1000 Access Point. (Default setting: ap0001)

mode: Set the WAP-1000 Access Point operation mode to **Wireless LAN Access Point (ap)** or **Inter-Building Connection (p2p)**. (Default setting: ap - Wireless LAN Access Point)

channel: Select the channel number as your operating radio channel. (Default

	setting: the first channel)
essid:	Input a six-digit ESS ID (i.e., 000000~999999) of your Access Point. (Default setting: default) (Works if the Access Point Mode is **Wireless LAN Access Point**.)
rts_threshold:	Assign a RTS/CTS packet size.
p2p_dest:	Set the WAP-1000 Access Point's Inter-Building connection mode to **Broadcast** (00:60:B3:FF:FF:FF or FF:FF:FF:FF:FF:FF) or **Unicast** (Fill in the MAC address of destination Access Point). (Default setting: None 00:60:B3:00:00:00) (Works if the Access Point Mode is **Inter-Building Connection**.)
ip_bootp:	WAP-1000 Access Point supports bootp protocol. WAP-1000 Access Point can automatically get an IP address from bootp server.
ip_address:	Input the IP Address of your Access Point.
ip_netmask:	Input the Subnet Mask Address of your Access Point.
ip_gateway:	Input the Default Gateway Address of your Access Point.

iii. To change settings, please type "set xxx(parameter) xxxx(value) (i.e. set mode ap, meaning set the Access Point as receiver of WL-2400 / WL-3501)

iv. If you want to change the settings via network, some parameters such as IP address, Subnet mask and Gateways must be configured.

v. Save the modification when completing settings and reset the Access Point.

save →

reset →

```
a0 - HyperTerminal
File  Edit  View  Call  Transfer  Help

Wireless Output: 15600 frames (2332714 bytes)
 Ethernet Input: 365342 frames (135949476 bytes)
Ethernet Output: 9740 frames (612623 bytes)
ap0007> save
Parameter Name        Current Value      New Value          Execute
---------------------------------------------------------------------
[ System ]
apname                ap0007                                Save
mode                  ap                                    Reset
[ Radio ]
channel               5                                     Reset
[ Network ]
essid                 irix                                  Reset
p2p_dest              FF:FF:FF:FF:FF:FF                      Reset
rts_threshold         2300                                  Reset
[ TCP/IP ]
ip_bootp              no                                    Reset
ip_address            203.67.40.177                         Reset
ip_netmask            255.255.255.0                         Reset
ip_gateway            203.67.40.1                           Reset
---------------------------------------------------------------------
You didn't change anything. Nothing new to be saved.
ap0007> reset
Reset Access Point? _

Connected 0:02:35   Auto detect   9600 8-N-1   SCROLL  CAPS  NUM  Capture  Print echo
```

3-2 Telnet Mode

1. Remote control via Telnet, default password is "**default**".

```
Telnet - 203.67.40.177
Connect  Edit  Terminal  Help
Access Point Console
--------------------
Version 2.00

Password: █
```
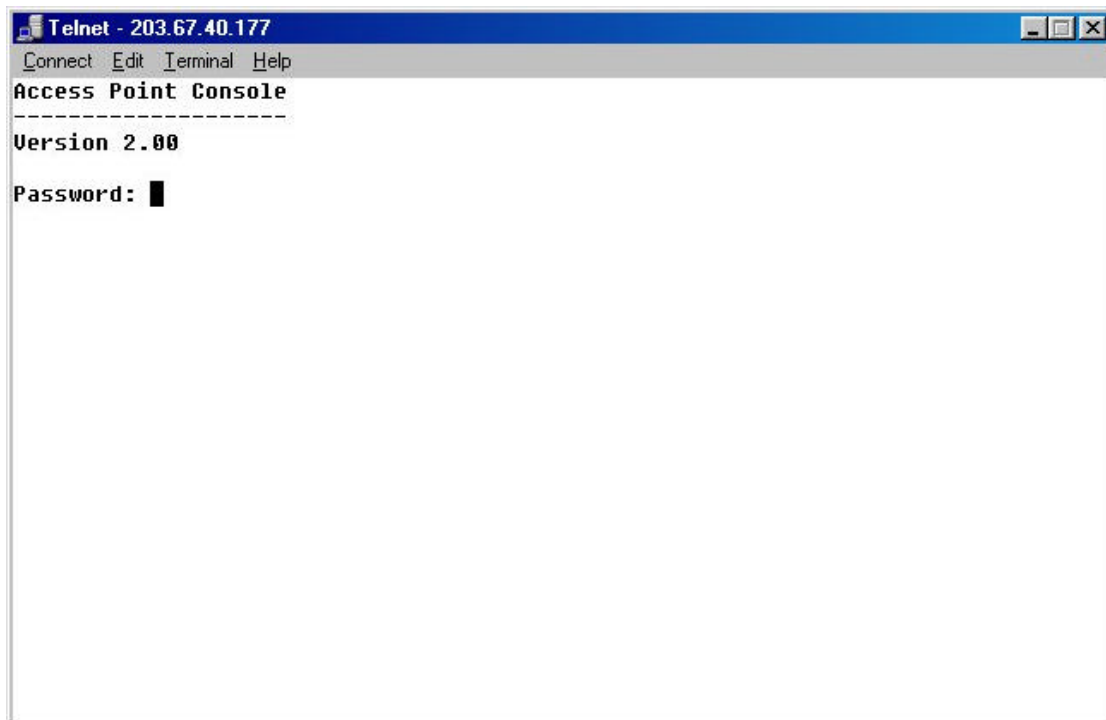
2. Type "**info**" and the associated parameters show up such as MAC address and Doamin   (FCC North America, IC Canada, ETSI Europe, MKK Japan, etc)

