User Manual

AP-1001g-P

802.11g 54Mbps Wireless Access Point and Wireless Bridge

FCC Compliance

NOTE: 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.

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.

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

Important Note:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth 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.

This device is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 20cm is maintained between the antenna and users, and
2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.)

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the product (Including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20cm may be maintained between the antenna and users (for example: Notebook, Assist Point, Router and similar product). The final end product must be labeled in a visible area with the following: “Contains TX FCC ID: **PXPAP1001G**”.

Manual Information That Must be Included

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the users manual of the end product which integrate this module.

The user’s manual for OEM integrators must include the following information in a prominent location “IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements. The antenna must not be co-located or operating in conjunction with any other antenna or transmitter and antenna must be installed such that 20cm is maintained between the antenna and users

Canada (IC):

To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing.

Contents

Introduction

The Product

The product is based on the IEEE **802.11g** standard, which is the latest **54Mbps** Wireless LAN (WLAN) standard. This standard is five times faster than the widely deployed **WiFi** (802.11b) products that are found in homes, airport and public wireless hotspots. Because 802.11g uses the same **2.4GHz** frequency band, the product is fully interoperable with existing WiFi cards and devices.

Having two wireless protocols in one product ensure that your investments are protected, while enabling you to enjoy the fastest Wireless LAN speed.

This product could operate as either one of the following modes:

a. Wireless LAN Access Point (AP) mode, or
b. Wireless Ethernet Bridge mode.

Product Features

- Fully compatibility with **IEEE 802.11g** WLAN standard
- Wireless data rate of up to **108Mbps**
- **2.4GHz** license-free frequency band
- Full backward compatibility with **802.11b** standard (WiFi 11Mbps)
- **802.1x** Authentication (For AP mode only). Used with a RADIUS server to check and verify the identity of WLAN users.
- **WEP** (Wired Equivalent Privacy). A simple WLAN encryption standard to protect wireless data from sniffers.
- **WPA** (WiFi Protected Access), for AP mode only. An improved WLAN encryption standard where the secret key renew automatically at regular intervals.
  - **TKIP** (Temporal Key Integrity Protocol). A new encryption key will be generated by corporate RADIUS server when a authorized wireless adaptor/user associate with the Access Point. This encryption key renew automatically at regular intervals. This is normally used in high security enterprise networks.
  - **Pre Shared Key (WPA-PSK).** A new key is generated each time a wireless adaptor connects to the Access Point. This normally used for home user without a RADIUS server.
- Intuitive Web-based configuration
- **Access Control List** provides added security for AP mode.

Basic IP Networking

IP = Internet Protocol

IP stands for Internet Protocol. In an IP network, every device has a **unique** IP Address (For example: 192.168.1.35) to identify itself. There are two ways of assigning an IP address to a PC or Router: Static and Automatic (DHCP). Static IP addresses are keyed-in manually, while Dynamic IPs are distributed by a DHCP Server.

Ports

Every packet of traffic is identified by its Source and Destination Addresses, which would ensure that the packet arrives at the correct destination. A Port Number is also embedded in each packet; to identify which software application that generated and uses that packet. Therefore, if AP1001g blocks a certain port number, it denies the particular software from using the connection.

Static IP Address

Static IP addressing ensures that the device will always have the same IP address. Static addressing is commonly used for your servers.

Dynamic IP Address

A dynamic IP address is one that is automatically assigned to a PC. These IP addresses are “dynamic” because they are only temporarily leased to the PC when it connects to the network. This is the most convenient and common way of managing IP addresses in a network. The Server that manages this pool of IP addresses is called the DHCP Server. The product has a DHCP Server built-in to simplify the network management.

DHCP (Dynamic Host Configuration Protocol)

The PC obtaining an IP address from the Server is called the DHCP Client. If there is already a DHCP Server running on your network, you must disable one of the two DHCP servers. Running more than one DHCP server together will cause network problems!

Wireless LAN Basics

A Wireless LAN (WLAN) is a computer network that transmits and receives data with radio signals instead of using cables. WLANs have become common in homes, offices, airports and public Hotspots. WLAN can support the same applications and software that run on a wired network (LAN). Besides supporting the same software and functions, WLAN brings greater convenience and eliminates the need to lay Ethernet cables in a home or office.

