802.11g WLAN Access Point

User's Guide

Version 1.0, May 2003

Copyright Statement

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Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one 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.

FCC Caution: To assure continued compliance, (example - use only shielded interface cables when connecting to computer or peripheral devices) any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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

(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:

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

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The user cannot use channel 12 & 13, or it will be a violation of the sensitive restricted bands of 15.205.

Chapter 1

Introducing the 802.11G ACCESS POINT

Overview of the Device

The 802.11G ACCESS POINT is an access-point based on IEEE 802.11g based 2.4-GHz radio technology. It contains an 802.11g and a full-duplex 10/100 LAN interfaces. The 802.11G ACCESS POINT can function as a simple Access Point (AP), and act as the center point of a wireless network supporting a data rate of up to 54 Mbps. It can also connect these wireless devices to wired network through the LAN interface.

The 802.11G ACCESS POINT can also function in a repeater mode, which is used to extend the physical coverage of the wireless network. Finally, the 802.11G ACCESS POINT can also function in a Wireless Distribution System (WDS) mode. Multiple 802.11G ACCESS POINT's can be configured to operate in the WDS mode to inter-connect wired LAN segments that are attached to these 802.11G ACCESS POINT's.

Since the 802.11g share the same 2.4GHz radio band as the 802.11b technology, it can inter-operate with existing 11Mbps 802.11b devices. Therefore you can protect your existing investment in 802.11b client cards, and migrate to the high-speed 802.11g standard as your needs grow.

To address growing security concerns in a wireless LAN environment, different levels of security can be enabled in the 802.11G ACCESS POINT, including:

- To disable SSID broadcast to restrict association to only those client stations that are already pre-configured with the correct SSID
- To enable WEP (Wireless Encryption Protocol) encryption to protect the privacy of your data.
- Support of Access List Control to allow you to grant/deny access to/from specified wireless stations
- Provisioning of centralized authentication through Radius Server(s).

802.11G ACCESS POINT Features

- Compliant with 802.11g and 802.11b standards with roaming capability
- Support of the standard access point mode for connection to wireless clients
- Support of the Repeater Mode to extend infrastructure coverage
- Support of the WDS mode for interconnecting LAN segments
- Built-in DHCP Server to Assign IP Addresses to wireless clients automatically
- Multiple security measures: to disable SSID broadcast, to define Access Control List, to enable WEP based encryption (up to 128 bits), and enhanced Security with 802.1x using a primary and a backup Radius Server
- Extensive monitoring capability such as event logging, traffic/error statistics monitoring
- Easy configuration and monitoring through the use of a Web-browser based GUI, a Command Line Interface (CLI) through a remote telnet session, or SNMP commands from a remote SNMP management station
- Setup Wizard for easy configuration/installation

Network Configuration Examples

A group of wireless stations communicating with each other is called a Basic Service Set (BSS) and is identified by a unique SSID.

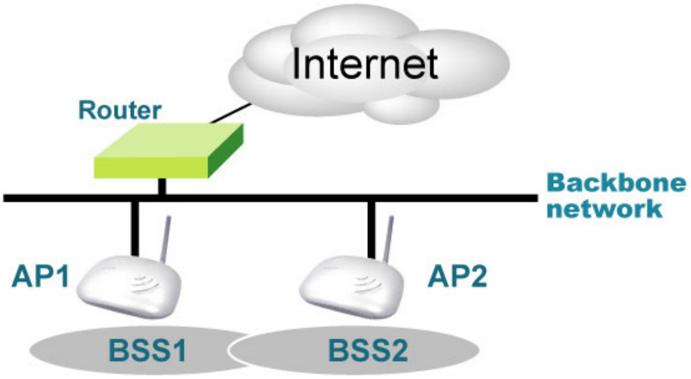
When an 802.11G ACCESS POINT is used, it can be configured to operate in the following three network configurations

AS AN ACCESS POINT

When configured in the Access Point mode, the 802.11G ACCESS POINT allows a group of wireless stations to communicate with each other through it. Such a network is called an Infrastructure BSS.

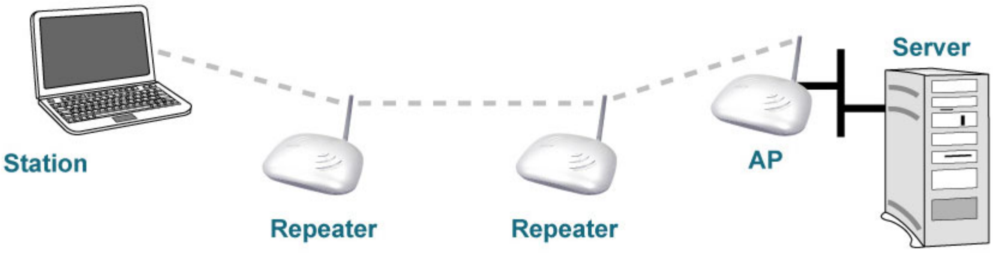
The 802.11G ACCESS POINT further provides bridging functions between the wireless network and the wired LAN network.

When multiple access points are connected to the same LAN segment, stations can **roam** from one 802.11G ACCESS POINT to another without losing their connections, as long as they are using the same SSID. This is shown in the diagram below.



AS A STAND-ALONE REPEATER

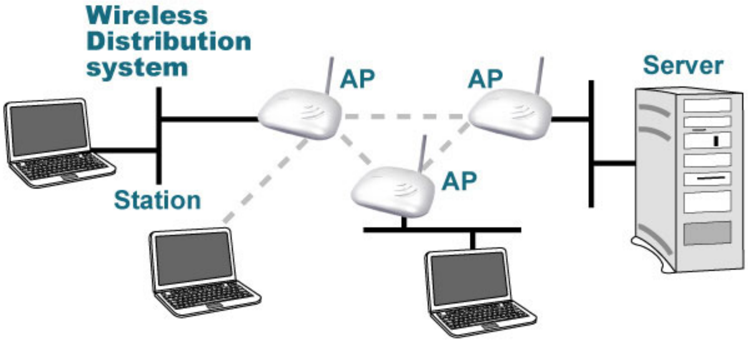
The purpose of a repeater is to expand an existing infrastructure BSS. When configured to operate in the Repeater Mode, the 802.11G ACCESS POINTs sit between wireless stations and a "root" AP whose BSS is being expanded, as shown below:



AS A POINT TO MULTI-POINTS BRIDGE

When configured to operate in the Wireless Distribution System (WDS) Mode, the 802.11G ACCESS POINT provides bridging functions between the LAN behind it and separate LANs behind other AP's operating in the WDS mode. The system will support up to eight such AP's in a WDS configuration.

Note that an 802.11G ACCESS POINT running in the WDS mode can also support wireless stations simultaneously, as shown in the left most AP in the diagram below:



Setting Up the device

The 802.11G ACCESS POINT can be managed remotely by a PC through either the wired or wireless network. To do this, the 802.11G ACCESS POINT must first be assigned an IP address, which can be done using one of the following two methods.

STATIC IP

The default IP address of the LAN interface of an 802.11G ACCESS POINT is a *private IP address* of **192.168.1.1**, and a *network mask* of 255.255.255.0. This means IP addresses of other devices on the LAN should be in the range of 192.168.1.2 to 192.168.1.254.

This IP address can be modified to either a different address in this same subnet or to an address in a different subnet, depending on the settings of the DHCP server in the network.

AUTOMATIC IP

The 802.11G ACCESS POINT can also be configured to "obtain" an IP address automatically from a DHCP server on the network. This address is called "dynamic" because it is only *dynamically* assigned to the device, which may change depending on the IP assignment policy used by the DHCP server in the network. Since the IP address in this case may change from time to time, this method is not recommended - unless the user uses UPnP or other management tools that do not depend on a fixed IP address.

Chapter

2

Installing the 802.11G ACCESS POINT

This section describes the installation procedure for the 802.11G ACCESS POINT. It starts with a summary of the content of the package you have purchased, followed by steps of how to power up and connect the 802.11G ACCESS POINT. Finally, this section explains how to configure a Windows PC to communicate with the 802.11G ACCESS POINT.

What's in the Box?

The 802.11G ACCESS POINT package contains the following items:

- One 802.11G ACCESS POINT 802.11g Access Point

. One 5V AC power adapter with a barrel connector

- CD of the 802.11G ACCESS POINT User' Guide

Connecting the Cables

The Back Panel of the 802.11G ACCESS POINT appears as follows:

Follow these steps to install your 802.11G ACCESS POINT:

Step 1. Connect a LAN hub to the LAN port on the 802.11G ACCESS POINT using the supplied LAN cable.

Step 2. Connect the power adapter to an electrical outlet and the 802.11G ACCESS POINT.

High Level Configuration Steps Required for the 802.11G ACCESS POINT

This section describes configuration required for the 802.11G ACCESS POINT before it can work properly in your network.

First, it is assumed that in your LAN environment, a separate DHCP server will be available for assigning dynamic (and often private) IP addresses to requesting DHCP clients. This means that the 802.11G ACCESS POINT normally will not need to enable the DHCP server function.

Additionally, since you need to perform various configuration changes to the 802.11G ACCESS POINT, including the SSID, Channel number, the WEP key, …, etc., it is necessary to associate a fixed IP address with the 802.11G ACCESS POINT, which is why the 802.11G ACCESS POINT will be shipped with a factory default private IP address of **192.168.1.1** (and a network mask of 255.255.255.0).

Therefore, during the system installation time, you need to build an isolated environment with the 802.11G ACCESS POINT and a PC or a wireless client, and then perform the following steps:

- Manually change the IP address of the PC/wireless client to become 192.168.1.2

- Connect the PC/wireless client to the 802.11G ACCESS POINT and change its configuration to a static IP address reserved by your LAN administrator based on the DHCP server setting. For example, if the DHCP server assigns IP addresses of range 192.168.23.1-192.168.23.254 to DHCP client devices, it can reserve 192.168.23.10 for the 802.11G ACCESS POINT. Please note that at this point the PC/wireless client will lose communication contact with the 802.11G ACCESS POINT, as they no longer belong to the same IP network address space.

- Change the setting of the PC/wireless client back to "obtain IP addresses dynamically".

From then on, any wireless client configured to "obtain IP addresses dynamically" will work with the AP, with each other, and with devices on the wired LAN network.

Setting up a Windows PC or wireless client as DHCP clients

The following will give detailed steps of how to configure a PC or a wireless client to "obtain IP addresses automatically". For other types of configuration, please refer to the corresponding user manual.

For the case of using a LAN attached PC, the PC must have an Ethernet interface installed properly, be connected to the 802.11G ACCESS POINT either directly or through an external LAN switch, and have TCP/IP installed and configured to obtain an IP address automatically from a DHCP server in the network.

For the case of using a wireless client, the client must also have an Ethernet interface installed properly, be physically within the radio range of the 802.11G ACCESS POINT, and have TCP/IP installed and configured to obtain an IP address automatically from a DHCP server in the network.

Then perform the following steps for either of the above cases. To configure types of workstations other than Windows 95/98/NT/2000, please consult the manufacturer's documentation.

Step 1. From the Win95/98/2000 Start Button, select Settings, then Control Panel. The Win95/98/2000 Control Panel displays.

Step 2. Double-click on the *Network* icon.

Network

Step 3. Check your list of Network Components in the Network window Configuration tab. If TCP/IP has already been installed, go to Step 8. Otherwise, select Add to install it now.

Step 4. In the new Network Component Type window, select Protocol.

In the new Select Network Protocol window, select Microsoft in the Manufacturers area.

Step 5. In the Network Protocols area of the same window, select TCP/IP, then click OK. You may need your Win95/98 CD to complete the installation. After TCP/IP installation is complete, go back to the Network window shown in Step 4.

Step 6. Select TCP/IP in the list of Network Components.

Step 7. Click *Properties*, and check the settings in each of the TCP/IP Properties window:

Bindings Tab: both **Client for Microsoft Networks** and **File and printer sharing for Microsoft Networks** should be selected.

Gateway Tab: All fields should be blank.

DNS Configuration Tab: **Disable DNS** should be selected.

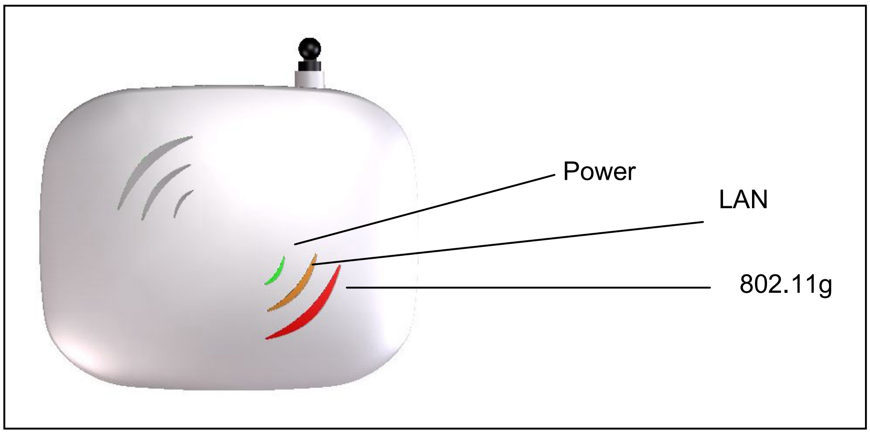
IP Address Tab: **Obtain IP address automatically** should be selected.