3. Type "**set**" and system status will come out as a list.

```
Telnet - 203.67.40.177
Connect  Edit  Terminal  Help
                    CH06  2437MHz
                    CH07  2442MHz
                    CH08  2447MHz
                    CH09  2452MHz
                    CH10  2457MHz
                    CH11  2462MHz
ap0007> set
Parameter Name       Current Value        New Value          Execute
-------------------------------------------------------------------------
[ System ]
apname               ap0007                                  Save
mode                 ap                                      Reset
[ Radio ]
channel              5                                       Reset
[ Network ]
essid                irix                                    Reset
p2p_dest             FF:FF:FF:FF:FF:FF                        Reset
rts_threshold        2300                                    Reset
[ TCP/IP ]
ip_bootp             no                                      Reset
ip_address           203.67.40.177                           Reset
ip_netmask           255.255.255.0                           Reset
ip_gateway           203.67.40.1                             Reset
-------------------------------------------------------------------------
ap0007>
```

4. To change settings, please type "set xxx(parameter) xxxx(value) (i.e. set mode ap, meaning set the Access Point as receiver of WL-2400 / WL-3501).

5. Save the modification when completing settings and reset the Access Point.

3-3 Web Management

1. Run any Browser that supports Java and JavaScript (Netscape¡BIE¡BMosaic, etc). Type the IP address of the Access Point in the IP Address field.
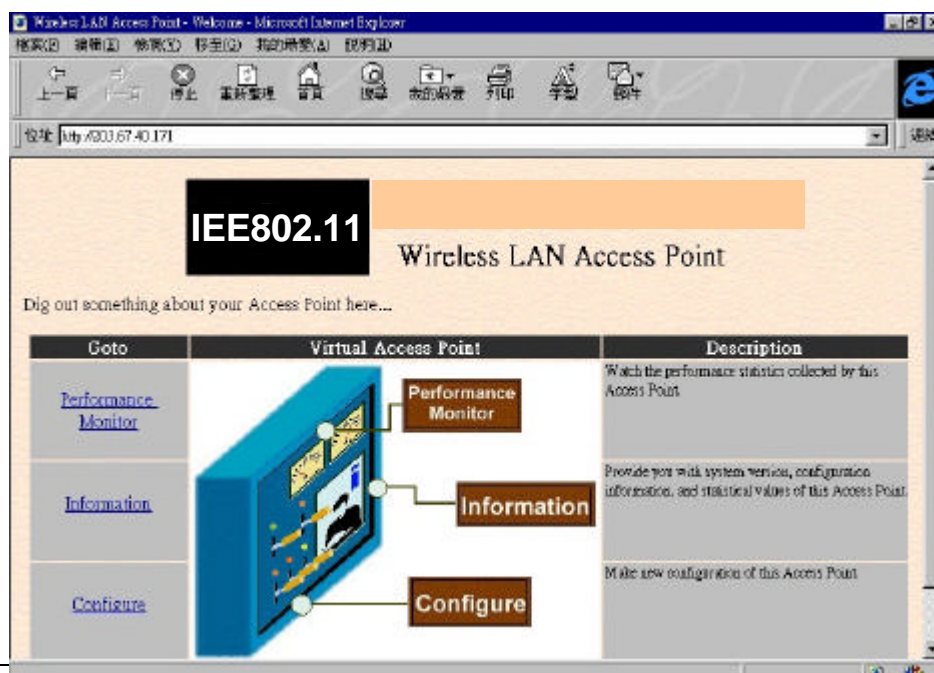
In the Performance Monitor item, you can monitor the access status between wired and wireless network.
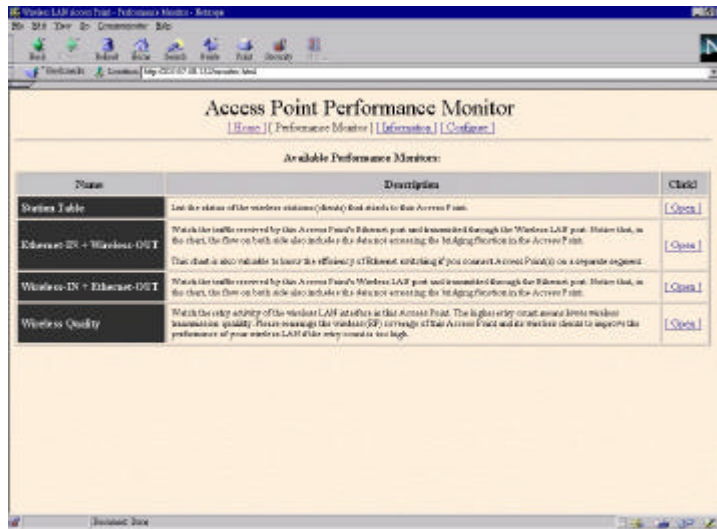
- Load: Ethernet-IN + Wireless-OUT
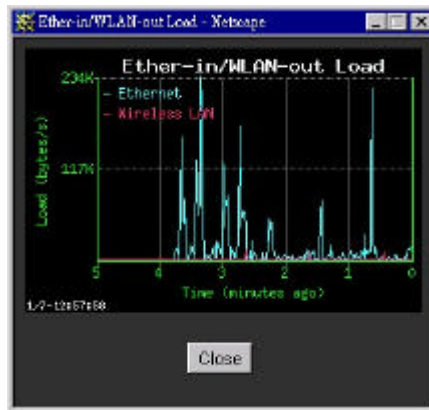
- Load: Ethernet-OUT + Wireless-IN
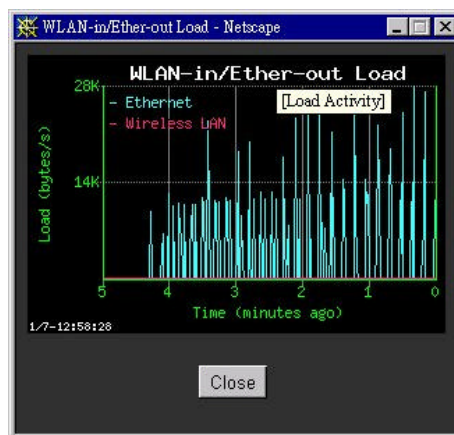
■ Status: Wireless Quality
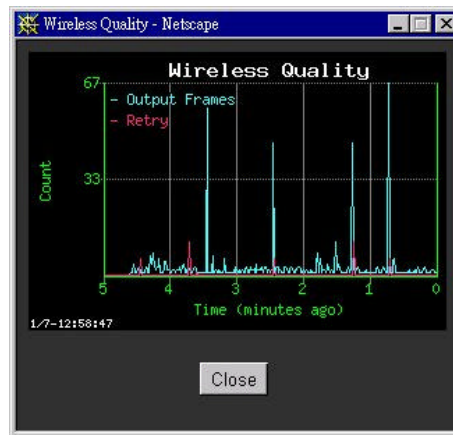
■ Status: Station Table
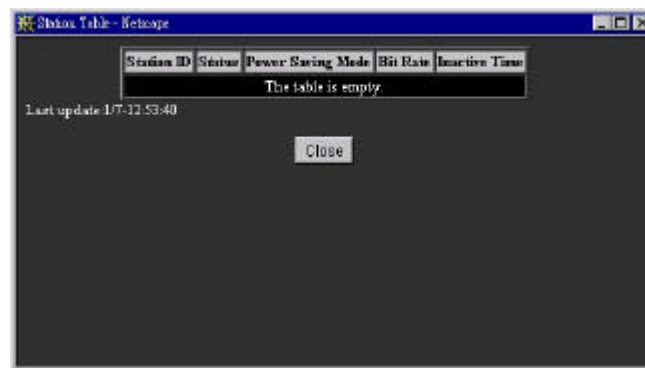
In the Information field, you can see the configuration of the Access Point.