The AP1001g is based on the finalised **802.11g** standard. The IEEE 802.11g standard is an improvement on the 802.11b (WiFi) standard. It increases the data rate up to 54 Mbps within the 2.4GHz band. As the 802.11b standard is also using the 2.4GHz frequency band, the product is fully backward compatible with the older 802.11b devices. WiFi cards can be used to connect to AP1001g at 11Mbps.

The AP1001g can even support 108Mbps wireless data rate at Turbo mode. This is only applicable for user using recommended Turbo-capable Cardbus (with Atheros chipset).

The AP1001g is also known as the Wireless Access Point (**AP**). The PC using the Cardbus is known as the **Client**. WLAN networking involves a few additional parameters to be configured:

SSID

The SSID is the “network name” for the WLAN network. The SSID is any name, and can be any set of characters or numbers, and must be configured on both the AP and Client. The Client sniffs the radio frequencies for an AP with the same SSID with itself. The client locks onto the AP and they are “**associated**”.
To enable plug-and-play convenience, most client cards can sniff the frequencies to extract the available SSIDs to let the user choose from.

Encryption

WLAN traffic can be captured by anybody to be read! The solution is to use encryption to make the traffic appear as random characters to the eavesdropper. Both the AP and client must use the same encryption standard and key to enable them to decode the “rubbish”. If the encryption settings are mismatched, the client and AP cannot associate. WEP (Wired Equivalent Privacy) is the most common WLAN encryption standard.

MAC Address Control

Every client card has a unique MAC Address. This MAC Address can be input into the AP (Router), such that the AP only allows this pool of MAC Addresses to use the WLAN.

Channel

There are a total of 13 channels in the 2.4GHz band. Depending on regulation, not all the frequencies may be available in every country. Frequency is configured on the AP only. The client searches for the AP and locks onto that AP’s channel.

Signal Strength

Radio signals drop in power over a distance. Even if all the settings are correct, a low signal strength makes association impossible. The usable distance between the AP and client can range from a few meters indoor to 200m outdoors maximum. When setting up the AP, make sure that you:

- Keep the distance from the AP to the clients as short as possible.

- Make sure that the WLAN signals do not have to pass through too many concrete walls and metal structures to reach the client.
- Make sure that APs are located far away from one another to avoid interference.

Interference

Interference happens when 2 APs with the same channels are placed near to one another. The speed of the network drops and the signal strength fluctuates wildly.

Roaming

Association happens when the SSID, Encryption and MAC Address Control settings are correct between the AP and client. If 2 APs with these same settings are located in the same area, the client would choose to associate to the one which gives it a better signal strength. The client would roam over to the 2nd AP when he moves nearer to it. The client switches AP and frequency as he does so.

GETTING STARTED

AP1001G CONFIGURATION

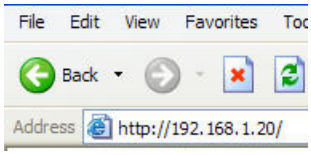
Web Configuration

AP1001g can be configure using a web server.

1. Connect the network as shown previously.

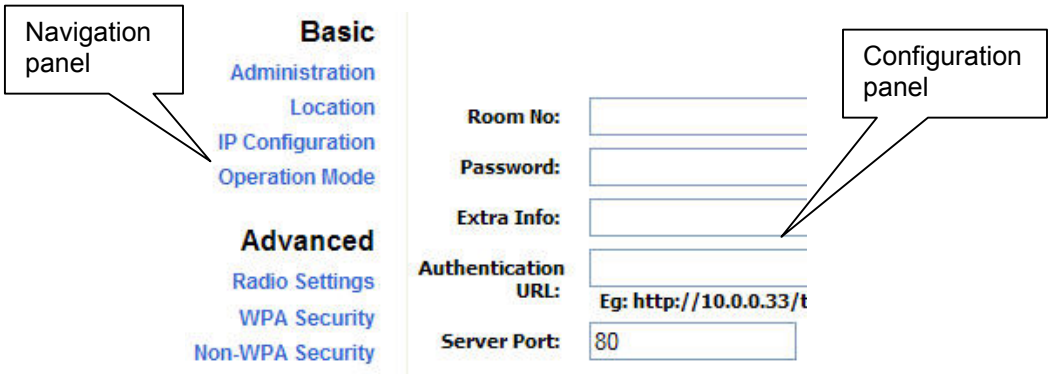
- If you are accessing the web server via Ethernet cable, check that the upper LED lights up on AP1001g.
- If your PC is **wireless**, check the PC's card utility to make sure that the signal strength is good and that the bottom LED lights up on AP1001g.

