

# **802.11g Wireless Converter**

**IEEE 802.11g  
54Mbps**

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# Chapter 1 Introduction

This product is a wireless converter for IEEE 802.11g/b 2.4GHz wireless network. It converts not only a computer but also several computers into wireless station and easily connects to the wireless network without installing any software. Plug and play is not hard to reach anymore.

This product can also setup to be a wireless Converter or a bridge among wired LANs. With the valuable function, you can simply build up a wireless LAN network.

To secure the wireless communication, the product supports WEP, WPA, ESSID and MAC address filter functions. With ESSID authentication, 64/128-bit WEP encryption, WPA and MAC address filtering you can prevent unauthorized wireless stations from accessing your wireless network.

The product's dipole antenna is detachable by connecting to a RP-SMA connector. Users can install a high gain antenna to the connector for better network link quality, so that you can build wireless network with more flexibility.

This product provides easy to use user interface and allows users to configuring from web browser. Also it integrates DHCP server to provide multiple wireless and wired users to get their IP address automatically.

With the versatile of features, this product is the best choice for you to integrate your wireless and wired networks seamlessly.

## 1.1 Package Contents

The Wireless Converter includes the following items:

- One Wireless Converter
- One Power Adapter
- One User's Manual

## 1.2 Features

- Comply with the IEEE 802.11g/b 2.4GHz specification.
- High data rate – up to 54Mbps network speed.
- Supports Plug-and-play, no software program needs to be installed.
- Saving wireless device cost by converting several computers into wireless stations.
- Auto rate fallback in case of obstacles or interferences.
- Provide 64/128-bit WEP, WPA function to protect the wireless data transmissions.
- Built-in DHCP server supports auto IP addresses assignment.
- Supports Web-based configuration.

## 1.3 Specifications

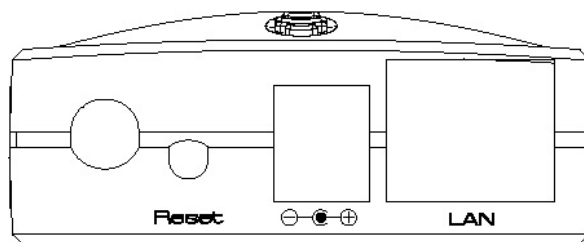
- Standards: IEEE 802.11g/b (Wireless), IEEE 802.3 (Wired)
- Data Rate: 54/48/36/24/18/12/11/9/6/5.5/2/1Mbps auto fallback
- Security: 64/128-bit WEP, WPA
- Frequency Band: 2.4000~2.4835GHz (Industrial Scientific Medical Band)
- Antenna: External detachable dipole antenna (with RP-SMA connector)
- Connectors: 10/100Mbps RJ-45 x 1
- Power: 5VDC, 2A
- Transmit Power: 16dBm~18dBm
- LEDs: LAN, Ready, WLAN
- Dimension: 20(H) x 58(W) x 82(D) mm
- Temperature:
  - Operating: 32~131°F (0~55°C)
  - Storage: -4~158°F (-20~70°C)

- Humidity: 10-90% (Noncondensing)
- Certification: FCC, CE

## 1.4 Physical Description

### Connector Explanation

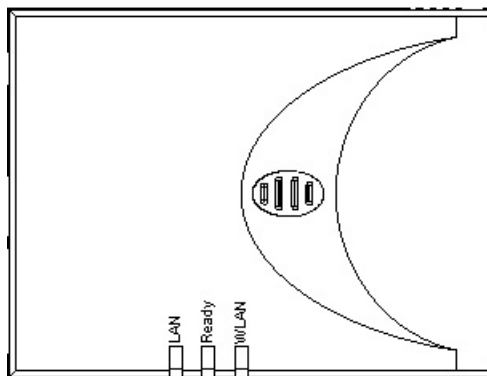
Please refer to the following explanation for the usage of the connectors in the Wireless Converter.



- **Antenna Connector**  
This round connection is standard Reverse SMA connector where any antennas with Reverse SMA connector can connect to the Wireless Converter.
- **Reset**  
The Reset button allows you to do one of two things.
  - 1) If problems occur with your Wireless Converter, press the reset button with a pencil tip (for less than 2 seconds) and the Wireless Converter will re-boot itself, keeping your original configurations.
  - 2) If problems persist or you experience extreme problems or you forgot your password, press the reset button for longer than 5 seconds and the Wireless Converter will reset itself to the factory default settings (warning: your original configurations will be replaced with the factory default settings).
- **DC Adapter Port**  
Insert the power jack of the power adapter into this port.
- **LAN Port**

The Wireless Converter's LAN port is where you connect to your LAN's network devices.