Step 8. With the 802.11G ACCESS POINT powered on, reboot the PC/wireless client. After the PC/wireless client is re-booted, you should be ready to configure the 802.11G ACCESS POINT. See Chapter 3.

The procedure required to set a static IP address is not too much different from the procedure required to set to "obtain IP addresses dynamically" - except that at the end of step 7, instead of selecting "obtain IP addresses dynamically, you should specify the IP address explicitly.

A Look at the Front Panel

The LEDs on the front of the 802.11G ACCESS POINT reflect the operational status of the unit. The status of the LAN, the 802.11g, and power can be monitored from this display.

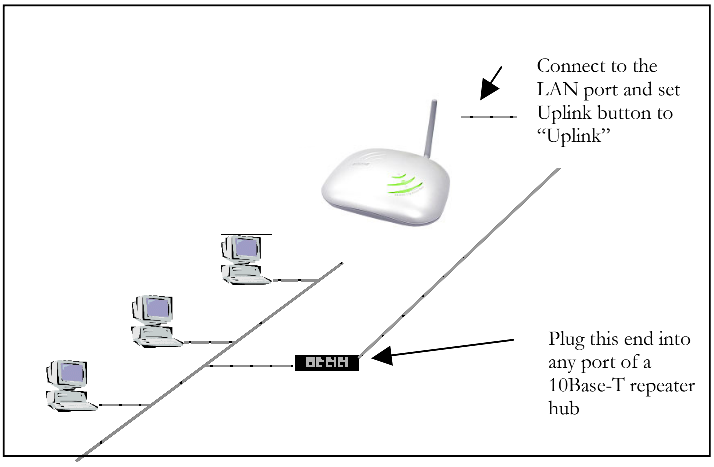


802.11G ACCESS POINT LED Description

Label	802.11g	LAN	POWER
Steady Light	Link is active	Link is active	Power
OFF	No Wireless connection	No LAN connection	No Power
FLASH	XMT/RCV Data	XMT/RCV Data	N/A

Connecting More Devices Through A Hub To The 802.11G ACCESS POINT

The 802.11G ACCESS POINT provides an RJ45 LAN interface which you can use to connect to a PC or an external hub.



Chapter

3

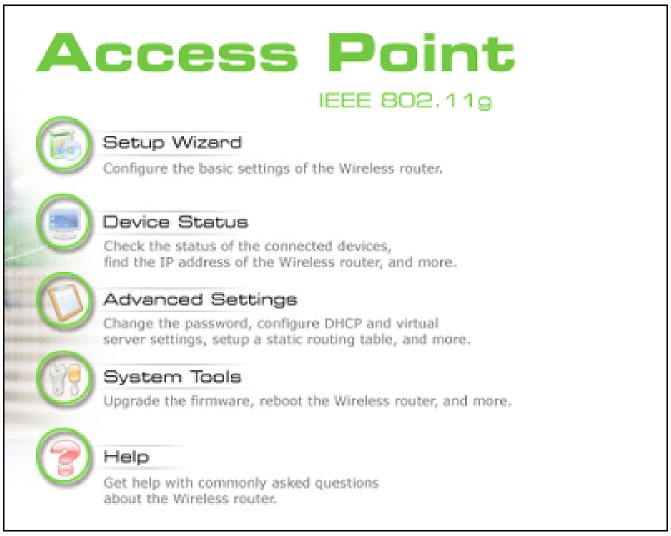
Basic Configuration of the 802.11G ACCESS POINT

This section describes the basic configuration procedure for the 802.11G ACCESS POINT. It describes how to set up the 802.11G ACCESS POINT for Infrastructure BSS operation, and the configuration of the local LAN environment.

Although the Command Line Interface (CLI) may also be used to configure the 802.11G ACCESS POINT, the browser-based configuration mechanism is the tool of choice.

The 802.11G ACCESS POINT is designed so that all basic configuration may be effected through the a standard Web browser such as Internet Explorer.

From a PC or a Wireless client that has been configured as described in Chapter 2, enter the IP address of the 802.11G ACCESS POINT as the URL in your browser.


Access Point

IEEE 802.11g

Setup Wizard

Configure the basic settings of the Wireless router.

Device Status

Check the status of the connected devices, find the IP address of the Wireless router, and more.

Advanced Settings

Change the password, configure DHCP and virtual server settings, setup a static routing table, and more.

System Tools

Upgrade the firmware, reboot the Wireless router, and more.

Help

Get help with commonly asked questions about the Wireless router.

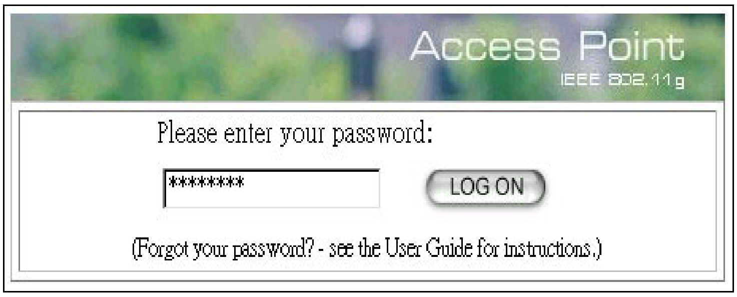
CAUTION

Note: The IP address of your PC must be in the same IP subnet as the 802.11G ACCESS POINT.

The **Home Page** of the 802.11G ACCESS POINT screen will appear, with its main menu displayed on the upper-side of the screen. The main menu includes the following choices: Setup Wizard, Device Status, System Tools, Advanced Settings and Help choices, which can be used to navigate to other menus.

Logging On

If you attempt to access a configuration item from the browser menu, an administrator login screen will appear, prompting you to enter the password in order to log on.



Please enter your password:

****

(Forgot your password? - see the User Guide for instructions.)

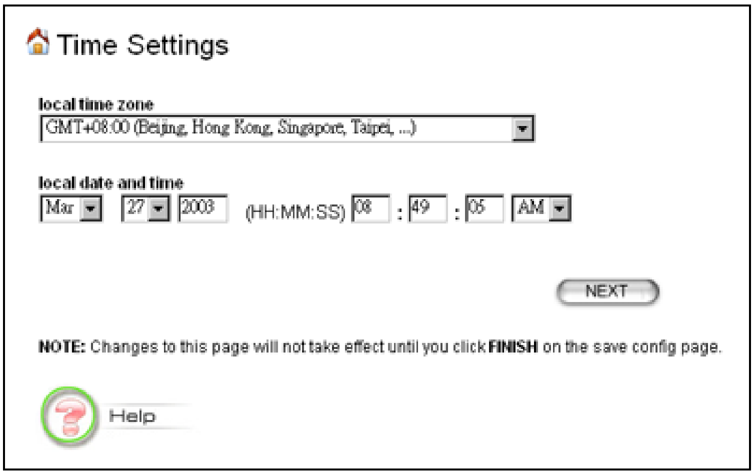
If you are logging on for the first time, you should use the factory default setting "**password**". The password is always displayed as a string of asterisks ("*"). Clicking the **LOG ON** button will begin the configuration session.

Setup Wizard

The Setup Wizard will guide you through a series of configuration screens to set up the basic functionality of the device. After you finish configuring these screens and press the "finish" button on the last screen, all your configuration modifications will take effect.

TIME SETTINGS

After logging in, the **time settings** page appears. The AP time is automatically set to the local time of the management PC the first time a connection is made. To modify the AP's clock, modify the appropriate fields, and click "NEXT".



Time Settings

local time zone

GMT+08:00 (Beijing, Hong Kong, Singapore, Taipei, ...)

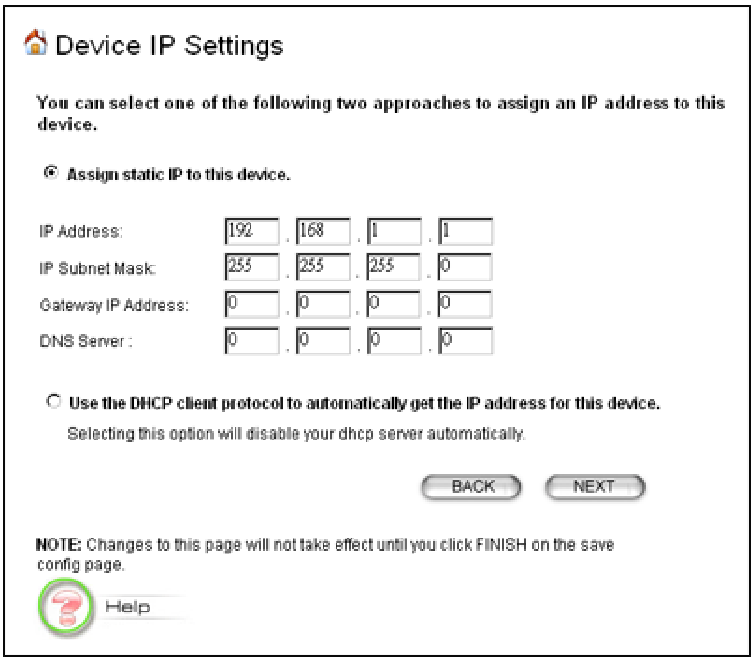
local date and time

Mar 27 2003 (HH:MM:SS) 08 : 49 : 05 AM

NOTE: Changes to this page will not take effect until you click **FINISH** on the save config page.

DEVICE IP SETTINGS

The **Device IP setting** screen allows you to configure the IP address and subnet of the AP on the LAN. Although you can rely on a DHCP server to assign an IP address to the 802.11G ACCESS POINT automatically, it is recommended that you configure a static IP address manually in most applications.



Device IP Settings

You can select one of the following two approaches to assign an IP address to this device.

● **Assign static IP to this device.**

IP Address: 192 . 168 . 1 . 1

IP Subnet Mask: 255 . 255 . 255 . 0

Gateway IP Address: 0 . 0 . 0 . 0

DNS Server : 0 . 0 . 0 . 0

○ **Use the DHCP client protocol to automatically get the IP address for this device.**

Selecting this option will disable your dhcp server automatically.

NOTE: Changes to this page will not take effect until you click FINISH on the save config page.

If you choose to assign the IP address manually, check the button that says "**Assign static IP to this device**" and then fill in the following fields

IP Address and **IP Subnet Mask:** These values default to 192.168.1.1 and 255.255.255.0, respectively. It is important to note that similar addresses fall within the standard *private IP address* range and it is an essential security feature of the device. Because of this private IP address, this device can no longer be accessed (seen) from the Internet.

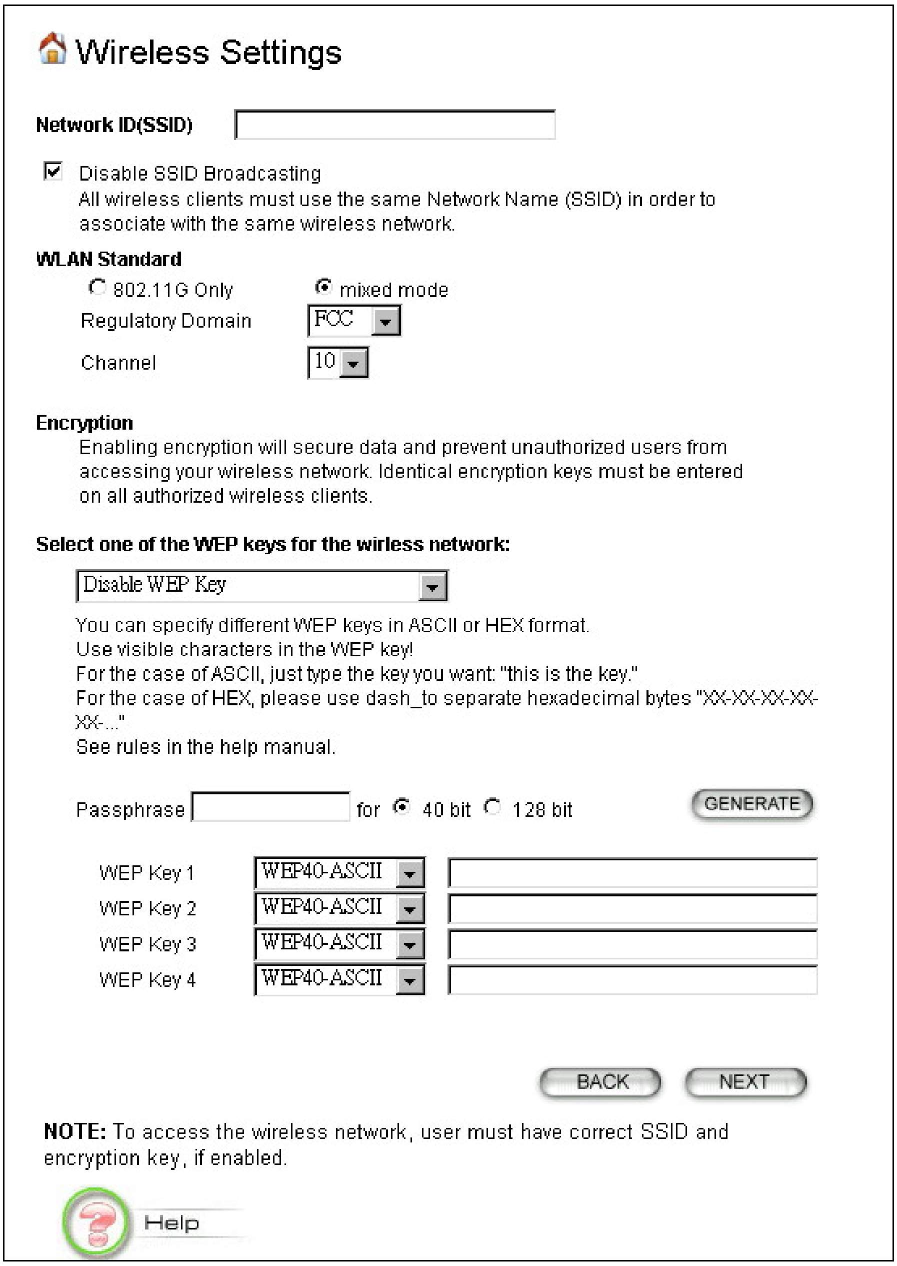
Gateway IP Address: Enter the IP address of your default gateway

DNS Server: The Domain Name System (DNS) is a server on the Internet that translates logical names such as "www.ebay.com" to IP addresses like 209.103.14.2. In order to do this, a query is made by the requesting device to special DNS servers to provide the necessary information. If your system administrator requires you to manually enter DNS Server addresses, you should enter them on this page.