In the Configure item, you can modify settings of the Access Point.
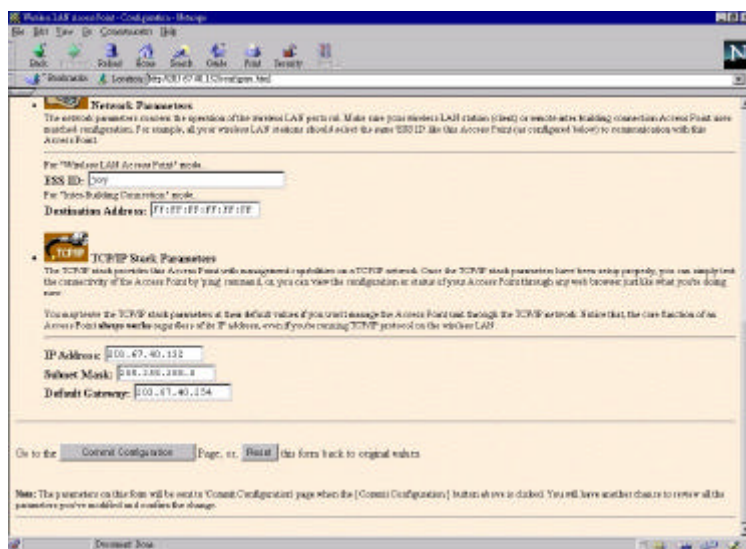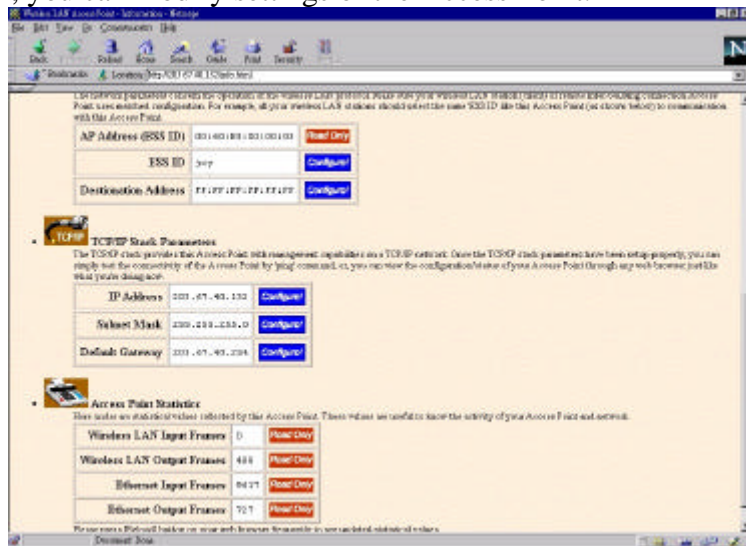
Chapter 4 Troubleshooting

1. Problem Solving

- *Cannot configure WAP-1000 by RS-232C direct connect*

  Probable Causes & Solution:

  a. Check the RS-232C cable, make sure there's no physical connection problem with both WAP-1000 and the configuration station.

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

- *Cannot configure WAP-1000 via Ethernet connect*

  Probable Causes & Solution:

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

  b. Check your net administrator that the IP address for the configuration station and other TCP/IP configuration, such as subnet mask, default gateway, are correct for your internet/intranet.

  c. Make sure the IP address of your target WAP-1000 is correct.

- *WireFree mobile users cannot roam across WAP-1000s*

  Probable Causes & Solution:

  a. Make sure all the WAP-1000s in the ESS, which you allow WireFree mobile users to roam, configured with the same ESS ID.

  b. Make sure all the WAP-1000 in the ESS operating on the same radio channel.

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

  d. Make sure the WireFree mobile users configured with the right operating radio channel.

2. How to obtain further support

a. Use the "Maintenance" page in the WAP-1000 Web Management to e-mail your questions to Planet.

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

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

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

   Direct any of your questions to sales support department.