## LED Explanation



LED	Color	Status	Description
WLAN	Green	Lit	Wireless function is enabled.
		Flash	Wireless data is transmitted or received.
		Off	Wireless function is not enabled.
Ready	Green	Lit	When the Wireless Converter is in “Station-Ad Hoc mode” or “Station-Infrastructure mode” and is connecting to a wireless device, “Ready” LED lit.
		Lit	When the Wireless Converter is in “AP mode”, “AP Bridge-Point to Point mode”, “AP Bridge-Point to Multi-Point mode” or “AP Bridge-WDS mode”, the “Ready” LED lit meaning the Wireless Converter is stand by to accept connection.
		Off	This Wireless Converter is not ready yet.
LAN	Green	On	A valid link is established.
		Flash	It is transmitting or receiving data.
		Off	No link is established.

## Chapter 2 Wireless Converter Connection

**1. Locate an optimum location for the Wireless Converter.**

The best location for your Wireless Converter is usually at the center of your wireless network, with line of sight to all of your mobile stations.

**2. Connect the Wireless Converter to your router, hub, switch or computer.**

Connect one end of standard UTP cable to the Wireless Converter's LAN Port and connect the other end of the cable to a switch, a router, a hub, or a computer. The Wireless Converter will then be connected to your existed wired LAN Network.

**3. Connect the DC Power Adapter to the Wireless Converter's Power Socket.**

Only use the power adapter supplied with the Wireless Converter. Using a different adapter may damage the product.

**The Hardware Installation is complete.**

# Chapter 3 Wireless Converter Configuration

## 3.1 Getting Started

This Wireless Converter provides web-based configuration tool allowing you to configure from wired or wireless stations. Follow the instructions below to get started configuration.

### From Wired Station

1. Make sure your wired station is in the same subnet with the Wireless Converter. The default IP Address and Sub Mask of the Wireless Converter is:

**Default IP Address: 192.168.2.1**

**Default Subnet: 255.255.255.0**

### Configure your PC to be in the same subnet with the Wireless Converter.

#### 1a) Windows 95/98/Me

1. Click the *Start* button and select *Settings*, then click *Control Panel*. The *Control Panel* window will appear.
2. Double-click *Network* icon. The *Network* window will appear.
3. Check your list of *Network Components*. If TCP/IP is not installed, click the *Add* button to install it now. If TCP/IP is installed, go to **step 6**.
4. In the *Network Component Type* dialog box, select *Protocol* and click *Add* button.
5. In the *Select Network Protocol* dialog box, select *Microsoft and TCP/IP* and then click the *OK* button to start installing the TCP/IP protocol. You may need your Windows CD to complete the installation.
6. After installing TCP/IP, go back to the *Network* dialog box. Select *TCP/IP* from the list of *Network Components* and then click the *Properties* button.
7. Check each of the tabs and verify the following settings:
  - **Bindings:** Check *Client for Microsoft Networks* and *File and printer sharing for Microsoft Networks*.
  - **Gateway:** All fields are blank.
  - **DNS Configuration:** Select *Disable DNS*.
  - **WINS Configuration:** Select *Disable WINS Resolution*.



- **IP Address:** Select *Specify an IP Address*. Specify the IP Address and Subnet Mask as following example.
    - ✓ IP Address: 192.168.2.3 (any IP address within 192.168.2.2~192.168.2.254 is available, **do not setup 192.168.2.1**)
    - ✓ Subnet Mask: 255.255.255.0
8. Reboot the PC. Your PC will now have the IP Address you specified.