Then you should press **Next** to get to the next screen.

If you choose to use a DHCP Server to assign IP address automatically, check the button that says, "**Use the DHCP protocol to automatically get the IP address for this device**", and then press **Next** to the next screen. Again, as a reminder, it is recommended that your 802.11G ACCESS POINT should be assigned a static IP address in order for you to be able to manage it later on.

WIRELESS SETTINGS



Wireless Settings

Network ID(SSID)

☑ Disable SSID Broadcasting
All wireless clients must use the same Network Name (SSID) in order to associate with the same wireless network.

WLAN Standard

○ 802.11G Only ● mixed mode

Regulatory Domain: FCC

Channel: 10

Encryption

Enabling encryption will secure data and prevent unauthorized users from accessing your wireless network. Identical encryption keys must be entered on all authorized wireless clients.

Select one of the WEP keys for the wirless network:

Disable WEP Key

You can specify different WEP keys in ASCII or HEX format.
Use visible characters in the WEP key!
For the case of ASCII, just type the key you want: "this is the key."
For the case of HEX, please use dash_to separate hexadecimal bytes "XX-XX-XX-XX-XX-..."
See rules in the help manual.

Passphrase for ● 40 bit ○ 128 bit

WEP Key 1	WEP40-ASCII	
WEP Key 2	WEP40-ASCII	
WEP Key 3	WEP40-ASCII	
WEP Key 4	WEP40-ASCII	

NOTE: To access the wireless network, user must have correct SSID and encryption key, if enabled.

Network Name (SSID): The SSID is the network name used to identify a wireless network. The SSID must be the same for all devices in the wireless network. Several access points on a network can have the same SSID. The SSID can be up to 32 characters long.

Disable SSID Broadcasting: An access point periodically broadcasts its SSID, along with other information, which allows client stations to learn its existence while searching for access points in the wireless network. Select **Disable** if you do not want the device to broadcast the SSID.

WLAN Operation mode: Although the wireless module is IEEE 802.11g and 802.11b complient, choosing 802.11G only may increase your wireless performance.

Regulatory Domain: Please make sure that your regulatory domain match your region. The default value are ETSI. For most region, ETSI may be the better choice.

Channel: Select the channel from the available list to match your network settings. All devices in the wireless network must use the same channel.

Note: The available channel numbers are different from country to country.

USA and Canada: CH01~11, Europe: CH01~CH13, Japan: CH01~CH14, France: CH10~CH13, Spain: CH01~CH13

You can use encryption to protect your data when you are transmitting data across wireless channels.

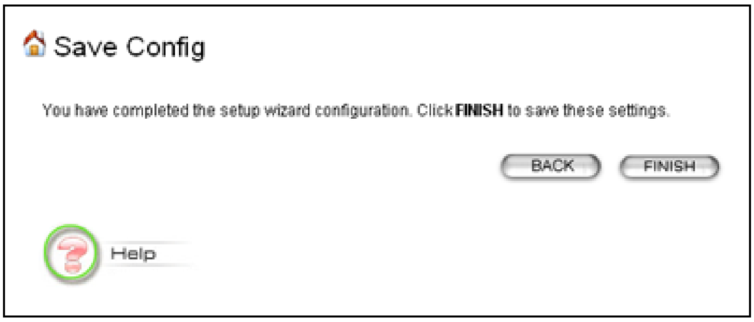
WEP Selection: The 802.11G ACCESS POINT allows you to use data encryption to secure your data from being eavesdropped by unauthorized wireless users. We allow up to four 40-bit encryption keys (**WEP40)** and four 128-bit encryption keys (**WEP128)** to be configured (using either the **ASCII** or **Hex**adecimal format) and selected.

WEP Key Setting: The length of a WEP40 key must be equal to 5 and WEP128 key equal to 13. Once you enable the WEP function, please make sure that the same WEP key is used by both the 802.11G ACCESS POINT as well as the wireless client stations.

Note: Some wireless client cards are used for Hexadecimal digits only. Please note that when configuring WEP keys, a WEP128 ASCII key looks like "An ASCII key!"(13 characters), while a WEP40 Hex key looks like "44-12-24-A8-B2"(5 characters).

Finish Setup Wizard and Save Your Settings

After stepping through the Wizard's pages, you can press the **FINISH** button for your modification to take effect. This will also cause your new settings to be saved into the permanent memory in your system.



Save Config

You have completed the setup wizard configuration. Click **FINISH** to save these settings.

Congratulations! You are now ready to use the 802.11G ACCESS POINT.

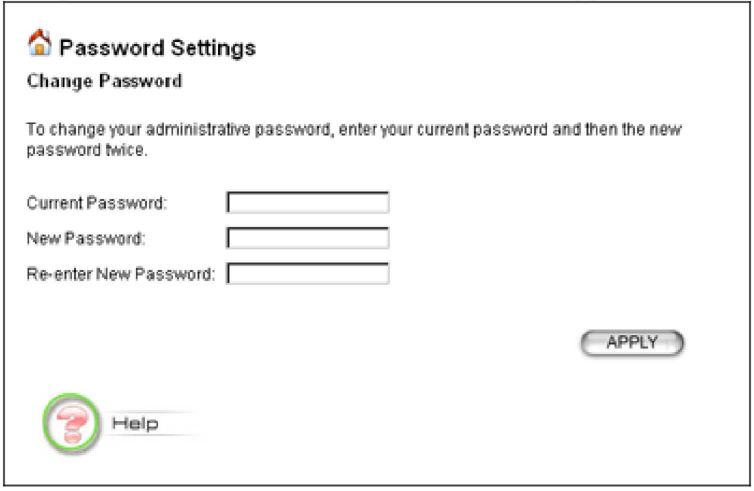
Note: If you change the AP's IP address, as soon as you click on FINISH you will no longer be able to communicate with your 802.11G ACCESS POINT. You need to change your IP address and then re-boot your computer in order to resume the communication.

Advanced Settings

The advanced settings tab on the top row of buttons will allow you to perform modifications that normally you may not need to do for basic operations. The exception to this is changing your password from the default factory setting. This is highly recommended for security purposes.

Password Settings

The default factory password is "password". To change the password , press the **Password Settings** button to enter the **Password Settings** screen, enter the current password followed by the new password twice. The entered characters will appear as asterisks.



Password Settings

Change Password

To change your administrative password, enter your current password and then the new password twice.

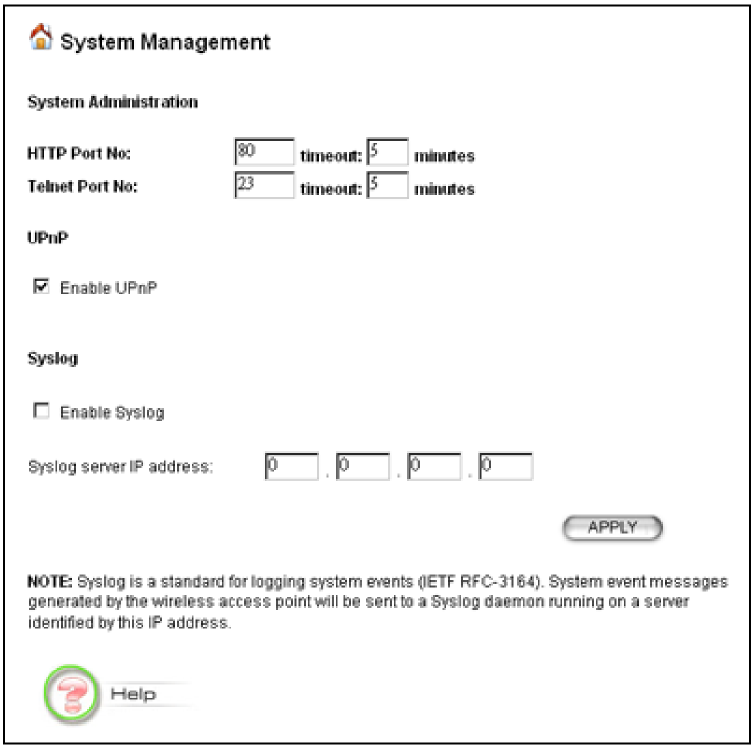
Current Password:

New Password:

Re-enter New Password:

System Management

Clicking the **System Management** button allows system related parameters to be configured for the 802.11G ACCESS POINT.


System Management

System Administration

HTTP Port No: 80 timeout: 5 minutes

Telnet Port No: 23 timeout: 5 minutes

UPnP

☑ Enable UPnP

Syslog

□ Enable Syslog

Syslog server IP address: 0 . 0 . 0 . 0

NOTE: Syslog is a standard for logging system events (IETF RFC-3164). System event messages generated by the wireless access point will be sent to a Syslog daemon running on a server identified by this IP address.

NOTE: Syslog is a standard for logging system events (IETF RFC-3164). System event messages generated by the Wireless router will be sent to a Syslog daemon running on a server identified by this IP address.

HELP

Management Utility Port Definition: The standard port settings for the HTTP Web server and the Telnet utility may be replaced by entering new port numbers in these fields.

Management Session Time-out: This setting specifies the duration of idle time (inactivity) before a web browser or telnet management session times out. The default time-out value is 10 minutes.

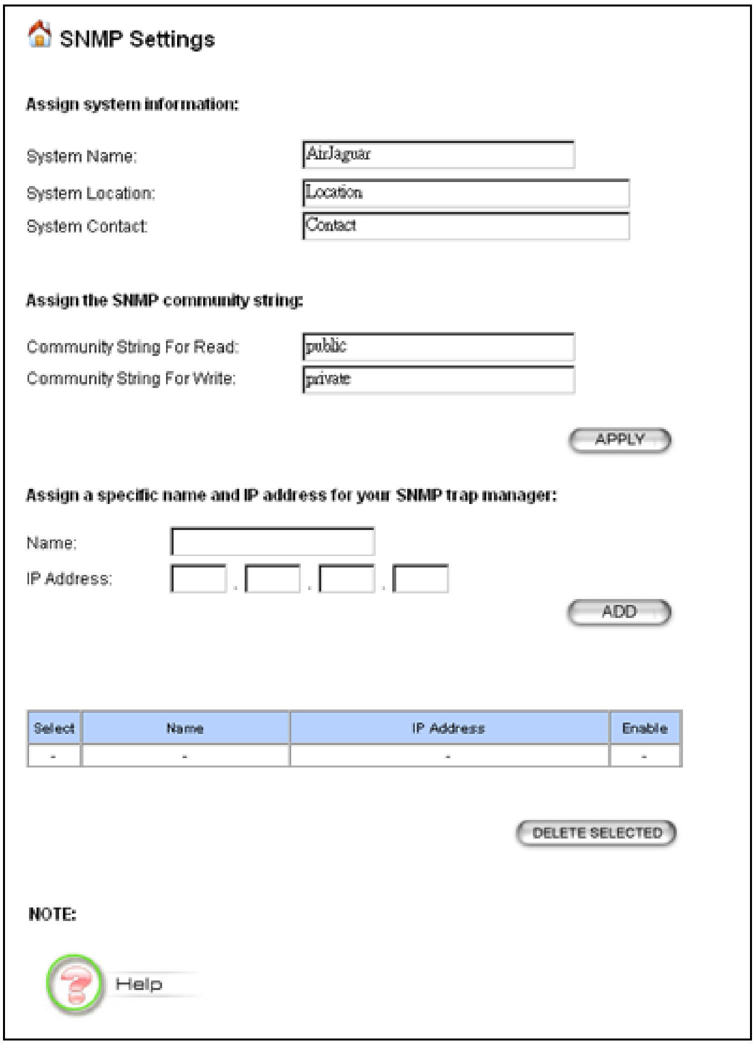
UPnP: The AP's Universal Plug and Play (UPnP) feature allows a Windows XP/ME PC to discover this AP and automatically show an icon on the screen. Subsequently a user can double-click the icon to access this AP directly (without having to specify its IP address).