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

Appendix A Network Configuration and Planning

WireFree supports the same network configuration options of the legacy Ethernet LANs as defined by 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.
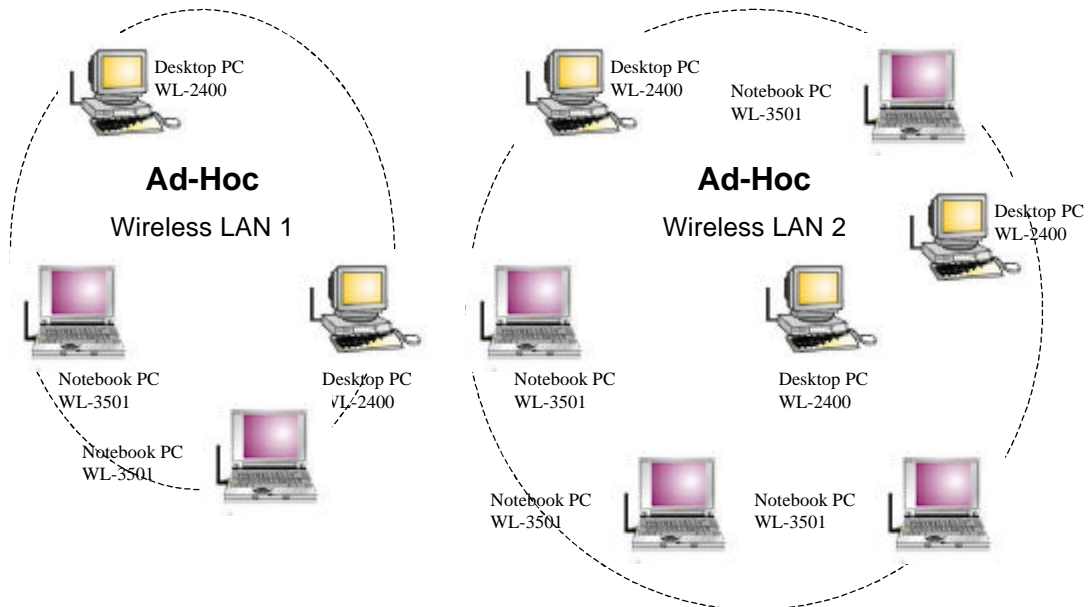
A-1 Network Topology

◆ **Ad-Hoc**

Fig a-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.
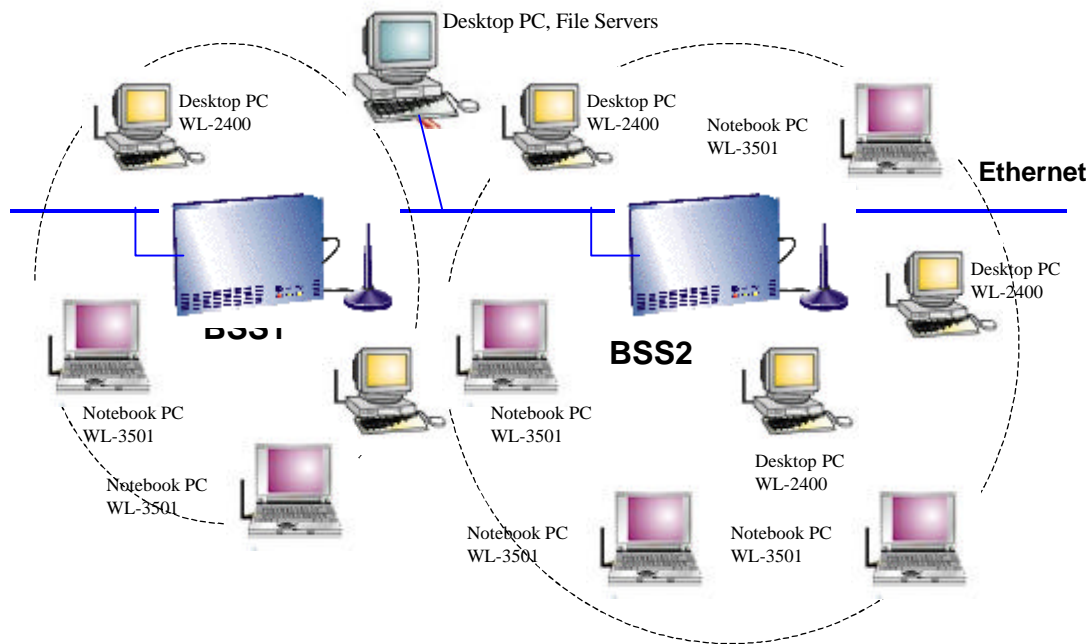
◆ **Infrastructure**

Fig a-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-1000 Access Point construct a Basic Service Set (BSS). Each WireFree PC in this BSS can talk to any computer in the wired LAN infrastructure via the WAP-1000 Access Point.