### 1b) Windows 2000

1. Click the *Start* button and select *Settings*, then click *Control Panel*. The *Control Panel* window will appear.
2. Double-click *Network and Dial-up Connections* icon. In the *Network and Dial-up Connection* window, double-click *Local Area Connection* icon. The *Local Area Connection* window will appear.
3. In the *Local Area Connection* window, click the *Properties* button.
4. Check your list of *Network Components*. You should see *Internet Protocol [TCP/IP]* on your list. Select it and click the *Properties* button.
5. In the *Internet Protocol (TCP/IP) Properties* window, select *Use the following IP address* and specify the IP Address and Subnet mask as following.
  - ✓ IP Address: 192.168.2.3 (any IP address within 192.168.2.2~192.168.2.254 is available, **do not setup 192.168.2.1**)
  - ✓ Subnet Mask: 255.255.255.0
6. Click *OK* to confirm the setting. Your PC will now have the IP Address you specified.

### 1c) Windows NT

1. Click the *Start* button and select *Settings*, then click *Control Panel*. The *Control Panel* window will appear.
2. Double-click *Network* icon. The *Network* window will appear. Select the *Protocol* tab from the *Network* window.
3. Check if the *TCP/IP Protocol* is on your list of *Network Protocols*. If *TCP/IP* is not installed, click the *Add* button to install it now. If *TCP/IP* is installed, go to **step 5**.
4. In the *Select Network Protocol* window, select the *TCP/IP Protocol* and click the *Ok* button to start installing the *TCP/IP protocol*. You may need your Windows CD to complete the installation.
5. After you install *TCP/IP*, go back to the *Network* window. Select *TCP/IP* from the list of *Network Protocols* and then click the *Properties* button.
6. Check each of the tabs and verify the following settings:

- **IP Address:** Select *Specify an IP address*. Specify the IP Address and Subnet Mask as following example.
  - ✓ IP Address: 192.168.2.3 (any IP address within 192.168.2.2~192.168.2.254 is available, **do not setup 192.168.2.1**)
  - ✓ Subnet Mask: 255.255.255.0
- **DNS:** Let all fields are blank.
- **WINS:** Let all fields are blank.
- **Routing:** Let all fields are blank.

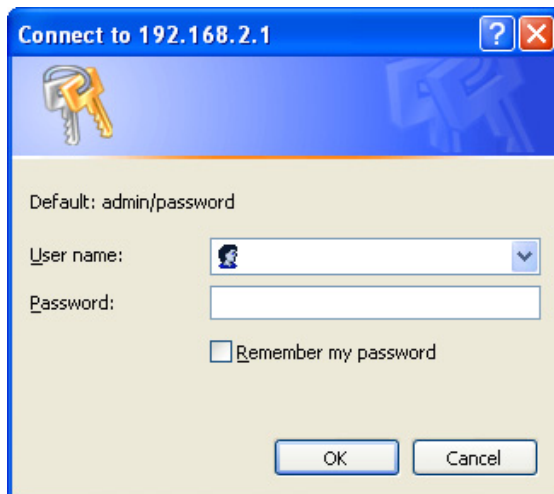
7. Click **OK** to confirm the setting. Your PC will now have the IP Address you specified.

2. Enter **192.168.2.1** from Web Browser to get into the Wireless Converter's configuration tool.
3. A screen will be popped up and request you to enter user name and password. The default user name and password is as follows.

User Name: Admin

Password: 1234

Enter the default user name and password, then press **OK** button directly.