2. Open a Web browser (Internet Explorer, Netscape etc.).
3. Type AP1001g LAN IP (**192.168.1.20**) address into the browser's Address field. The default LAN IP address of AP1001g is 192.168.1.20.



4. Enter username and password. There are two types of users, admin user and super user. The default username and password for admin user is admin/admin and the default username and password for super user is super/super. Only super user will be able to carry out firmware upgrade.

In every AP1001g Web Configuration page, the left panel is the navigation menu containing the main sections. The right-side frame is where the detailed configuration is done.



Basic Configuration

Administration

This page allows you to change the Username and Password for admin user. The default username and password is admin / admin. After every factory reset, the Username and Password reverts to this combination. Device name allows you to give APRT-2001g2 a name.

Device Name:	
User Name:	admin
Password:	*****

The username and password are case sensitive.

Location

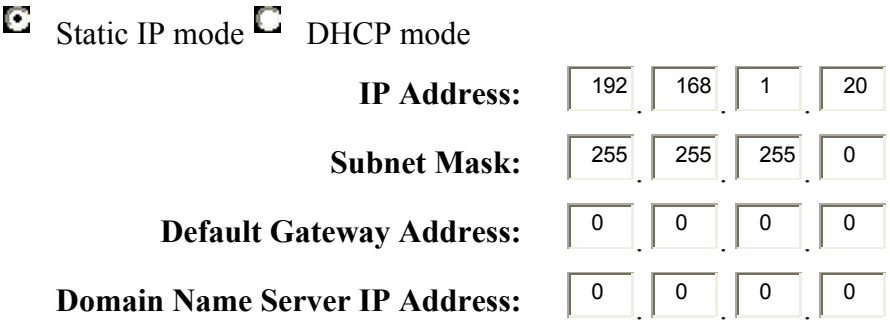
This page allows you to store information such as where the AP1001g is being placed.

Room No:	
Password:	
Extra Info:	
Authentication URL:	Eg: http://10.0.0.33/test.asp or http://www.abc.com/test.asp
Server Port:	80

Room No: Enter the room number where the AP1001g is being place.
Password: Enter the password.
Extra Info: Enter any extra information that for the particular room.
Authentication URL: The website for the authentication server.
Server Port: The port number use by the server.

IP Configuration

This page allows you to choose the type of IP



Static IP mode: When you boot up the AP1001g for the first time, it is in Static mode. You assign a Static IP to AP1001g. The default IP address, subnet mask and gateway mask are 192.168.1.20, 255.255.255.0 and 0.0.0.0.
DHCP mode: AP1001g will obtain an IP Address from an upstream DHCP Server.