Infrastructure configuration not only extends the accessibility of a WireFree PC to the wired LAN, but also doubled the effective wireless transmission range for 2 WireFree PCs. Since WAP-1000 is able to forward data within its BSS, the effective transmission range in an infrastructure LAN is **doubled**.
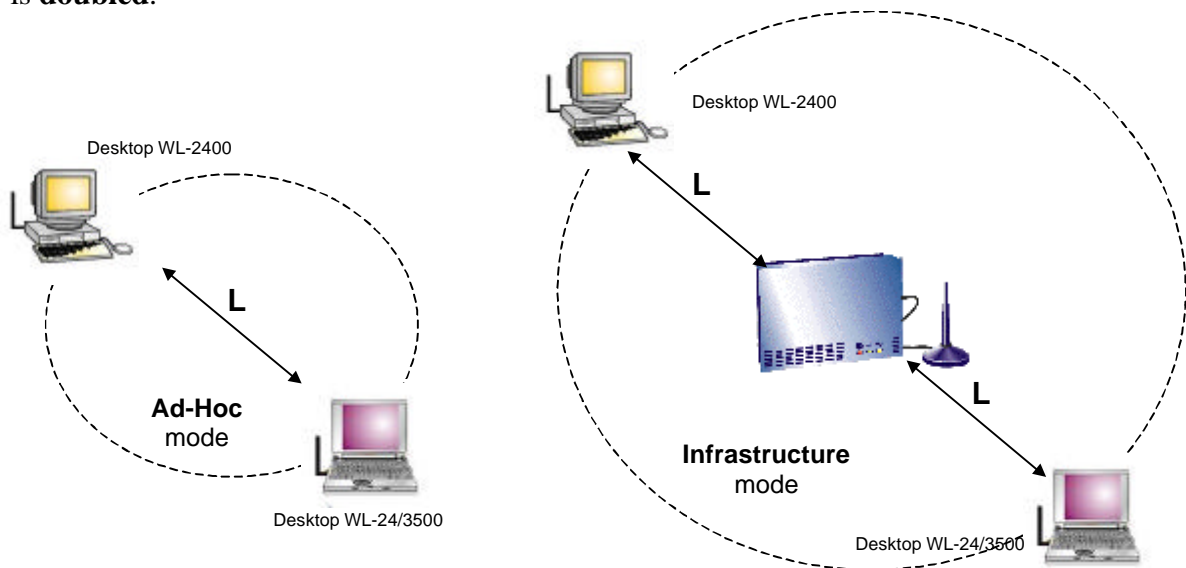

Fig a-3   The effective Transmission Range

BSS ID is, in essential, the ID of each independent WAP-1000. All WireFree PCs configured without roaming options in this independent BSS must be configured with BSS ID of that WAP-

1000. Check your WAP-1000 for its BSS ID or use the Access Point Browser Utility program described in next section, "Roaming".

Infrastructure is applicable to enterprise scale for wireless access to central database, or wireless application for mobile workers.
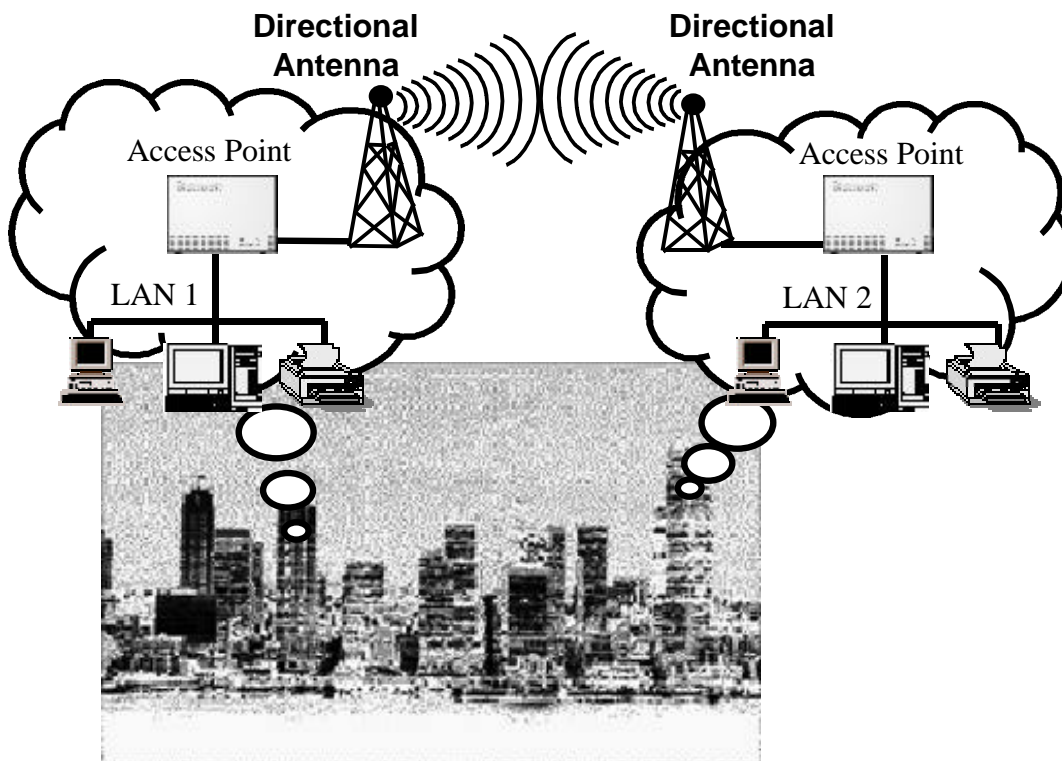
◆ **LAN-Interconnection**

Fig a-4 An Example of Wireless LAN-Interconnection

Two Access Points could be used, with a directional antenna (it is an optional accessory, please contact your dealer for detail information), as a point-to-point link between two LANs.   LAN-Interconnection is applicable to a wireless backbone between buildings.