4. You can start configuring the Wireless Converter.

### From Wireless Station

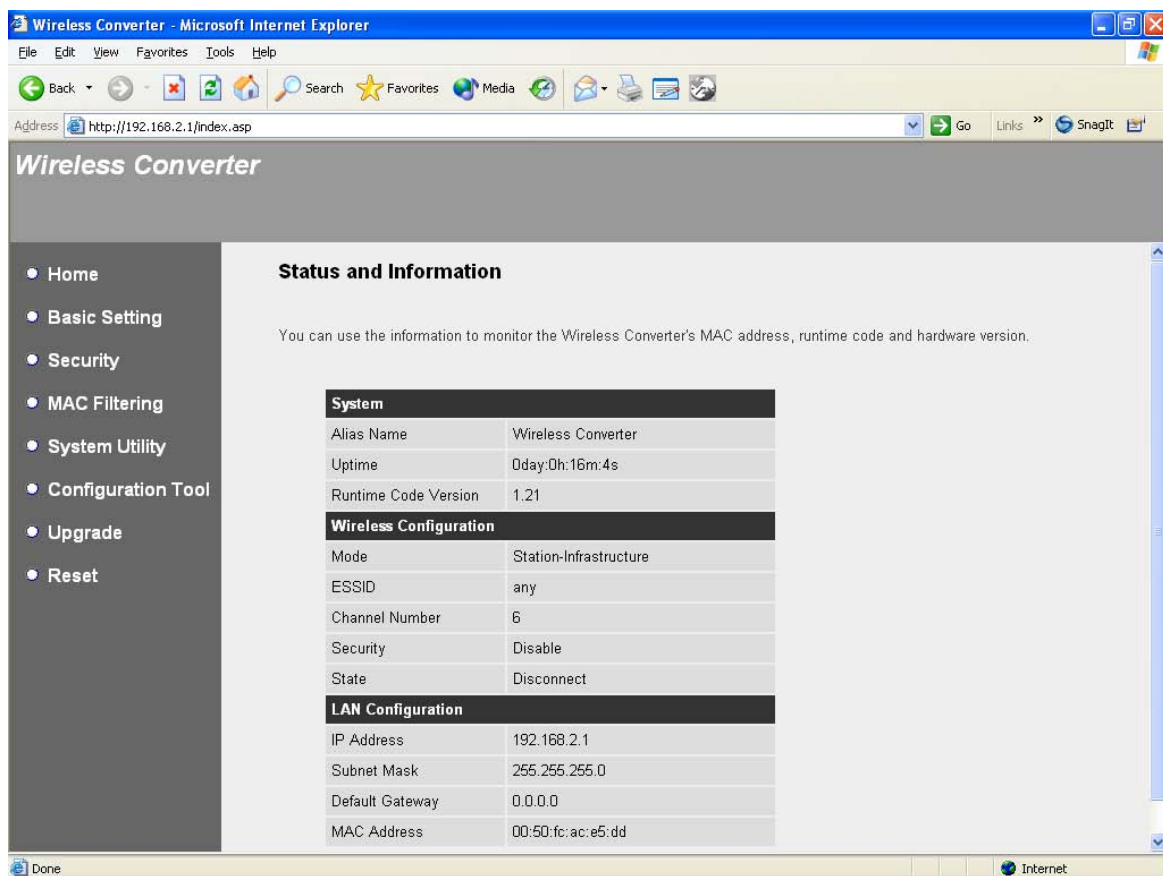
1. Connect your wireless station to the same AP which the Wireless Converter is connecting to.

2. Make sure your wireless station is in the same subnet with the Wireless Converter. Please refer to the **step 1** above for configuring the IP Address and Sub Mask of the wireless station.
3. Enter **192.168.2.1** from Web Browser to get into the Wireless Converter's configuration tool.
4. Enter the user name and password and then press **OK** button and you are available to configure the Wireless Converter now.

## 3.2 Configuring the Wireless Converter

### 3.2.1 Status and Information

On this screen, you can see the general information of the Wireless Converter including Alias Name, Firmware Version, ESSID, Channel Number, Status, IP Address, MAC Address, etc.



The screenshot shows the 'Status and Information' page of the Wireless Converter. The page includes a navigation menu on the left and a main content area with a table of configuration details.

**Status and Information**

You can use the information to monitor the Wireless Converter's MAC address, runtime code and hardware version.

System	
Alias Name	Wireless Converter
Uptime	0day:0h:16m:4s
Runtime Code Version	1.21
Wireless Configuration	
Mode	Station-Infrastructure
ESSID	any
Channel Number	6
Security	Disable
State	Disconnect
LAN Configuration	
IP Address	192.168.2.1
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
MAC Address	00:50:fc:ac:e5:dd