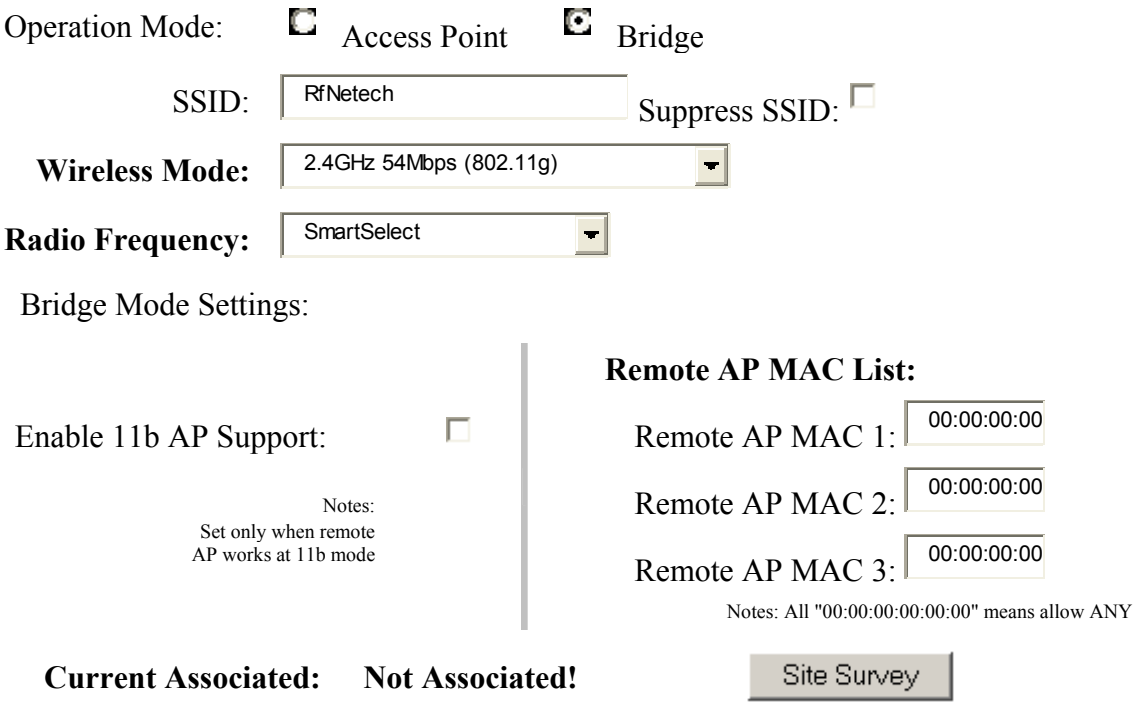
When in DHCP client mode, these 4 columns show the IP settings obtained from the network.

Remember that after every configuration change, it is necessary to:

- Click **Update** on the page.
- **Reboot** AP1001g.

The changes take effect only **AFTER Reboot**.