Syslog: Syslog is an IETF (Internet Engineering Task Force - the Internet standards body)-conformant standard for logging system events (RFC-3164). When the 802.11G ACCESS POINT encounters an error or warning condition (e.g., a log-in attempt with an invalid password), it will create a log in the system log table. To be able to remotely view such system log events, you need to check the **Enable Syslog** box, configure the IP address of a PC where a Syslog daemon is always running in the background. When doing so, the 802.11G ACCESS POINT will send logged events over the network to the PC for future viewing.

Syslog server IP address: The IP address of the PC where the Syslog daemon is running.

SNMP Settings

This screen allows you to configure general system parameters including the system name, the location and contact information. Additionally, you can configure the 802.11G ACCESS POINT to send SNMP Traps to remote SNMP management stations. Traps are unsolicited alert messages that 802.11G ACCESS POINT sends to remote management stations.



SNMP Settings

Assign system information:

System Name: AirJaguar

System Location: Location

System Contact: Contact

Assign the SNMP community string:

Community String For Read: public

Community String For Write: private

Assign a specific name and IP address for your SNMP trap manager:

Name:

IP Address: . . .

Select	Name	IP Address	Enable
-	-	-	-

NOTE:

System Name: A name that you assign to your 802.11G ACCESS POINT.

System Location: Description of where your 802.11G ACCESS POINT is physically located

System Contact: Contact information for the system administrator responsible for managing your 802.11G ACCESS POINT

Community String For Read: A password used by a remote SNMP management station to issue SNMP Read requests

Community String For Write: A password used by a remote SNMP management station to issue SNMP Read/Write requests

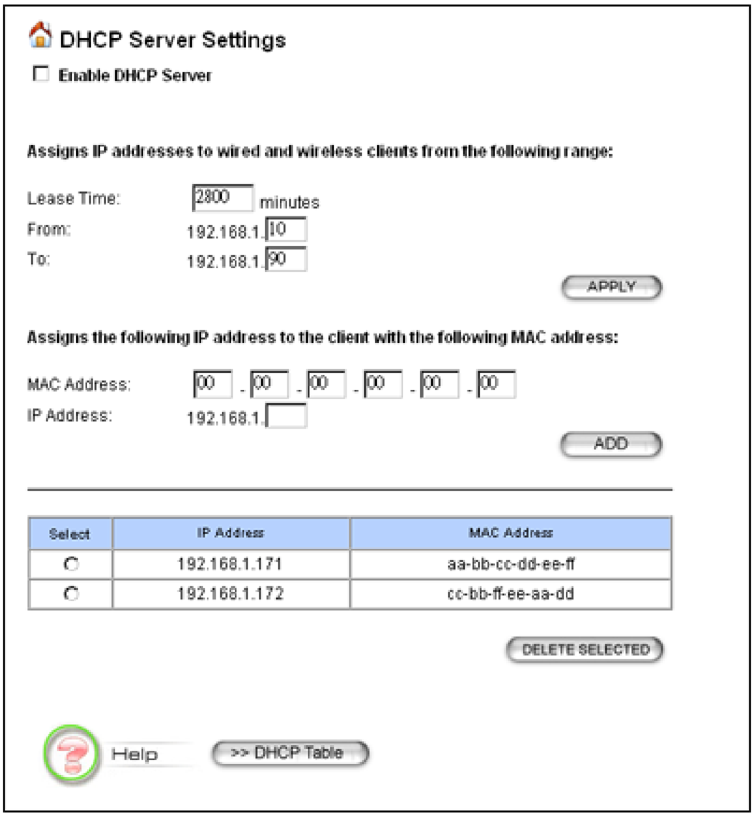
Name: The name of the remote SNMP manager

IP Address: The IP address of the SNMP trap manager

SNMP Trap Manager List: The list of SNMP trap managers configured; entries may be deleted by selecting the entry and then pressing the **DELETE SELETED** button

DHCP Server Settings

The DHCP server option allows the 802.11G ACCESS POINT to assign IP addresses to DHCP client devices on your wired or wireless LAN to obtain IP addresses automatically.



DHCP Server Settings

□ Enable DHCP Server

Assigns IP addresses to wired and wireless clients from the following range:

Lease Time:	2800 minutes
From:	192.168.1. 10
To:	192.168.1. 90

Assigns the following IP address to the client with the following MAC address:

MAC Address:	00 - 00 - 00 - 00 - 00 - 00
IP Address:	192.168.1.

Select	IP Address	MAC Address
○	192.168.1.171	aa-bb-cc-dd-ee-ff
○	192.168.1.172	cc-bb-ff-ee-aa-dd

Enable DHCP server: To enable the DHCP server option of the 802.11G ACCESS POINT

Dynamic IP Address Assignment

When the DHCP server option is enabled, the 802.11G ACCESS POINT will assign IP addresses from an available IP address pool (e.g., 192.168.1.1 – 192.168.1.254). If you wish to avoid using certain addresses (so as to assign them to other special devices), you can specify the available IP address pool in the **From/To** boxes and the press **SUBMIT**.

From: The beginning IP address of a range

To: The ending IP address of a range

Static IP Address Assignment

If you require certain PCs to always obtain the same IP addresses, enter each PC's MAC address and the corresponding IP address desired and press **ADD**

MAC address: The MAC address of the PC

IP address: The IP address to assign to the PC with the above MAC address

DHCP Client List: The list of all static MAC-address/IP-Address pairs configured. Entries may be deleted by checking the **Select** box followed by pressing **DELETE SELECTED.**

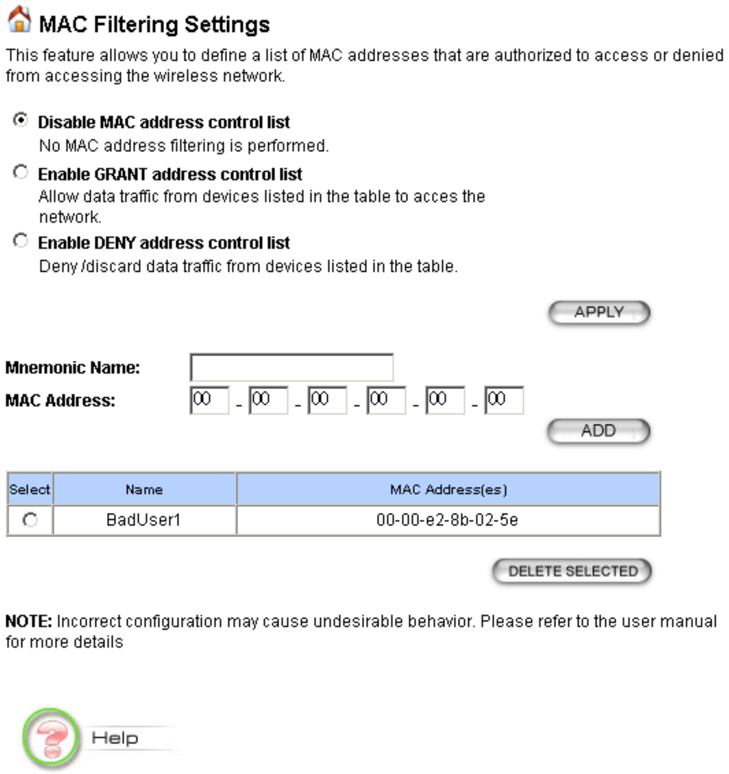
MAC Filtering Settings

The 802.11G ACCESS POINT allows you to define a list of MAC addresses that are allowed or denied to access the wireless network

Disable MAC address control list: When selected, no MAC address filtering will be performed.

Enable GRANT address control list: When selected, data traffic from devices listed will be allowed in the network.

Enable DENY address control list: When selected, data traffic from devices listed in the table will be denied/discarded by the network.



MAC Filtering Settings

This feature allows you to define a list of MAC addresses that are authorized to access or denied from accessing the wireless network.

● **Disable MAC address control list**
No MAC address filtering is performed.

○ **Enable GRANT address control list**
Allow data traffic from devices listed in the table to acces the network.

○ **Enable DENY address control list**
Deny /discard data traffic from devices listed in the table.

Mnemonic Name:

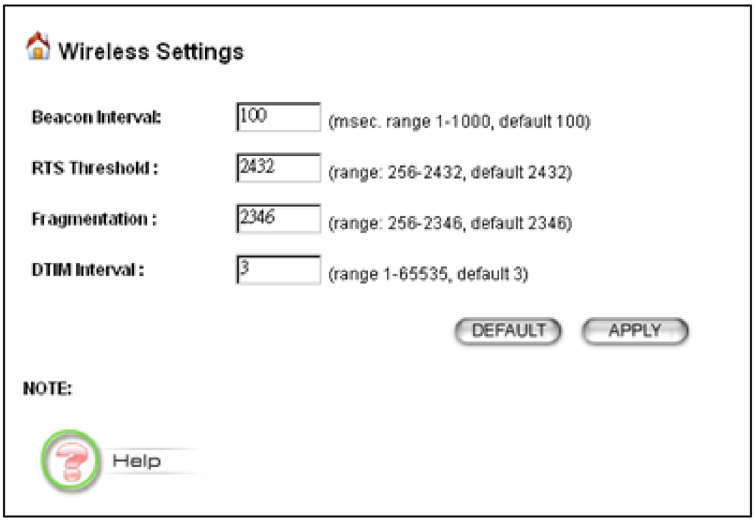
MAC Address: 00 - 00 - 00 - 00 - 00 - 00

Select	Name	MAC Address(es)
○	BadUser1	00-00-e2-8b-02-5e

NOTE: Incorrect configuration may cause undesirable behavior. Please refer to the user manual for more details

The table lists all configured MAC Filter entries. To delete entries, check the corresponding **select** boxes and then press **DELETE SELECTED**

Wireless Settings



Wireless Settings

Beacon Interval: 100 (msec. range 1-1000, default 100)

RTS Threshold : 2432 (range: 256-2432, default 2432)

Fragmentation : 2346 (range: 256-2346, default 2346)

DTIM Interval : 3 (range 1-65535, default 3)

NOTE:

Beacon Interval: The 802.11G ACCESS POINT broadcasts beacon frames regularly to announce its existence. The beacon Interval specifies how often beacon frames are transmitted - in time unit of miniseconds. Its default value is 100; a valid value should be between 1 and 65,535.

RTS Threshold: RTS/CTS frames are used to gain control of the medium for transmission. Any unicast (data or control) frames larger than specified RTS threshold must be transmitted following the RTS/CTS handshake exchange mechanism. The RTS threshold should have a value between 256-2432 bytes, with a default of 2432. A value of zero activates the RTS/CTS handshake before every transmission. It is recommended that this value does not deviate from the default too much.

Fragmentation Threshold: When the size of a unicast frame exceeds the fragmentation threshold, it will be fragmented before transmission. It should have a value of 256-2346 bytes, with a default of **2346**. If you experience a high packet error rate, you should slightly decrease the Fragmentation Threshold.

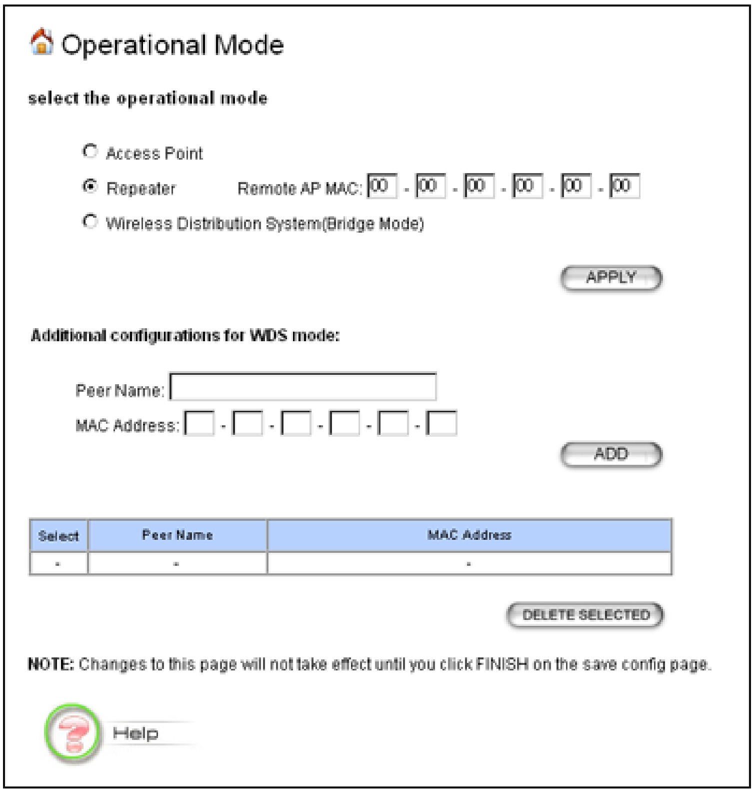
DTIM Interval: The 802.11G ACCESS POINT buffers packets for stations that operate in the power-saving mode. The Delivery Traffic Indication Message (DTIM) informs such power-conserving stations that there are packets waiting to be received by them. The DTIM interval specifies how often the beacon frame should contain DTIMs. It should have a value between 1 to 65535, with a default value of **3**.