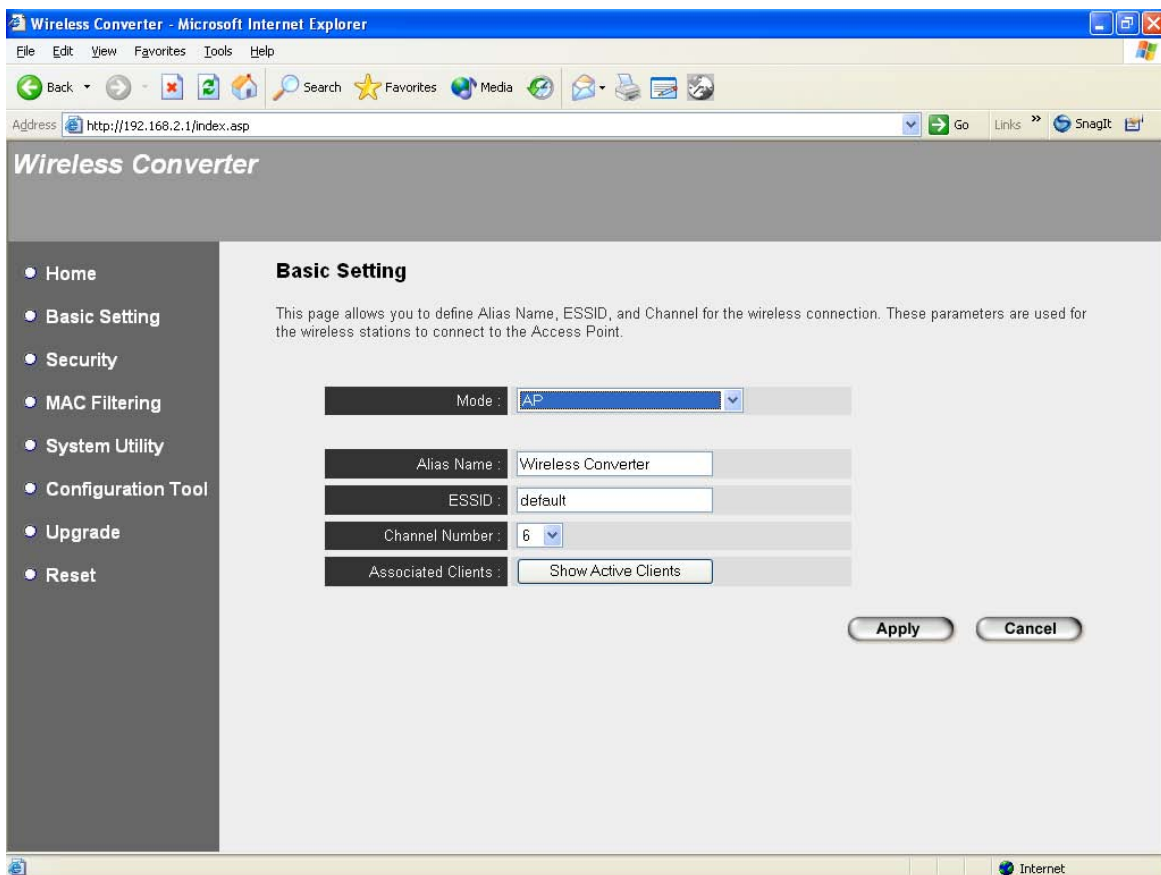
### 3.2.2 Basic Setting

This Wireless Converter supports AP, Station, Bridge and WDS modes. “AP Mode” provides pure Access Point function. The simplest way to build up a wireless LAN is to use “AP Mode”. “Station Mode” enables the computers become wireless stations. “AP Bridge Mode” provides the function to bridge more than 2 wired Ethernet networks together by wireless LAN. You can use two Access Points with “AP Bridge-Point to Point mode” to bridge two wired Ethernet networks together. If you

want to bridge more than two wired Ethernet networks together, you have to use enough Access Points with “AP Bridge-Point to Multi-Point mode”. An Access Point with “AP Bridge-Point to Point mode” or “AP Bridge-Point to Multi-Point mode” can only be used to bridge wired Ethernet networks together. It can’t accept connection from other wireless station at the same time. If you want an Access Point to bridge wired Ethernet network and provide connection service for other wireless station at the same time, you have to set the Access Point to “AP Bridge-WDS mode”. Simply speaking, “AP Bridge-WDS mode” function is the combination of “AP mode” and “AP Bridge-Point to Multi-Point mode”.