Operation Mode

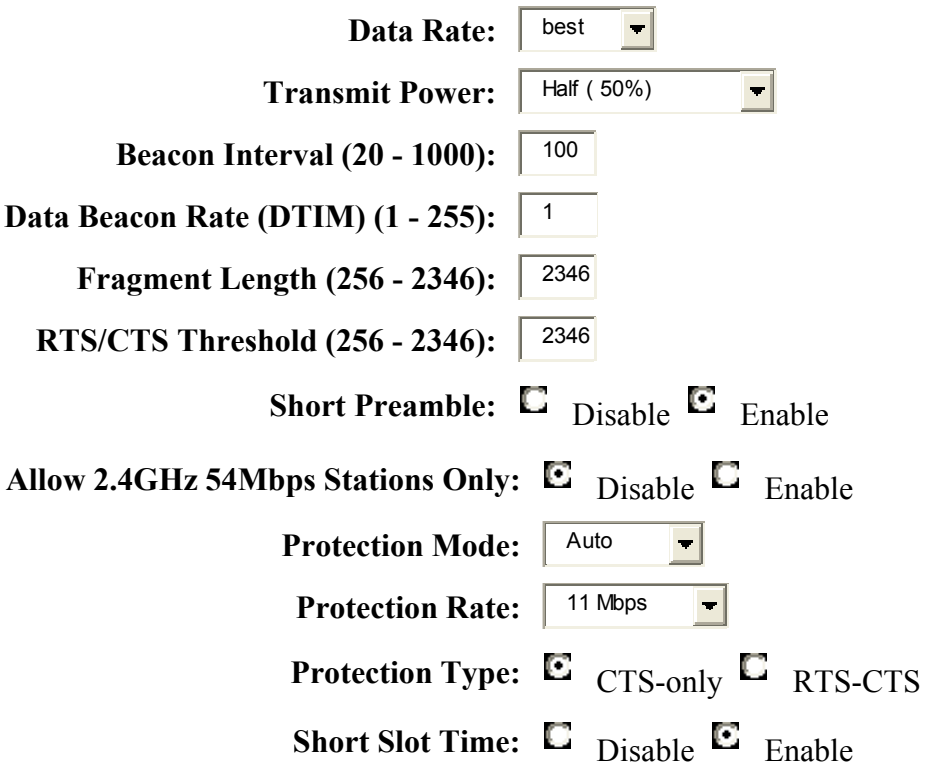


Operation Mode: AP1001g can be used as an Access Point or as a Wireless Bridge. Wireless Bridge is used when it is not advisable to lay an Ethernet line over a distance. Two AP1001g can be set up to connect over this distance, acting as the wired backbone.
SSID: Service Set Identifier. It is a sequence of characters that uniquely names a Wireless LAN. This name allows PCs to connect to the correct Wireless Access Point when multiple Access Points operate in the same location. The default SSID is ANY.
Supress SSID: When this is ticked, AP1001g will not broadcast the SSID. Unwelcome PCs will not be able to scan for the SSID of this AP1001g, and they can only associate if they know exactly what is the SSID.
Wireless Mode: To choose to operate the AP or Bridge in 802.11b or 802.11g. Both operate in the frequency of 2.4GHz but 802.11g has a faster data rate of 54Mbps as compared to the 11Mbps of 802.11b.
Radio Frequency: There are 11 different frequency channels. You can choose to set the frequency channel to use or use SmartSelect for automatic channel selection.
Enable 11b AP Support: This is use only if AP1001g is set to Bridge mode. Tick the box if the AP that the bridge is associated to supports only 802.11b.
Remote AP MAC List: This is use only if AP1001g is set to Bridge mode. The Bridge will only associate with AP whose MAC address is in the list. It is essential to type in the MAC address of the AP without any spacing in front or behind it.
Site Survey: Display the MAC address, RSSI, SSID and the channel of other AP.

Do not insert any spacing in front or behind the MAC address when using Remote AP MAC List. Failing to do so will cause the bridge unable to associate with the intended AP.