Operational Mode

The 802.11G ACCESS POINT can be configured to operate in one of the following three modes as mentioned previously in Chapter 1:

- As an Access Point
- As a repeater, or
- As a Wireless Distribution System

When configured as a WDS, you need to further configure the name and MAC address of its peer WDS devices.



Operational Mode

select the operational mode

○ Access Point

● Repeater Remote AP MAC: 00 - 00 - 00 - 00 - 00 - 00

○ Wireless Distribution System(Bridge Mode)

Additional configurations for WDS mode:

Peer Name:

MAC Address: - - - - -

Select	Peer Name	MAC Address
-	-	-

NOTE: Changes to this page will not take effect until you click FINISH on the save config page.

Radius Settings

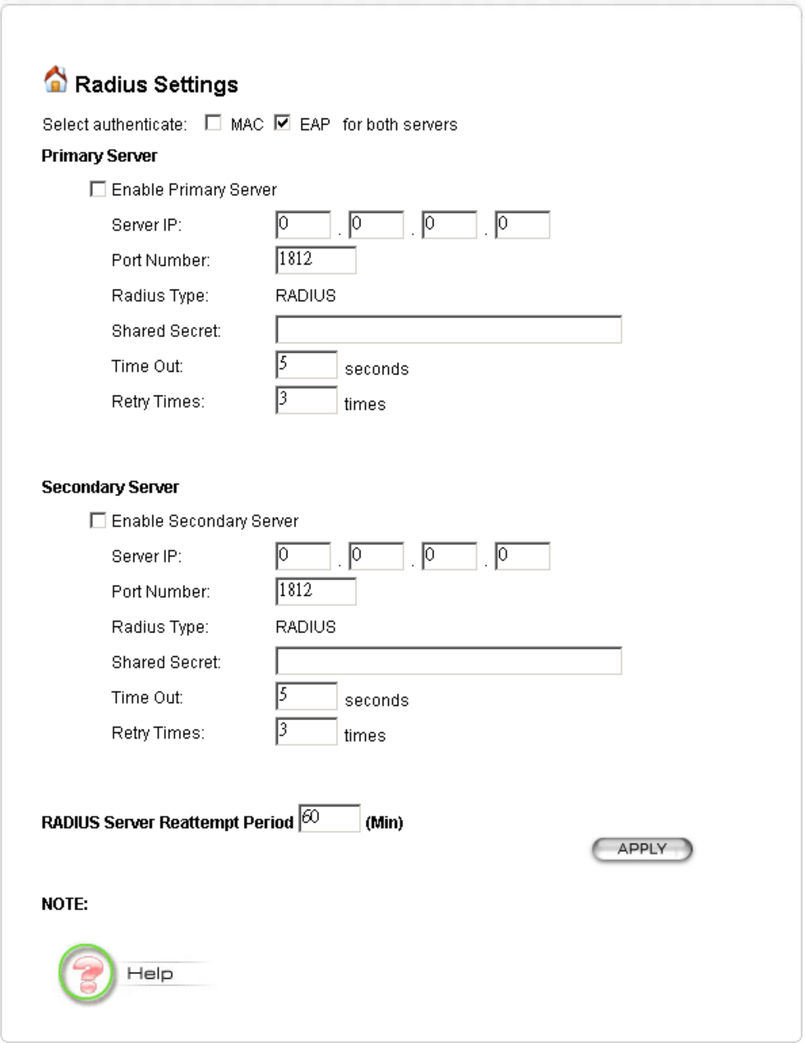
Radius servers provide centralized authentication services to wireless clients. Two Radius servers can be defined, one acting as a primary, the other acting as a backup.

Two user authentication methods can be enabled: one based on MAC address filter, the other based on 802.1x EAP/MD5 authentication.

MAC address filtering based authentication requires a MAC address filter table to be created in either the 802.11G ACCESS POINT and/or the Radius server. During the Authentication phase of a wireless station, the MAC address filter table is searched for a match against the wireless client's MAC address to determine whether the station is to be allowed or denied to access the network.

The Radius server can also be used for 802.1x EAP/MD5 authentication. IEEE 802.1x is an IEEE standard which is based on a framework that involves stations to be authenticated (called Supplicant), an authentication server (a Radius Server) that provides authentication services, and an authenticator that provides necessary translation and mediating functions between the authentication server and stations to be authenticated, in this case your 802.11G ACCESS POINT.

During EAP authentication, the 802.11G ACCESS POINT relays authentication messages between the RADIUS server and client devices being authenticated. You can use the following screen to set up and enable EAP authentication.



Radius Settings

Select authenticate: □ MAC ☑ EAP for both servers

Primary Server

□ Enable Primary Server

Server IP: 0 . 0 . 0 . 0

Port Number: 1812

Radius Type: RADIUS

Shared Secret:

Time Out: 5 seconds

Retry Times: 3 times

Secondary Server

□ Enable Secondary Server

Server IP: 0 . 0 . 0 . 0

Port Number: 1812

Radius Type: RADIUS

Shared Secret:

Time Out: 5 seconds

Retry Times: 3 times

RADIUS Server Reattempt Period 60 (Min)

Enable Primary Server: Check this if you want to enable centralized authentication using the Radius Server

Authenticate: You can select MAC or EAP, or both

Server IP: The IP address of the RADIUS server

Port Number: The port number your RADIUS server uses for authentication. The default setting is 1812.

Shared secret: This is used by your RADIUS server in the Shared Secret field in Radius protocol messages. The shared secret configured in the 802.11G ACCESS POINT must match the shared secret configured in the RADIUS server. The shared secret can contain up to 64 alphanumeric characters.

Time Out: The number of seconds the 802.11G ACCESS POINT should wait before authentication is considered to have failed in the Retry Times (sec) field.

Retry Times: The number of times the 802.11G ACCESS POINT should attempt to contact the primary server before giving up.

Chapter

4

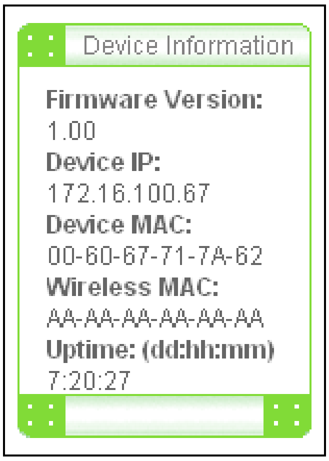
Managing the 802.11G ACCESS POINT

This Chapter covers other management aspects of your 802.11G ACCESS POINT:

- How to view the device status
- How to view the system log
- How to upgrade your 802.11G ACCESS POINT firmware
- How to save or restore configuration changes
- How to reboot your 802.11G ACCESS POINT
- What if you forgot the password

How to View the device Status

You can monitor the system status and get general device information from the **Device Information** screen:



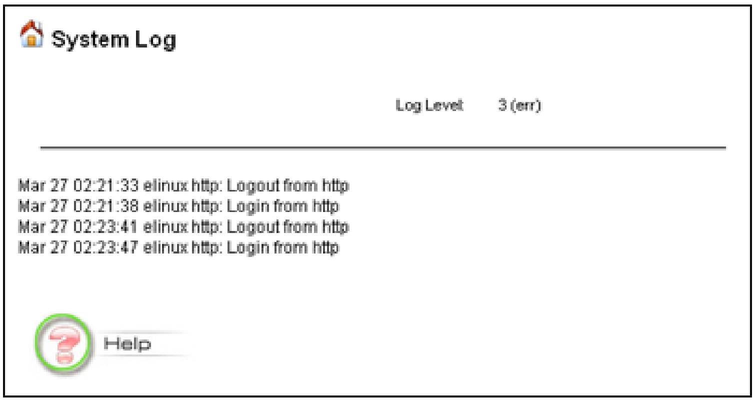
Device Information

Firmware Version:
1.00
Device IP:
172.16.100.67
Device MAC:
00-60-67-71-7A-62
Wireless MAC:
AA-AA-AA-AA-AA-AA
Uptime: (dd:hh:mm)
7:20:27

How to View the System Log

The 802.11G ACCESS POINT maintains a system log that you can use to track events that have occurred in the system. Such event messages can sometimes be helpful in determining the cause of a problem that you may have encountered.

You can select **System Log** on the left to view log events recorded in the system. The System Log entries are shown in the main screen along with the log level, the severity level of messages that are being displayed (a low number such as 2 means critical), and the uptime, the amount of time since the 802.11G ACCESS POINT was last reset.



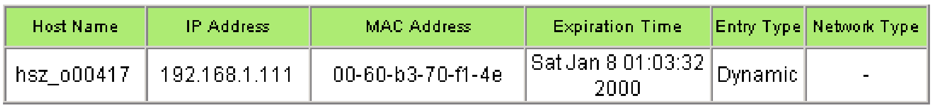
System Log

Log Level 3 (err)

```
Mar 27 02:21:33 elinux http: Logout from http
Mar 27 02:21:38 elinux http: Login from http
Mar 27 02:23:41 elinux http: Logout from http
Mar 27 02:23:47 elinux http: Login from http
```

DHCP Client Table

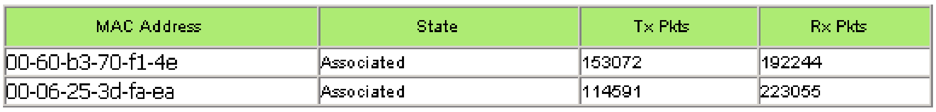
The DHCP client table lists the current DHCP clients connected with its host name, IP address, MAC address, expiration time, and entry type.



Host Name	IP Address	MAC Address	Expiration Time	Entry Type	Network Type
hsz_o00417	192.168.1.111	00-60-b3-70-f1-4e	Sat Jan 8 01:03:32 2000	Dynamic	-

Wireless Client Table

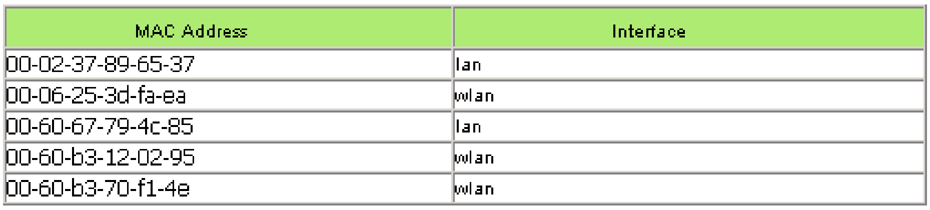
The wireless client table lists the current wireless clients with its MAC address, state, transmitted packets, and received packets.



MAC Address	State	Tx Pkts	Rx Pkts
00-60-b3-70-f1-4e	Associated	153072	192244
00-06-25-3d-fa-ea	Associated	114591	223055

Bridge Table

The bridge table shows all MAC entries learned from the LAN interface, wireless clients, and WDS peers.

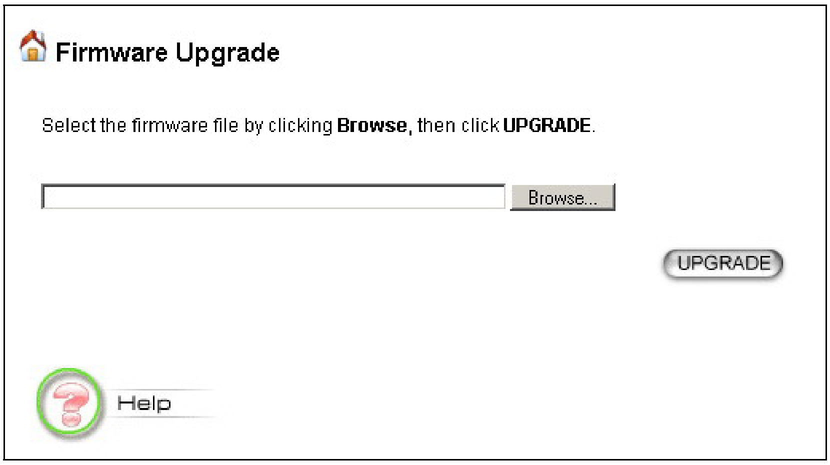


MAC Address	Interface
00-02-37-89-65-37	lan
00-06-25-3d-fa-ea	wlan
00-60-67-79-4c-85	lan
00-60-b3-12-02-95	wlan
00-60-b3-70-f1-4e	wlan

Upgrading Firmware

You can upgrade your 802.11G ACCESS POINT's firmware (the software that controls your 802.11G ACCESS POINT's operation). Normally, this is done when a new version of firmware offers new features that you want, or solves problems you have encountered when using the current version. System upgrade can be performed through the System Upgrade option as follows:

Step 1 Select **System Tools,** then **Firmware Upgrade** from the menu and the following screen displays:



Firmware Upgrade

Select the firmware file by clicking **Browse**, then click **UPGRADE**.