A-2 Roaming

An Infrastructure configuration also supports roaming capability for mobile workers.   More than one BSS can be configured as an Extended Service Set (ESS).   On account of a continuous connection to the network, users **within this ESS** could roam freely.   All WireFree PCs and WAP-1000s within one ESS must be configured with the same ESS ID and at the same radio channel.
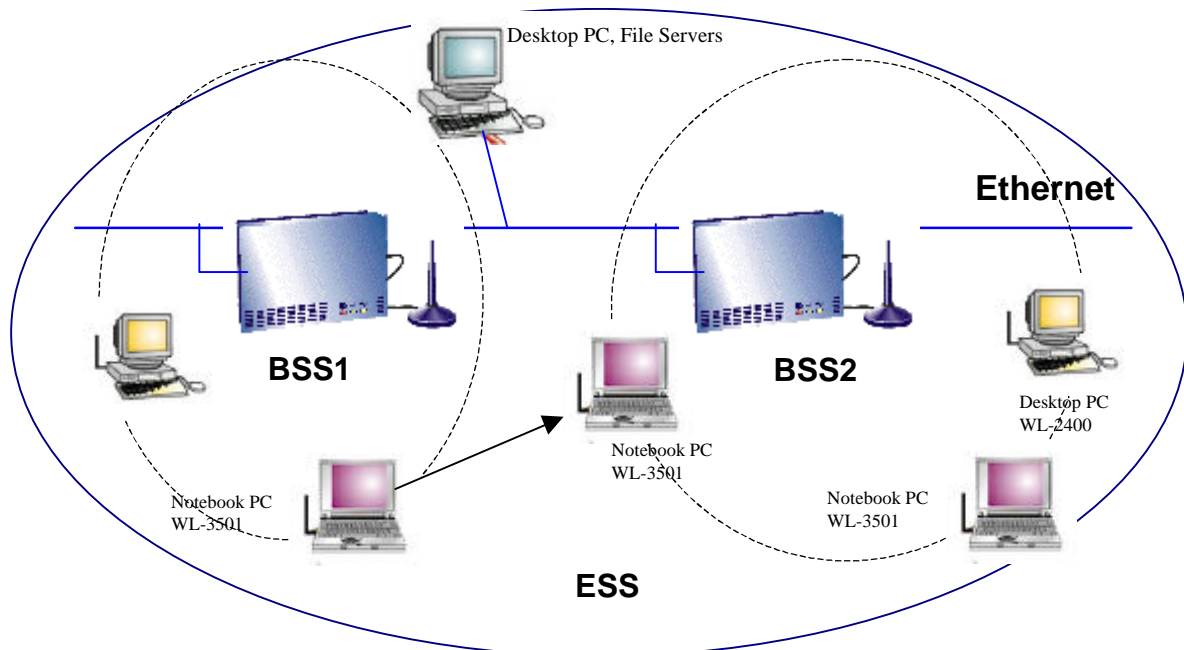
Fig a-5 Roaming in an Extended Service Set (ESS)

Before setting up an ESS for roaming, it would be helpful to improve the performance by choosing a feasible 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 WireFree WL-2400 / WL-3501 adapter and Utility program installed is necessary. For details of WLU, check the chapter of "WireFree Utility-WLU" in the WL-2400 / WL-3501 User's Manual.
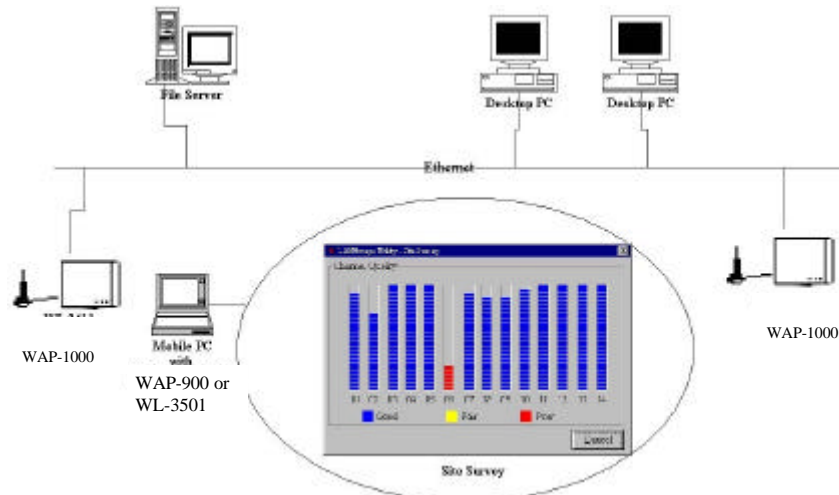
◆ **Site Survey**