Advance Configuration

Radio Setting

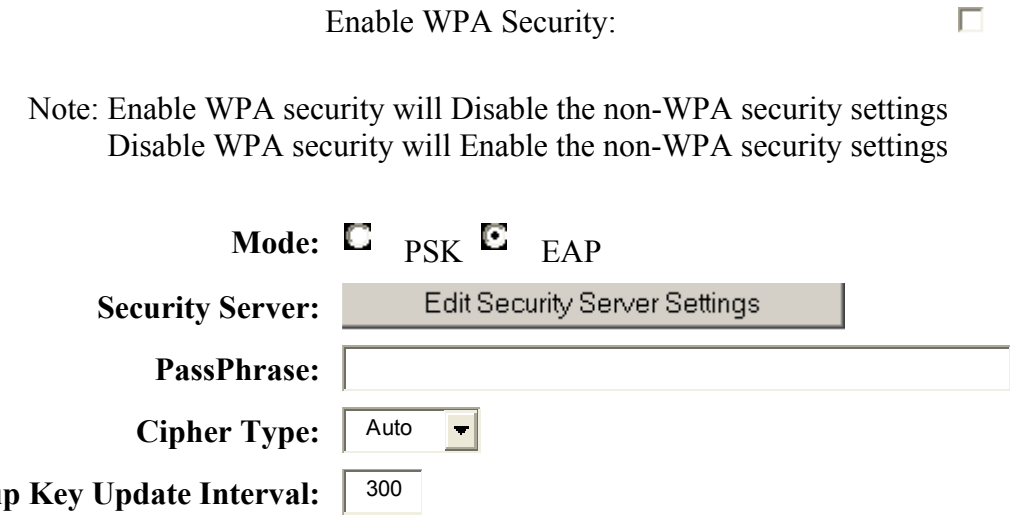


Data Rate: You can fix the data rate to different values as 11Mbps or 24Mbps. However it is recommended to set the setting to “Best” for AP1001g to determine the best data rate to be use.
Transmit Power: Sometimes, it is useful to decrease the coverage range of each AP1001g, so that more AP1001g can be located together without interference to one another. The default transmission power is 100%.
Beacon Interval: Choose between 20 to 1000.Low Beacon Interval will make the association and roaming process very responsive. However, throughput will decrease, so it is necessary to strike a balance. Typical Beacon Interval is set to 100ms.
Data Beacon Rate (DTIM): Choose between 1 to 16384.This is always a multiple of the beacon interval. It determines how often the beacon contains a delivery traffic indication message (DTIM). The DTIM tells power-save client devices that a packet is waiting for them.
Fragment Length: Specifies the fragment length. Enter a value between 256 and 2346.
RTS/CTS Threshold: Enter a value between 256 and 2346
Short Preamble: Enable to use Short Preamble in the Wireless LAN packet headers. Most manufacturers implement long preambles. Even if there is a mismatch between AP1001g and the client, they can still connect well and the mismatch may not be noticeable to most users. Do not change this setting without seeking advice.
Allow 2.4GHz 54Mbps Stations Only: Use this radio button to enable or disable the association of 2.4 Ghz 54 Mbps STA only.
Protection Mode: Select None, Always or Auto
Protection Rate: Select 1Mbps, 2Mbps, 5.5Mbps or 11Mbps

Protection Type: Select either CTS only or RTS-CTS
Short Slot Time: Enable or disable short time slot usage

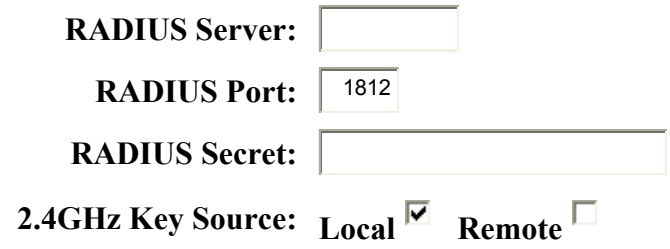
WPA Security

This section allows you to configure wireless encryption to prevent unwelcome parties from reading your traffic. Authentication can also be configured to block outsiders from accessing your network.



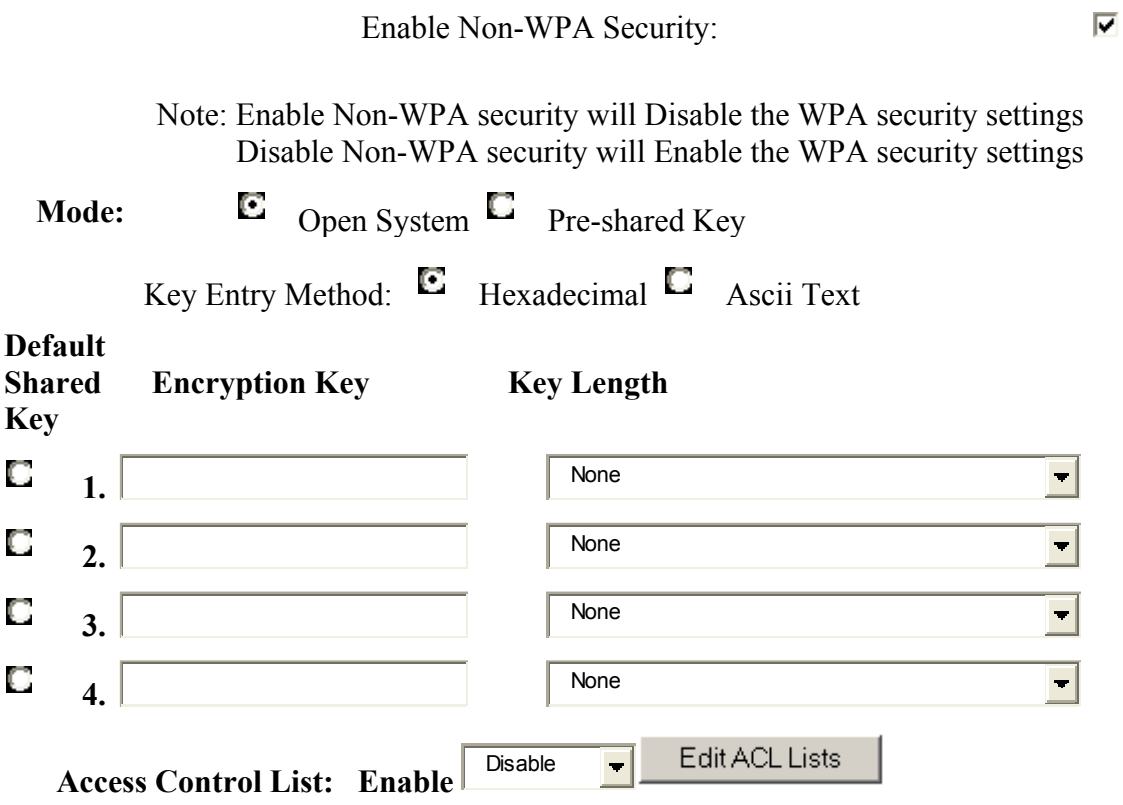
Enable WPA Security: Tick the box to enable the following suite of Encryption and Authentication features. Enabling WPA Security will **disable** the non-WPA security.
PSK: Pre-shared Key. PSK mode is less secure than EAP as it does not use a RADIUS Server. To configure, key in an 8-64 character PassPhrase onto both AP1001g and the Client.
EAP: Extensible Authentication Protocol. When chosen, the RADIUS server is used for authentication between AP1001g and Client. To configure, use the "Edit Security Server Settings" feature.
Security Server: This is to edit the RADIUS Server.
PassPhrase: Key in the 8-64 character for PSK.
Cipher Type: Choose Auto, TKIP or AES
Group Key Update Interval: Specifies the interval in milliseconds