Step 2 To update the 802.11G ACCESS POINT firmware, first download the firmware from the distributor's web site to your local disk, then from the above screen enter the path and filename of the firmware (or click **Browse** and then select the path and filename of the firmware). Next, Click the **Upgrade** button.

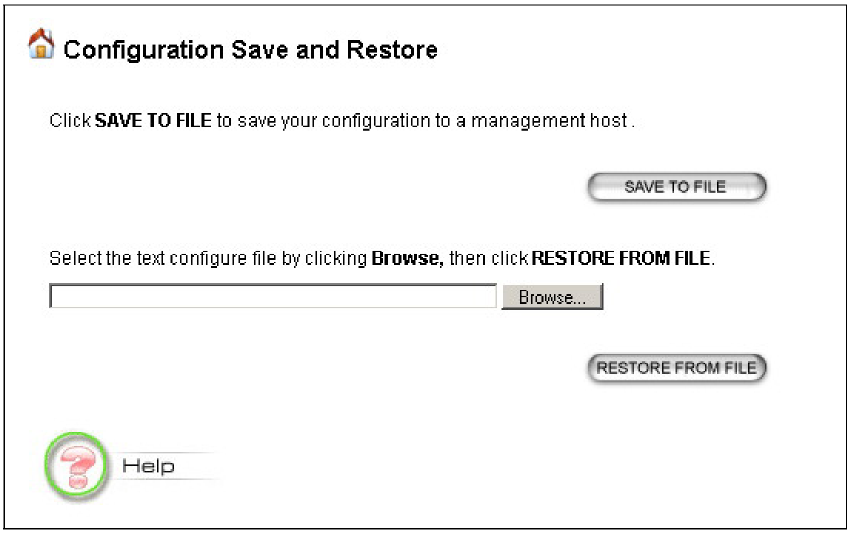
The new firmware will begin being loaded to your 802.11G ACCESS POINT. After a message appears telling you that the operation is complete, you need to reset the system to have the new firmware take effect.

Note: It is recommended that you do not upgrade your 802.11G ACCESS POINT unless the new firmware contains a new feature that you want or if it contains a fix to a problem that you've encountered.

How to Save or Restore Configuration Changes

You can save system configuration settings to a file, and later download it back to the 802.11G ACCESS POINT system by following the steps below.

Step 1 Select **Configuration Save and Restore** from the **System Tools** menu and the following screen displays:



Configuration Save and Restore

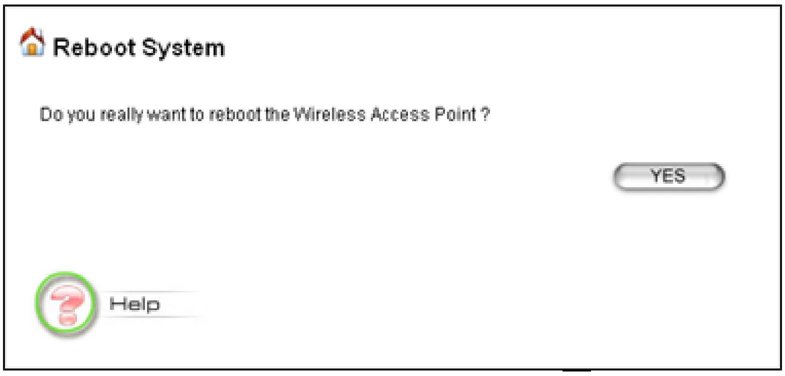
Click **SAVE TO FILE** to save your configuration to a management host .

Select the text configure file by clicking **Browse,** then click **RESTORE FROM FILE**.

How to Reboot your 802.11G ACCESS POINT

You can reset your 802.11G ACCESS POINT from the Brower. To reset it:

Step 1 Select **Reboot System** from the System Tools menu, the following screen shows:



Reboot System

Do you really want to reboot the Wireless Access Point ?

Step 2 Click **YES** to reset the 802.11G ACCESS POINT.

CAUTION

Note: Resetting the 802.11G ACCESS POINT disconnects any active clients, and therefore will disrupt any current data traffic.

What if you Forgot the Password?

If you forgot the password, the only way to recover is to clear the device configuration and return the unit to its original state as shipped from the factory. You can do this by pressing the hardware "restore" button on the device for **two seconds**. Please note that this will require you to re-enter all of your configuration data.

Chapter

5

Command Line Interface

This document defines the Command Line Interface (CLI) for the 802.11G ACCESS POINT. The CLI is accessible through a Telnet session.

General guidelines

When the 802.11G ACCESS POINT is powered up, the user can use a standard telnet application from a PC connected to the network to perform configuration and management functions - by typing the telnet command "telnet <the 802.11G ACCESS POINT's ip>" (the default is 192.168.1.1) and pressing a return key, the user will see a system sign-on message followed by a password prompt as follows.

```
Wireless AP Manager Console Version: rev_no
Please enter your password: ********
```

A default password "*password*" has been pre-configured with the system. The user should use it to log into the system until the password is explicitly changed using the ***change password*** command. Note that the entered password is case-sensitive. This password may also be changed using the browser-based GUI configuration utility.

The password entered will be echoed as asterisks (*). After the Carriage Return is entered, if the password string is validated, the command prompt ***Command>>>*** will be displayed, and the user can then issue other commands. Otherwise, the password prompt will be redisplayed.

Most commands are single-line commands, and commands are not context sensitive: each command is independent of other commands before or after it.

The command syntax is straightforward.

The following briefly summarizes the guideline for the interface.

- At any time, the user can type a "**?**" (preceded by a space) to request context-sensitive help on what the user can enter next.
- At any time, the user can type control-p (^p, by pressing both the Ctrl key and the p key at the same time) to repeat the previous command, or control n to return to the following (next) command. At startup, typing ^p or ^n will not cause anything to happen - since previous commands do not yet exist. In normal operation, typing ^p will cause the previous command to show, and the cursor will sit at the end of the command. At this point, the user can either type a carriage return to accept the command, or type backspaces to edit the command from the end. Up to 15 previously entered commands can be invoked through ^p's and ^n's.

- If a keyword is expected when the user types " ?", all valid keywords will be displayed. The command typed in so far will then be displayed again along with the cursor sitting at the end, waiting for the user to continue.
- If the user types in part of the keyword but does not type in the entire word, the user can then enter a tab or space for the system to automatically complete the keyword if the characters typed in so far can uniquely identify the keyword. If the characters typed in so far do not uniquely identify a keyword, a list of possible keywords will be displayed.

If the user is not sure what to type next, he or she can type "?" to display the possible keywords that match the current CLI command input.

If an interactive mode is entered, the system will prompt for each required parameter, such as:

```
        ...
select regulatory domain (fcc, fcc/etsi/france/spain/japan):
enter channel number (10, 1-14):
        ...
```

The first prompt means there are five choices (FCC, ETSI, France, Spain, or Japan), with FCC being the default. The second prompt means a number between 1 and 14 is expected, with 10 being the default.

During the first time a particular parameter is configured, typing a carriage return will cause the default value to be selected. Otherwise, typing a carriage return means no change to the current value.

Express Mode vs. Advanced Mode of operation

The Command Line Interface operates in one of two modes: ***Express Mode*** or ***Advanced Mode***. In Express Mode, not all parameters are displayed. Default values are set for those parameters not displayed in multi-line commands. In Advanced Mode, users have the option to modify all possible values appropriate to each operation.

The user can toggle between Express Mode and Advanced Mode by typing ^E (Control-E) at any time. Normally, the system prompt will be changed by appending ">>" to the configured prompt when in Advanced Mode.

Conventions

The following notations will be used:

- lan means the LAN port;
- wlan means the Wireless port;
- <> specifies the arguments of the command, <1-4> means a number between 1 to 4;
- [ ] indicates a required or optional parameter, or choice of parameters;
- MacAddr, or XX-XX-XX-XX-XX-XX means any MAC address in hexadecimal format, where each nn can be 00, 01, ... 99, 0A, 0B, 0C, 0D, 0E, 0F, 10, 11,… FF;

- ipAddr, netmask, or xxx.xxx.xxx.xxx means any ip address or network mask, where xxx is a decimal integer between 0 and 255;

- the term *string* means a string of characters up to the specified length, which may be enclosed in double quotes (") (required if the string contains embedded blanks;

- Names representing filters and MAC addresses should be up to 30 characters in length; password and SNMP community read/write strings are up to 15 characters in length. When the password and SNMP community write string are entered, they are echoed back as a string of "*"s for protection, while other parameters, such as WEP keys, are echoed back the way they are typed (in clear text).

Command List

From a functional point of view, CLI commands will be grouped into the following categories:

(1) System

(2) Port

(3) Filtering

(4) DHCP Server

(5) SNMP

(6) Diagnostics

(7) Security

(8) Wireless

The command format will be described in the following sections, some with description and examples as follows:

Command Syntax

Description: the description of the command is given here.

Example:

```
Command>>> command (with parameters)
```

Output …

System Commands

Login

Description: When you use telnet to connect to the 802.11G ACCESS POINT, you will see the following message from your telnet screen:

```
Wireless AP Management Console, Version: rev_no
Please enter your password: ********
```

Logout

Description: This command logs the user out of the system.

Example:

```
Command> logout
```

Help

Example:

```
Command> help
Commands are categorized as follows:
(1) System         (2) Port         (3) Filtering
(4) DHCP Server    (5) SNMP         (6) Diagnostics
(7) Security       (8) Wireless     (9) Statistics

Please enter a selection number [1..9] for more detailed information:
```

Reset system

Description: This command allows the user to reset the system and may cause unsaved configurations to be lost. A confirmation message will be displayed.

Example:

```
Command> reset system
Warning: Reset system may cause unsaved configuration to be lost;
do you want to continue (y/n)?
```

Set telnet port <port number>

Description: This command allows the user to change the Telnet service port. This information is displayed in the "show telnet" and "show system" commands.

Example:

```
Command> set telnet port 2323
Warning: Changing the port number will close existing sessions; do
you want to continue (y/n)? y

Telnet service port: 2323
```

Set telnet timeout <min>

Description: This command is used to set the telnet session time-out value (in minutes). The default value is 10 minutes. This means that if the user does not type anything for 10 minutes, the telnet session will be terminated automatically. This information is displayed in the "show telnet" command.

Example:

```
Command> set telnet timeout 20
Telnet timeout value: 20 minutes
```

Show telnet

Description: This command displays telnet related settings.

Example:

```
Command> show telnet
Telnet service port: 23
Telnet timeout value: 20 minutes
```

Set http port <port number>

Description: This command allows the user to change the HTTP service port. This information is displayed in the "show http" and "show system" commands.

Example:

```
Command> set http port 8080
Warning: Changing the port number will close existing sessions; do
you want to continue (y/n)? y

HTTP service port: 8080
```

Set http timeout <min>

Description: This command is used to set the http session time-out value (in minutes). The default value is 10 minutes. The user has to login again before proceeding any further.

Example:

```
Command> set http timeout 20
HTTP session timeout: 20 minutes
```

Show http

Description: This command displays http related settings.

Example:

```
Command> show http
HTTP service port: 8080
HTTP session timeout: 20 minutes
```

Set prompt <"prompt">

Description: This command defines a new command prompt of up to 15 characters. The default prompt is "Command".

Example:

```
Command> set prompt "Yes, Master"
Yes, Master>
```

Set system contact <"name">

Description: This command sets the system contact information. The maximum number of characters allowed is 60. This information is displayed in the "show system" command.

Example:

```
Command> set system contact "John Doe, pager: (408) 731-1111"
System contact:    John Doe, pager: (408) 731-1111
```

Set system location <"location information">

Description: This command sets the system location. The maximum number of characters allowed is 60. This information is displayed in the "show system" command.

Example:

```
Command> set system location "101 ABC Drive, Sunnyvale, CA 94086"
System location: 101 ABC Drive, Sunnyvale, CA 94086
```

Set system name <"system name">

Description: This command sets the system name. The maximum number of characters allowed is 60. This information is displayed in the "show system" command.

Example:

```
Command> set system name "Wireless_AP_012"
System Name: Wireless_AP_012
```

Set date <mm-dd-yy>

Description: This command sets the current date in the system.

Example:

```
Command> set date 2-18-02
Time (GMT-8:00): Mon Feb 18 11:20:24 2002
```

Show date

Description: This command displays the current date setting. This information is also displayed in the "show time" command.

Example:

```
Command> show date
Date: 4-12-01
```

Set time <hh:mm:ss>

Description: This command sets the time of the day (based on 24-hour clock).

Example:

```
Command> set time 20:33:00
Time (GMT-8:00): Mon Feb 18 20:33:00 2002
```

Set time zone <-12:00 - +12:00>

Description: This command sets the time zone as an offset (in hours) from the Greenwich Mean Time (GMT).

Example:

```
Command> set timezone -8:00
Time (GMT-8:00): Mon Feb 18 20:33:00 2002
```

Show time

Description: This command shows the time zone, daylight savings time, date and time of the day. The time can be set either through the manual "set time" command, or the first time when the user access the 802.11G ACCESS POINT through the web GUI after system reset. In either case, the time information will be lost after a system reboot.