### 3.2.2.1 AP, Bridge and WDS Mode

#### AP Mode Setting Page:

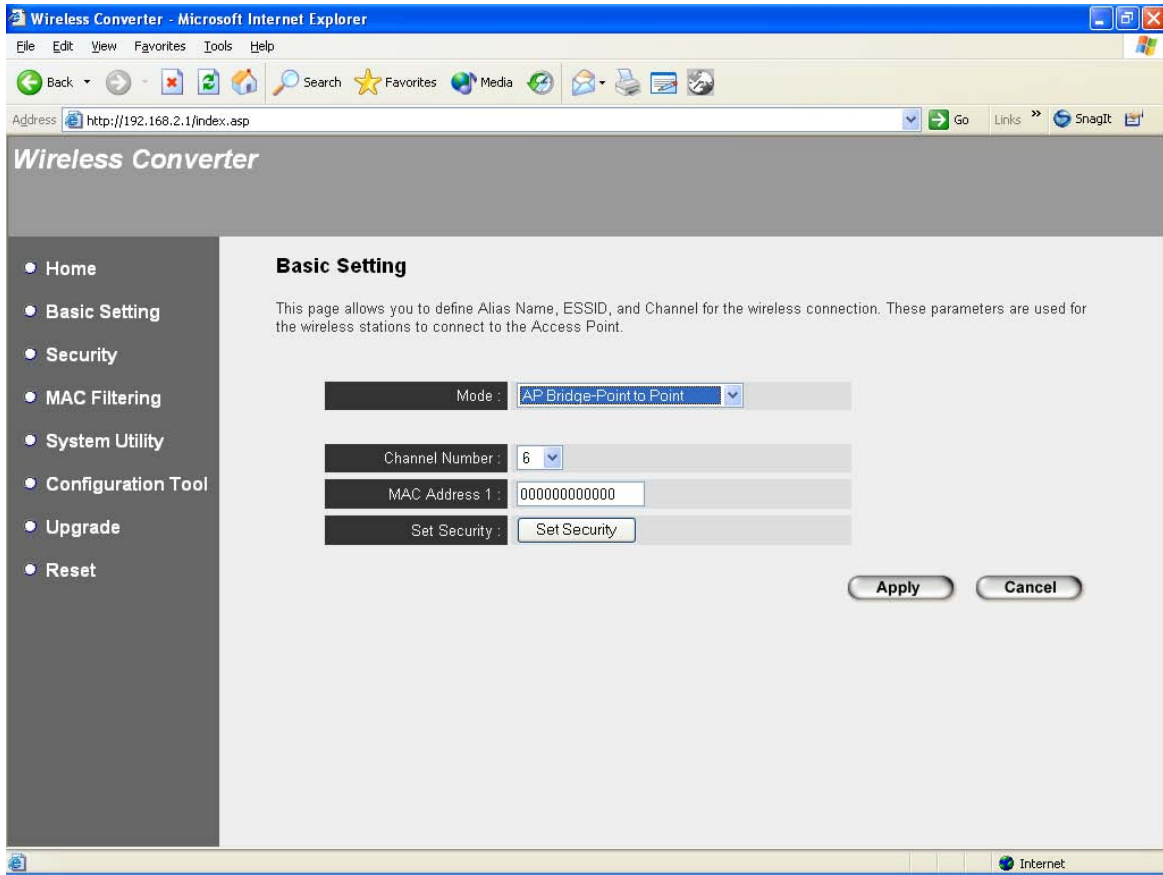


The screenshot shows the 'Basic Setting' page of the Wireless Converter web interface. The browser window title is 'Wireless Converter - Microsoft Internet Explorer' and the address bar shows 'http://192.168.2.1/index.asp'. The page has a navigation menu on the left with options: Home, Basic Setting (selected), Security, MAC Filtering, System Utility, Configuration Tool, Upgrade, and Reset. The main content area is titled 'Basic Setting' and contains the following fields:

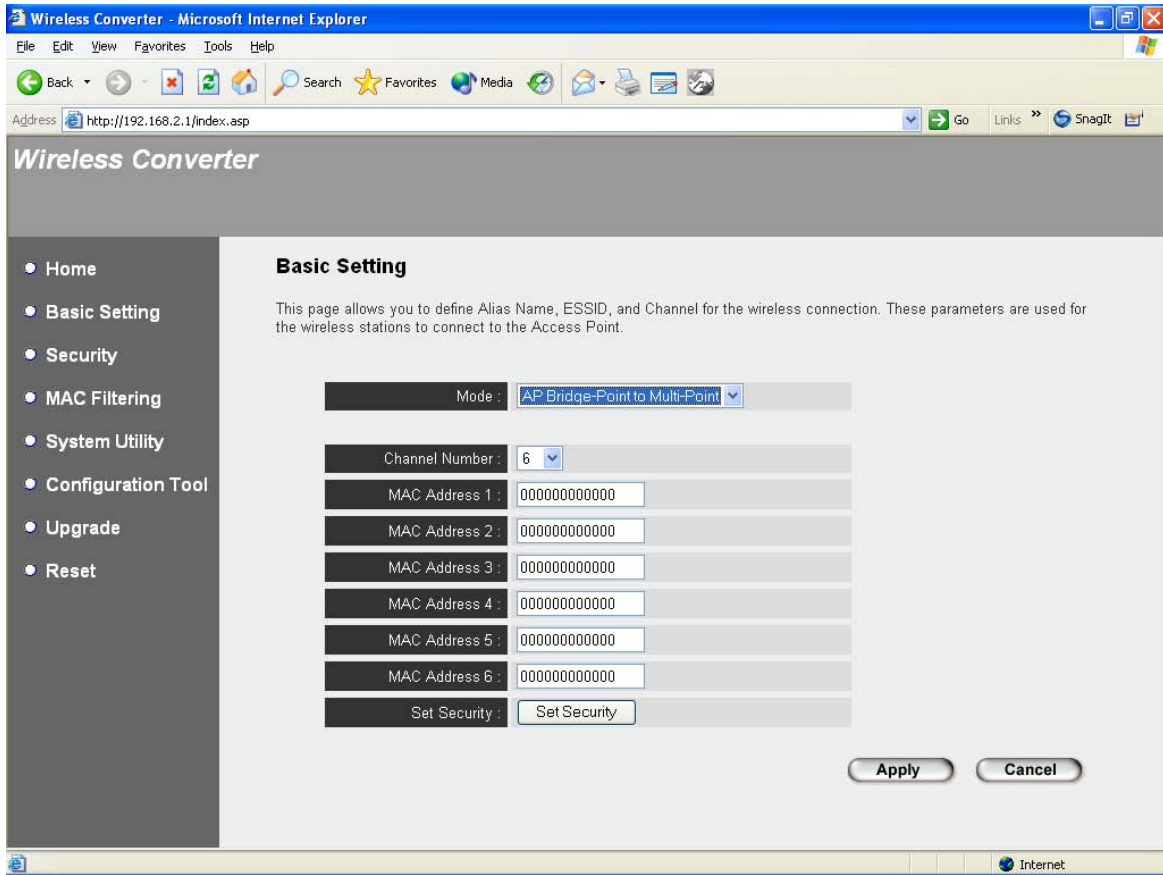
- Mode: AP (dropdown menu)
- Alias Name: Wireless Converter (text input)
- ESSID: default (text input)
- Channel Number: 6 (dropdown menu)
- Associated Clients: Show Active Clients (button)

At the bottom right of the form area, there are two buttons: 'Apply' and 'Cancel'. A status bar at the bottom of the browser window shows 'Internet'.