Security Server Settings

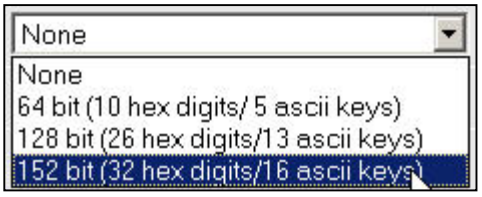


RADIUS Server: Enter the IP Address of the RADIUS Server (for 802.1x authentication purposes). This is used only when you have a RADIUS Server and want to use it for authenticating the Wireless Clients. Almost all homes and many offices do not have a RADIUIS Server. These settings are for advanced users only.
RADIUS Port: Enter the port number of the RADIUS Server.
RADIUS Secret: Enter the Shared Secret of the RADIUS Server. (Only if 802.1x protocol is used)
2.4GHz Key Source: Specify the location of the key storage. (Only if 802.1x is used.) If you are using PSK or Pre-shared key, select local.

NON-WPA Security



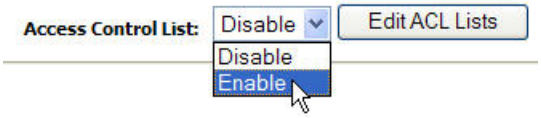
Enable Non-WPA Security: Tick the box to enable the following suite of Encryption and Authentication features**.** Enabling non-WPA security will **disable** WPA security.
Open System: No encryption and authentication features in this mode. When the AP1001g is in this mode, any Client can associate with it. This is the default setting for the non-WPA Security setting.
Pre-shared Key: When chosen, the encryption Key is also used for authentication between AP1001g and Client. To configure, enter the encryption Key in the "Encryption Key" field.
Key Entry Method: Choose Hexadecimal if you want to enter the Keys in hexadecimal format. Otherwise, choose Ascii Text to enter the Key in ASCII format. ASCII is also called Alphanumeric in some systems. Use the same key format for AP1001g and Client!
Key Length: Choose the number of bit for the encryption key.



Hexadecimal Characters:
0,1,2,3,4,5,6,7,8,9 and a,b,c,d,e,f

ASCII Characters:
0,1,2,……8,9 and
a,b,c,d,…….x,y,z

Access Control List: To enable **MAC Address Filtering**, enable Access Control List. Only valid computers (whose MAC addresses are in the MAC address table) would be allowed to access AP1001g. Click on Edit ACL Lists to amend the MAC address table.



To add a MAC address, key in the MAC address in the format 00:11:22:33:44:55. The table display all the MAC address currently allows.

Enabling WPA Security will **disable** the non-WPA Security setting.
Enabling non-WPA Security will **disable** the WPA Security setting.