Example:

```
Command> show time
Time (GMT-8:00): Mon Feb 18 11:20:24 2002
```

Enable/disable upnp

Description: This command enables/disables the UPnP feature.

Example:

```
Command> enable upnp
UPnP is enabled
```

Show UPnP

Description: This command displays the UPnP setting. This information is also displayed in the "show system" command.

Example:

```
Command> show upnp
UPnP is enabled
```

Show system

Description: This command displays system and SNMP related configuration. All of them can be changed through individual commands, except for the S/W and H/W version numbers that are constant for each version of the product.

Example:

```
Command> show system
System Name: Wireless_AP_012           Up Time:  0 months 0 days 18:29:06
```

```
-------------------------------------------------------------
System description:         Wireless Access Point
System contact:             John Doe, pager: (408) 731-1111
System location:            101 ABC Drive, Sunnyvale, CA 94086
Community string (read-only): public

S/W Version:                1.00
H/W Version:                1.0

System IP/NetMask:          192.168.1.1/255.255.255.0
Gateway IP address:         120.1.1.1
System LAN MAC:             12-34-56-78-90-12
Wireless MAC:               00-00-11-22-33-44

Telnet port: 23             Timeout: 10 mins
Http port: 80               Timeout: 10 mins

UPnP:                       Enabled
STP:                        Enabled
```

Set system ip

Description: This command assigns an IP address to the system.

Example:

```
Command> set system ip
obtain IP address automatically(no, yes/no): no
/* if no is selected */
IP address (192.168.1.1): 192.168.1.1
IP subnet mask (255.255.255.0): 255.255.255.0
default gateway IP address (Unspecified): 192.168.1.10
DNS IP address (Unspecified): 120.1.1.1

IP address:                          192.168.1.1
IP netmask:                          255.255.255.0
default gateway IP Address:          192.168.1.10
DNS IP address:                      120.1.1.1 (or Unknown)
```

Show system ip

Description: This command displays the IP address information of the system.

Example:

```
Command> show system ip
IP address:                    192.168.1.1
IP netmask:                    255.255.255.0
default gateway IP Address:    192.168.1.10
DNS IP address:                120.1.1.1 (or Unknown)
```

Enable/disable stp

Description: This command enables/disables the STP feature.

Example:

```
Command> show stp
STP is enabled
```

Show stp

Description: This command displays the STP setting. This information is also displayed in the "show system" command.

Example:

```
Command> show stp
STP is enabled
```

Show bridge table

Description: This command shows all MAC entries in the bridge table, including those learned from the LAN interface, wireless clients (that are associated with the 802.11G ACCESS POINT), and WDS peers.

Example:

```
Command> show bridge table

MAC Address              Interface
----------------------------------
00-01-02-03-04-05        LAN
00-05-04-03-02-01        WLAN
Total 2 entries
```

Clear config

Description: This command is used to clear the configuration data in the flash memory. After clearing, the system will reboot. All user-configured data will be lost. The configuration will return to the factory default settings.

Example:

```
Command> clear config
All configuration will be cleared and system will reset
Do you want to continue (y/n)? y
```

Save config

Description: This command saves any configuration changes to the flash memory.

Example:

```
Command> save config
```

Port

Set port wlan

Description: This command configures wireless related settings

Example:

```
Command> set port wlan
enter network name (WLAN): test
disable SSID broadcasting (no, yes/no):
select regulatory domain (fcc, fcc/etsi/france/spain/japan): fcc
enter channel number (10, 1-11): 10
/* Valid channel ranges are as follows
   FCC:        1-11;
   ETSI:       1-13;
   France:     10-13;
   Spain:      1-13;
   Japan:      1-14; */
enable WEP encryption (no, yes/no): yes
/* if WEP is enabled */
use passphrase to generate key (no, yes/no): yes
select WEP key length (40, 40/128): 40
/* if passphrase is used */
enter Passphrase (Unspecified): abcde
generated WEP keys with passphrase:
WEP key1: XXXXX
WEP key2: YYYYY
WEP key3: ZZZZZ
WEP key4: WWWWW
select the key index to activate (1, 1-4):
/* if passphrase is not used */
enter WEP key1 (Unspecified): 11111
enter WEP key2 (Unspecified): 22222
enter WEP key3 (Unspecified): 33333
enter WEP key4 (Unspecified): 44444
select the key index to activate (1, 1-4):

>>> enter rts/cts threshold (2347, 256-2432):
>>> enter fragment threshold (2346, 256-2346): /* must be an even integer */
>>> enter beacon interval (mini-seconds) (100, 1-1000):
>>> enter DTIM interval (3, 1-65535):
```

Show port [<lan|wlan>]

Description: This command displays settings and operational information of the specified port. If "show port" is issued without any argument, it means to display the summary information of all ports. The *Link State* can be Up, Down, or Disabled.

Example:

```
Command> show port lan
Port Name:          LAN
Link State:         Up
Link Speed:         100Mbps
Duplex Mode:        Full
Flow Control:       Enabled
MAC Address:        00-01-02-03-04-05
```

Example:

```
Command> show port wlan
Port Name:                     WLAN
Link State:                    Up
Network Name:                  test
Disable broadcast SSID:        no
WLAN Mode:                     802.11g
Regulatory Domain:             FCC
Channel:                       10
WEP:                           Enabled
WEP key1: 11111
WEP key2: 22222
WEP key3: 33333
WEP key4: 44444
key index to activate: 1
rts/cts threshold:             2347
fragment threshold:            2346
beacon interval:               100
DTIM interval:                 3
MAC address:                   00-05-04-03-02-01
```

Example:

```
Command> show port
Port
Name      MAC address          Description      State
-----------------------------------------------------
lan       00-01-02-03-04-05                     Up
wlan      00-05-04-03-02-01    802.11g          Up
```

If no argument is used, it means all ports.

Show port statistics [<lan|wlan>]

Example:

```
Command> show port statistics lan

                               Received    Transmitted
-----------------------------------------------------
Good Transmitted Packets                   0
Good Received Packets          0
Bad Transmitted Packets                    0
Bad Received Packets           0
Transmit Abort                             0
Collision                      0           0
Dropped Packets                0           0
```

Example:

```
Command> show port statistics wlan

                                  Received     Transmitted
-----------------------------------------------------------
Total Octets:                     98830        64171
Total Packets:                    2177         198
Total Error:                      0            3

[Reason for Receive Discards]
```

```
No Buffer:                        0
Received WEP Errors:              0
Frame Checksum Errors:            340856

[Reason for Transmit Discards]
Wrong Source Address:                          0
Retry Limit Exceeded:                          3
Other Reasons:                                 0
```

Example:

```
Command> show port statistics

Port          Received    Transmitted       Error
Name          Frames      Frame             Frames
-----------------------------------------------------
lan           324246      451526            0
wlan          2626        37343             0
```

If no argument is used, it means all ports.

Clear port statistics <lan|wlan|all>

Description: This command clears traffic statistics for a specified port or all ports. The argument "all" is used to clear all ports' statistics.

Example:

```
Command> clear port statistics wlan
statistics counter of wlan cleared.
```

Filtering

Set mac filter mode <disabled|grant|deny>

Description: This command configures the operational mode of the MAC filter in the system. When MAC filtering is enabled and configured as "deny", the frame will be filtered (denied) if the source MAC address of a received frame matches any entry in the MAC filter table. When MAC filtering is enabled and configured as "grant", the frame will be forwarded if the source MAC address of a received frame matches any entry in the MAC filter table. Otherwise, the frame will be filtered.

Example:

```
Command> set mac filter mode grant
MAC filter mode: grant
```

Show mac filter mode

Description: This command shows the operational mode of the MAC filtering feature configured in the system.

Example:

```
Command> show mac filter mode
MAC filter mode: grant
```

Add mac filter <name> <mac>

Description: This command adds or modifies an entry in the system MAC filter table.

The total number of entries in the MAC filtering table in this version of the firmware is thirty-two. The checking is done against the source MAC address of an Ethernet packet. MAC Filters are referred to by names.

Example:

```
Command> add mac filter John 90-00-12-34-56-78
Filter Name        MAC Address
-----------------------------------
John               90-00-12-34-56-78
```

Delete mac filter <name>

Description: This command deletes an entry in the system MAC filter rule by name.

Example:

```
Command> delete mac filter John
MAC filter John is deleted.
```

Show mac filter [<name>]

Description: This command shows all or the specified entry in the system MAC filtering table.

Example:

```
Command> show mac filter John
Filter Name        MAC Address
-----------------------------------
John               90-00-12-34-56-78
```

Example:

```
Command> show mac filter
Filter Name        MAC Address
-----------------------------------
John               90-00-12-34-56-78
Mary               00-00-12-34-56-79
```

If no argument is used, it means all MAC filter entries.

DHCP Server

Set DHCP server

Description: This command sets the range of IP addresses (to be assigned to DHCP clients), the lease time and the DNS addresses to be used. The default lower bound is the configured system IP plus one. For example, if the configured IP subnet is 192.168.1.1/255.255.255.0, then the default lower bound for dynamic assignment is 192.168.1.2. The default upper bound is the broadcast address value minus one (255 – 1) which, in this example, is 192.168.1.254.

Example:

```
Command> set dhcp server
enter lower IP address of address pool (192.168.1.2):
enter upper IP address of address pool (192.168.1.254):
enter lease time (10080, 1 - 525600):
do you want to assign DNS server (Yes, yes/no)
/* if yes is entered */
enter IP address of the primary DNS (Unspecified): 129.1.1.1
enter IP address of the secondary DNS (Unspecified): 129.1.1.2

DHCP server status:       Disabled
IP address range:         192.168.1.2 to 192.168.1.254
Network mask:             255.255.255.0
Lease time:               10 minutes
Primary DNS IP address:   129.1.1.1
Secondary DNS IP address: 129.1.2.2
```

Show DHCP client table

Description: This command displays entries in the dynamic DHCP Assignment Table.

Example:

```
Command> show dhcp client table

HostName  IP-Address     Mac-Address          Lease-Expires        Entry  Network
---------------------------------------------------------------------------  -------
  User1   192.168.1.133  00-40-05-35-AB-41    10-09-02 16:04:18    dynamicLAN
User2     192.168.1.134  00-40-05-35-AB-42    10-09-02 16:04:18    dynamicWLAN
```

Enable DHCP server

Description: This command enables the Dynamic Host Configuration Protocol server feature in the 802.11G ACCESS POINT. When enabled, the 802.11G ACCESS POINT will service DHCP client requests and will respond with IP address, net mask, DNS and the default gateway's IP address assignment.

Example:

```
Command> enable dhcp server
DHCP server is enabled.
```

Disable DHCP server

Description: This command disables the Dynamic Host Configuration Protocol server feature in the 802.11G ACCESS POINT. When disabled, the 802.11G ACCESS POINT will not respond to DHCP/lease requests. Existing leaseholders will not be able to renew their leases from the 802.11G ACCESS POINT after the lease term expires, unless another DHCP server exists in the network.

Example:

```
Command> disable dhcp server
DHCP server is enabled.
```

Show DHCP server

Description: This command shows dhcp server settings.

Example:

```
Command> show dhcp server
DHCP server status:       Disabled
IP address range:         192.168.1.2 to 192.168.1.254
Network mask:             255.255.255.0
Lease time:               10 minutes
Primary DNS IP address:   129.1.1.1
Secondary DNS IP address: 129.1.2.2
```

Add DHCP static <ip> <mac>

Description: This command adds or modifies a static DHCP assignment entry. If an entry is added, the corresponding IP address will be assigned when a DHCP client with the specified MAC address issues the DHCP request.

Example:

```
Command> add dhcp static 192.168.1.134 00-40-05-35-db-4f
```

/ Please note that the format of the MAC address uses embedded dashes. */*

```
IP Address               MAC Address
-------------------------------------
192.168.1.134      00-40-05-35-DB-4F
```

Delete DHCP static <ip>

Description: This command deletes an entry in the static DHCP assignment table with the specified ip address.

Example:

```
Command> delete dhcp static 192.168.1.134
static entry for 192.168.1.134 is deleted.
```

Show DHCP static

Description: This command displays the static DHCP Assignment Table.

Example:

```
Command> show dhcp static
IP Address               MAC Address
-------------------------------------
192.168.1.134      00-40-05-35-DB-4F
192.168.1.135      00-12-34-56-78-90
```

SNMP

A remote SNMP management console can access a set of MIBs supported in the system. MIB information is retrieved/configured from/to the system's SNMP Agent to/from the SNMP Management station via SNMP *Gets*/*Sets* commands. *Traps* are unsolicited status messages sent from the system's SNMP agent to report management events asynchronously. Trap Managers must be configured in order to receive these messages. All traffics/error statistics and system control parameters can be done through SNMP requests.

Additionally, a few commands are required for SNMP operation, as follows:

ENABLE SNMP

Description: This command enables the SNMP feature.

Example:

```
Command> enable snmp
SNMP is Enabled
```

DISABLE SNMP

Description: This command disables the SNMP feature.

Example:

```
Command> disable snmp
SNMP is Disabled
```

SHOW SNMP

Description: This command shows the current state of SNMP.