Fig a-6 Site Survey Utility

Site Survey function can be found in the WLU program.   After running WLU, select **[Diagnostics Tools]** ⇨**[Site Survey]**.   Site Survey displays the quality of all 12-radio channels in your environment.   Generally, the **higher** the bar is, the better the quality will be.   Choose the radio channel with the best quality as your operating radio channel.   If you are setting up an ESS for roaming, configure all the WireFree PCs and WAP-1000s within this ESS with that channel.
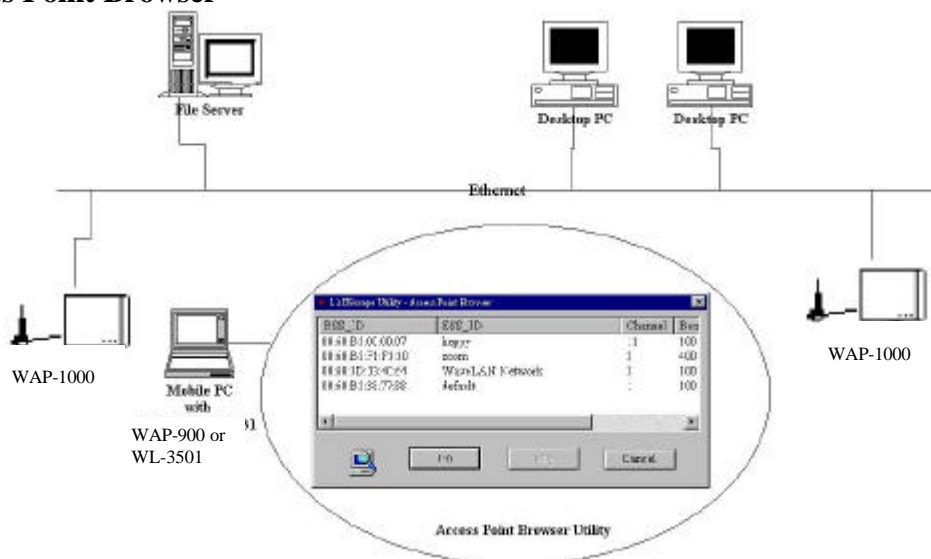
◆ **Access Point Browser**

Fig a-7 Access Point Browser Utility

Access Point Browser functions can be found in the WLU program.   After running WLU, select [**Diagnostics Tools**] ⇨ [**Access Points Browser**].   Each Access Point broadcasts "beacon" periodically.   The mobile station (with the "roaming" option being enabled) receives beacons from different Access Points, compares the signal level (technically, the RSSI, Radio Signal Strength Indicator), then the mobile station connects to the Access Point with the highest (i.e., best) signal value.   Signal level is the indicator of the radio signal coverage of an Access Point.

Access Point Browser displays all the beacons received and its signal level in the current

physical location.   Use a notebook PC running the Access Point Browser to walk around the coverage area of your ESS.   The coverage of each Access Point can therefore be measured. Adjust the placement of your Access Points to form continuous radio signal coverage within the ESS.

Appendix B   Specifications

Product	WireFree WAP-1000
Wired Interface	Ethernet, 10BaseT
Wireless Interface	WireFree Wireless LAN
Spanning Tree	IEEE 802.1d
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
Web Management	Support

Appendix C Glossary

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

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

Backbone - 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 off-loaded onto a local system.

Base Station - In mobile telecommunications, a base station is the central radio transmitter/receiver that maintains communications with the mobile radio telephone sets within 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' base.

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

BSS - Stands for "Basic Service Set," an Access Point and all the WireFree PCs that associated with it.

ESS - Stands for "Extended Service Set." More than one BSS can be configured as an Extended Service Set. WireFree mobile users can roam between BSS in an ESS.

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

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

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 3.3 mm (Type I) to 5.0 mm (Type II) to 10.5 mm (Type III). These cards can be used for many functions, including memory storage, landline modems and wireless modems.

Roaming - A WireFree mobile user moves around an ESS and get the continuous connection to the Infrastructure network.

RTS Threshold – Transmitters contending for the medium may not hear 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.

Web Management - Network management by using web browser connecting to the target devices.