Remember that after every configuration change, it is necessary to:

- Click **Update** on the page.
- **Reboot** AP1001g.

The changes take effect only **AFTER Reboot**.

Protocol

Filter AppleTalk Packet: ☐

Filter IPX Packet: ☐

Wireless Isolation: ☑

Filter AppleTalk Packet: Selecting this option will disallow all AppleTalk packets to pass through
Filter IPX Packet: Selecting this option will disallow all IPX packets to pass through
Wireless Isolation: Selecting this option will disallow wireless clients associated with this device to communicate with each other

Miscellaneous

Enable Telnet: ☑

Button Mode: ☐ Request Internet Access ◉ Restore Good Settings

Save the current settings as a backup: Save

Restore settings from the backup: Restore&Reboot

Enable Telnet: Disable/enable Telnet access to this device
Request Internet Access: TBA
Restore Good Setting: Restore last known good setting
Save the current setting as a backup: After you have successfully configured AP1001g, you can save this "Good Config" into memory. You can retrieve this "Good Config" later, if you have messed up some settings and do not know what was the previous working setting. If you have even forgotten the password to get into the configuration pages, you would have to do a Factory Reset to AP1001g.

Restore settings from the backup: Allows you to retrieve the “Good Config” that you have saved previously.

Remember that after every configuration change, it is necessary to:

- Click **Update** on the page.
- **Reboot** AP1001g.

The changes take effect only **AFTER Reboot**.

Status

System Status

This page presents a convenient overview of the overall status of the AP1001g. The most common configuration parameters are shown here, for a quick look.

IP Mode:	DHCP mode
IP Address:	192.168.1.20
Subnet Mask:	255.255.252.0
Gateway Address:	0.0.0.0
SSID:	RfNetech
Wireless Mode:	11g
Radio Frequency:	2462
Operation Mode:	Access Point
Security method:	Non-WPA security
Security Mode:	Disabled
Wireless MAC Address:	00:06:c7:14:07:bc
Ethernet MAC Address:	00:06:c7:14:07:bd

Association Status

This page presents an overview of the MAC address of all the Client connected to AP1001g through Ethernet or wireless.

Connected Ethernet Stations

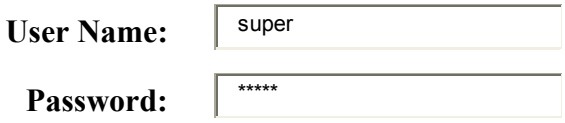
Connected Wireless Stations

00:03:7f:00:01:4e

Super User

Super User

This page allows you to change the Username and Password for admin user. The default username and password is admin / admin. After every factory reset, the Username and Password reverts to this combination. AP1001g does not allow you to set the same Username for both admin and super users.



The Username of super user cannot be the same as the Username of admin user.

Firmware Upgrade

This page allows you to update the firmware (software) in AP1001g. New firmwares are issued to improve the performance and add features to the product.

The new firmware will be name “apimg1”.

1. Save the file in your PC.

2. Browse to the file with the name “apimg1”.
3. Click on **Upload**.
4. **Reboot** the AP1001g and the process is complete.

Do not change the filename of the new firmware. New firmware with filename other than “apimg1” will cause the process to fail.

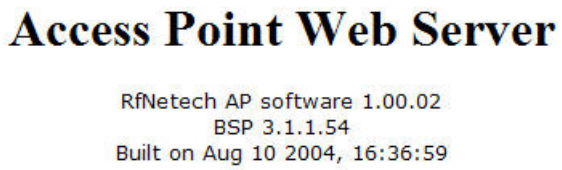
Remember that after every configuration change, it is necessary to:

- Click **Update** on the page.
- **Reboot** AP1001g.

The changes take effect only **AFTER Reboot**.

Firmware Version

This page presents information of the firmware version of AP1001g.



Factory Reset

In case you forget the password or IP address of the wireless bridge and is unable to configure the wireless bridge, you can restore it back to factory setting by doing a factory reset. To restore the wireless bridge to factory default setting, follow the following steps:

1. Power off the bridge.
2. Press the reset button.
3. Power on the bridge without releasing the reset button.
4. Keep on pressing the reset button for 10 sec then release it.