Example:

```
Command> show snmp
SNMP is Enabled
```

Set community string read <"password">

Description: This command sets the community string used for authenticating SNMP get and getnext requests. The default for the read community string is "public". The community string is case sensitive.

Set community string write <"password">

Description: This command sets the community string used for authenticating SNMP get, set and getnext requests. The default for the write community string is "private". The community string is case sensitive.

Show community string read

Description: This command shows the "read" community string.

Add trap manager <name> <ip>

Description: This command sets the IP address of a trap manager. When an SNMP trap condition is met, and if at least one trap manager has been enabled, a trap message will automatically be sent out to each trap manager that has been defined. A total of up to three trap managers can be defined in the system. Trap messages will also be sent to the System Log.

Example:

```
Command> add trap manager SanJose 203.23.12.71
Trap Manager       IP Address        Status
---------------------------------------------
SanJose            203.23.12.71      Disabled
```

Delete trap manager <name>

Description: This command deletes the specified trap manager.

```
Command> delete trap manager SanJose
trap manager SanJose is deleted.
```

Enable/disable trap manager <name>

Description: This command is used to enable/disable the specified trap manager. When all trap managers are disabled, no SNMP trap messages will be generated.

Show trap manager [<name>]

Description: This command displays trap managers that are currently defined. If a name is specified, only that trap manager is displayed.

Example:

```
Command> show trap manager
Trap Manager       IP Address        Status
---------------------------------------------
SanJose            11.22.33.44       Disabled
Taipei             55.66.77.88       Disabled
```

Show snmp statistics

Example:

```
Command> show snmp statistics
                         Received    Transmitted
----------------------------------------------
Total Packets            0           0
Request Variables        0
SET Variables            0
GETRequests                          0
GETNEXT Requests         0
GET-RESPONSEs            0           0

Errors:
Bad Versions             0
Bad Community Uses:      0
ASN1 Parse Errors        0
Packet Too Long                      0
NO-SUCH-NAME Errors      0
BAD-VALUE Errors         0
READ-ONLY Errors         0
GENERAL-ERR Errors                   0
```

Ping <ipAddr> [<n_times> <n_size>]

Description: This command allows the user to ping an IP device (i.e., to send a diagnostic message to be echoed by the receiving device). If *n_times* and *n_size* are specified, the ping will be performed *n_times* times, each time with packet size *n_size*. Otherwise, ping will be invoked once with packet size equal to 56 bytes. The maximum value of *n_times* is 100, any value larger than this will default to 100. The maximum value of *n_size* is 1932, any value larger than this will default to 1932.

Example:

```
Command> ping 10.0.0.2 100 1000
Repeat times = 100, data length = 1000
Ping packets -- total: 100 sent: 100 received: 100

Command> ping 10.0.0.2
Repeat times = 1, data length = 56
Ping packets -- total: 1 sent: 1 received: 1
```

Set log level <1-7>

Description: This command changes the system log level, causing different events to be logged into the system log table. It is used mainly for debugging purposes. The log level configured in the system corresponds to the detail level of the messages to be logged. The default log level is 3, which means all system messages defined as log level 3 or below will be logged. A setting of 7 yields the maximum detail.

The log level definition is given below:

ALERT	1	/* action must be taken immediately */
CRIT	2	/* critical conditions */
ERR	3	/* error conditions */
WARNING	4	/* warning conditions */
NOTICE	5	/* normal but significant condition */
INFO	6	/* informational */
DEBUG	7	/* debug level */

Show log level

Description: This command shows the system log level that has been configured.

Enable log <facility> [<level>]

Description: This command enables system log messages associated with the specified facility (such as http, etc.).

Example:

```
Command> enable log ppp 6
Or
```

```
Command> enable log backup
```

Available log facilities are “http”, “csp”, “dhcpc”, “dhcps”, “dns”, “filter”, “bridge”, “xkern”, “ipc”, “ip”, “snmp”, “upnp”, “radius”

Disable log <facility>

Description: This command disables system log messages associated with the specified facility.

Enable trace <facility> [<level>]

Description: This command enables the debug trace messages associated with the specified facility. When enabled, all log messages entered into the system log will appear in the telnet screen from which this command is issued.

Disable trace <facility>

Description: This command disables the debug trace messages associated with the specified facility.

.

Show log table [<facility>]

Description: The log table contains logs of various events of interest, depending on the log level set at the time. Common events to be logged will include login, as well as certain protocol progress messages for debugging purposes.

This command will display the entire log table in one command instance. However, the screen will only display 22 entries at one time. Therefore, if the table contains more than 22 entries, the screen will pause and wait for the user to press any key to continue to the next 22 entries. When the system powers up, the log is re-initialized and contains no entries. A first-in, first-out scheme is used in the log table: when the 128-entry log table is full, new entries will replace the oldest entries.

Example:

```
Apr 9 16:33:30 AirJaguar http: Login from http
Apr 9 16:35:30 AirJaguar http: Logout from http
Apr 9 16:39:30 AirJaguar http: Login from http
```

Set syslogd <ip>

Description: This command configures the IP address of the Syslog daemon.

Example:

```
Command> set syslogd 192.168.168.100
```

Enable/disable syslogd

Description: Syslog is a de-facto standard logging mechanism that allows System Log entries to be sent to a remote device running a standard “Syslog Daemon” application. When enabled, the 802.11G ACCESS POINT will send system log information to the syslog daemon.

Example:

```
Command> enable syslogd
```

Example:

```
Command> disable syslogd
```

Show syslog

Description: This command displays the current configuration of the Syslog facility.

Example:

```
Command> show syslog
Syslog configuration:
State = enabled
Remote daemon's IP address = 192.168.168.100
```

Security

Change password <string>

Description: This command allows the user to change the password that logs on to the Command Line Interface or the HTTP interface. The password is a character string that starts with a letter and contains at least 6 and up to a total of 15 alphanumeric characters. The password is case sensitive. The default factory setting is "password". If you forget the password, the only way to recover is to clear the entire configuration and return the unit to its original state as shipped from the factory – by pressing the hardware factory default button. Unfortunately, this means that you have to re-enter all of your configuration data.

After the user presses the hardware factory default button, the system will return all settings to the factory default. The password will once again be "password".

Example:

```
Command> change password
Please enter the old password: ********
Please enter the new password: ********
Please re-enter the new password: ********
```

Set radius server reattempt <min>

Description: This command sets the re-authentication attempt time.

Example:

```
Command> set radius server reattempt 5
RADIUS server reattempt is 5 minutes.
```

Add radius server <primary|secondary>

Description: This command configures the primary/secondary radius server for authentication.

Example:

```
Command> add radius server primary
enter authenticatation (eap, mac/eap/both):
enter server IP (unspecified): 129.1.1.1
enter port number (1812, 1-65535):
enter shared secret (unspecified):
enter timeout (5, 1-60):
enter retry times (3, 1-10):
enable primary server (yes, yes/no):

Admin State: Enabled
Authentication scheme: MAC
Server IP: 129.1.1.1
Port number: 1812
Timeout value: 5 seconds
Retry times: 3
```

Delete radius server <primary|secondary>
Description: This command deletes the primary/secondary radius server configured in the system.

Example:

```
Command> delete radius server primary
primary radius server is deleted.
```

Enable radius server <primary|secondary>
Description: This command enables the primary/secondary radius server configured in the system.

Example:

```
Command> enable radius server primary
Primary radius server is enabled.
```

Disable radius server <primary|secondary>
Description: This command disables the primary/secondary radius server configured in the system.

Example:

```
Command> disable radius server primary
Primary radius server is disabled.
```

Show radius server [<primary|secondary>]
Description: This command shows the primary/secondary radius server configured in the system.

Example:

```
Command> show radius server primary
Admin State: Enabled
Authentication scheme: MAC
Server IP: 129.1.1.1
Port number: 1812
Timeout value: 5 seconds
Retry times: 3
```

Example:

```
Command> show radius server
Radius server: Primary
Admin state: Enabled
Authentication scheme: MAC
Server IP: 129.1.1.1
Port number: 1812
Timeout value: 5 seconds
Retry times: 3

Radius server: Secondary
Admin state: Enabled
Authentication scheme: MAC
Server IP: 129.1.2.1
Port number: 1820
Timeout value: 5 seconds
Retry times: 3

Radius server reattempt: 60 minutes
```

Wireless

Set operational mode <accesspoint|wds|repeater>

Description: This command configures the device to operate in one of the three following modes: an access point, a WDS (Wireless Distribution System), or a repeater.

Example:

```
Command> set operational mode accesspoint
operational mode: accesspoint
```

Show operational mode

Description: This command displays the current operational mode of the device, which can be one of the three following modes: an access point, a WDS (Wireless Distribution System), or a repeater.

Example:

```
Command> show operational mode
operational mode: accesspoint
```

Add WDS peer <name> <MAC>

Description: This command adds a WDS peer by specifying a name and its corresponding MAC address.

Example:

```
Command> add wds peer Sanjose 00-02-55-F9-45-0B

Peer Name           MAC Address
-----------------------------------
Sanjose             00-02-55-F9-45-0B
```

Delete WDS peer <name>

Description: This command deletes a WDS peer.

Example:

```
Command> delete wds peer Sanjose
WDS peer Sanjose is deleted.
```

Show WDS peer

Description: This command shows all WDS peers in the network.

```
Command> show wds peer

Peer Name           MAC Address
------------------------------------
Sanjose             00-02-55-F9-45-0B
LosAngles           00-02-55-F9-45-0A
Sunnyvale           00-02-55-F9-45-0C
```

Add repeater ap <name> <MAC>

Description: This command adds a repeater AP by specifying a name and its corresponding MAC address.

Example:

```
Command> add repeater ap engineering 00-02-55-F9-45-0B
```

Delete repeater ap <name>

Description: This command deletes a repeater AP.

Example:

```
Command> delete repeater ap engineering
```

Show repeater ap

Description: This command shows the repeater AP setting

```
Command> show repeater ap
The Repeater AP is set to engineering 00-02-55-F9-45-0B
```

Show wireless client table

Example:

```
Command> show wireless client table

MAC Address              State
------------------------------
00-02-55-F9-45-0B   Associated
00-60-00-00-00-01   Associated
Total 2 entries
```

Show wireless client statistics

Example:

```
Command> show wireless client statistics

MAC Address          TX     RX     TX     RX
                     Frames Frames Bytes  Bytes
-------------------------------------------------------
00-02-55-F9-45-0B    1000   1000   64000  64000
00-60-00-00-00-01    2000   2000   128000 128000
Total 2 entries
```

Clear wireless client statistics

Example:

```
Command> clear wireless client statistics
statistics counter of wireless client(s) clear
```

Product Specification

Product Name	IEEE 802.11b/g Enterprise Access Point
Control Number	RA-8
Core Logic, CPU	IDT32333 @ 150 MHz
Core Logic, WLAN	Intersil® Prism® Gti/Frisbee™
OS	Linux® 2.4.18
Standard	• IEEE 802.11b • IEEE 802.11g • IEEE 802.1d Spanning Tree • IEEE 802.1x • IEEE 802.3u Ethernet protocol
Frequency Range	• U-NI: 2.412 ~2.456 GHz & 2.400 ~ 2.483 GHz • EU: 2.412~ 2.471 GHz & 2.400~ 2.483 GHz • Japan: 2.412~ 2.484 GHz & 2.400~ 2.483 GHz • China: 2.412~ 2.484 GHz & 2.400~ 2.483 GHz
WLAN Network Architecture Type	• Infrastructure • Bridge Mode (WDS) • Repeater Mode
Wireless Transfer Data Rate for IEEE 802.11g Standard	IEEE 802.11g Standard: 54, 48, 36, 24, 18, 12, 9 & 6 Mbps with auto fallback
Wireless Transfer Data Rate for IEEE 802.11b	11, 5.5, 2 & 1 Mbps with auto fallback
Physical Specification	• External Power Adapter with DC5V/2A Input • PCB Dimension: 100 mm x 100 mm • Desktop Instillation • Wall/Ceiling Mountable
Hardware & Antenna	• 1 x RJ45 • 1 x Restore Button • 1x External Antenna & 1x embedded antenna • 3 x LED (1 x Power, 1 x LAN, 1 x WLAN)
DHCP Server	• Build-in DHCP server • Support static DHCP assignment
Security	• WEP 64 bit, 128 bit Encryption • MAC Access Control for the wireless interface • EAP & 802.1x support • Support Primary & secondary RADUIUS server
Management	• Web-Based Management Tool • UPnP • SNMP V1 & V2 • MIB: Ethernet, MIB II, 802.11 • Command line interface with Telenet • Upload & download test-based configuration file vis HTTP browser • Firmware upgrade via HTTP browser • SysLog
IP Address Assignment	• DHCP Client • Static IP Address
Environmental Specification	• Operation Temperature: 0^0 ~50^0 C.

	• Storage Temperature: -20^0 ~ 65^0 C • Operating Humidity: 10% ~80% (without Condensation)
EMC Certification	• FCC • UL • TELEC/JTEC • SRRC/CCC • DGT • CE
Certificate	• Wi-Fi Class 2.4 GHz 802.11g (Planning) • Cisco CCX 1.0 (planning)