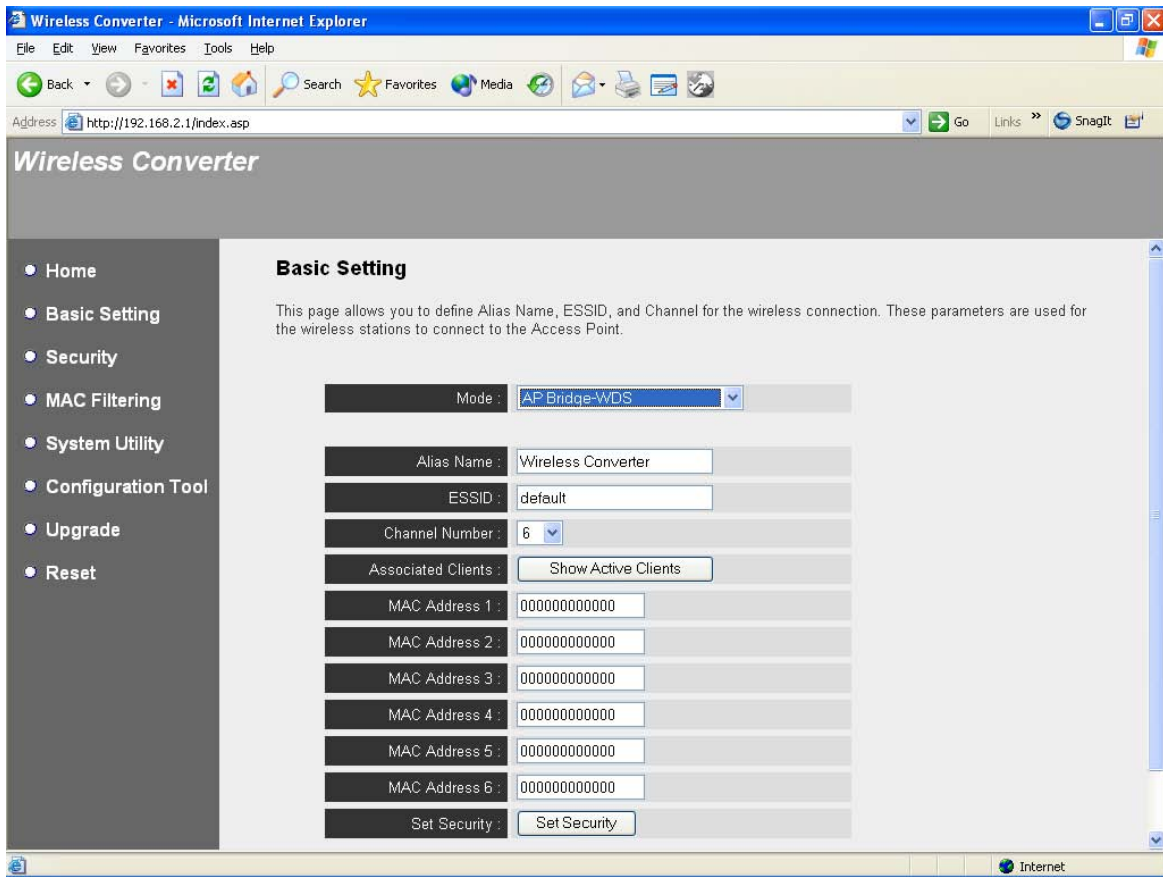
#### AP Bridge-Point to Point Mode Setting Page:



**AP Bridge-Point to Multi-Point Mode Setting Page:**



**AP Bridge-WDS Mode Setting Page:**



Parameter	Description
Alias Name	Define a recognizable name to be the alias name for this Wireless Converter.
ESSID	The ESSID (up to 32 printable ASCII characters) is the unique name identified in a WLAN. The ID prevents the unintentional merging of two co-located WLANs. Please make sure that the ESSID of all stations in the same WLAN network are the same. The default ESSID is “ <b>default</b> ”.
Channel Number	Select the appropriate channel from the list provided to correspond with your network settings. Channels differ from country to country. Channel 1-11 (North America) Channel 1-14 (Japan) Channel 1-13 (Europe) There are 14 channels available.
Associated Clients	Click “Show Active Clients” button, then an “Active Wireless Client Table” will pop up. You can see the status of all active wireless stations that are



connecting to the Wireless Converter.

#### MAC Address

If you want to bridge more than one wired Ethernet network together with wireless LAN, you have to set this Wireless Converter to “AP Bridge-Point to Point mode”, “AP Bridge-Point to Multi-Point mode” or “AP Bridge-WDS mode”. You have to enter the MAC addresses of other Wireless Converters that join the bridging network.

#### Set Security

Click “Set Security” to set up security. From here, you can only enable WEP setting, for more setting, please enter into “Security” option in the left side of the screen.

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Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

### Active Wireless Client Table

“Active Wireless Client Table” records the status of all active wireless stations that are connecting to the Wireless Converter in “AP mode”, “AP Bridge-Point to Point mode”, “AP Bridge-Point to Multi-Point mode” and “AP Bridge-WDS mode”. You can lookup the MAC Address and Power Saving Status of each active wireless client in this table.



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Parameter	Description
MAC Address	MAC address of this active wireless station.
Power Saving	Shows if the wireless client is in Power Saving mode.

---

## Set Security

Please refer to section 3.2.4 for the detail description of WEP setting.

**WDS Security Setup - Microsoft Internet Explorer**

### Security Setup

This page allows you setup the WEP key value. If WEP is enabled, you must set the same WEP key among these APs. You could choose use 64-bit or 128-bit as the encryption key, and select ASCII or Hex as the format of input value.

**Enable WEP Security**

**Key Length :** 64-bit

**Key Format :** ASCII (5 characters)

**Default Key :** Key 1

**Encryption Key 1 :** \*~\*~\*~\*~\*

**Encryption Key 2 :** \*~\*~\*~\*~\*

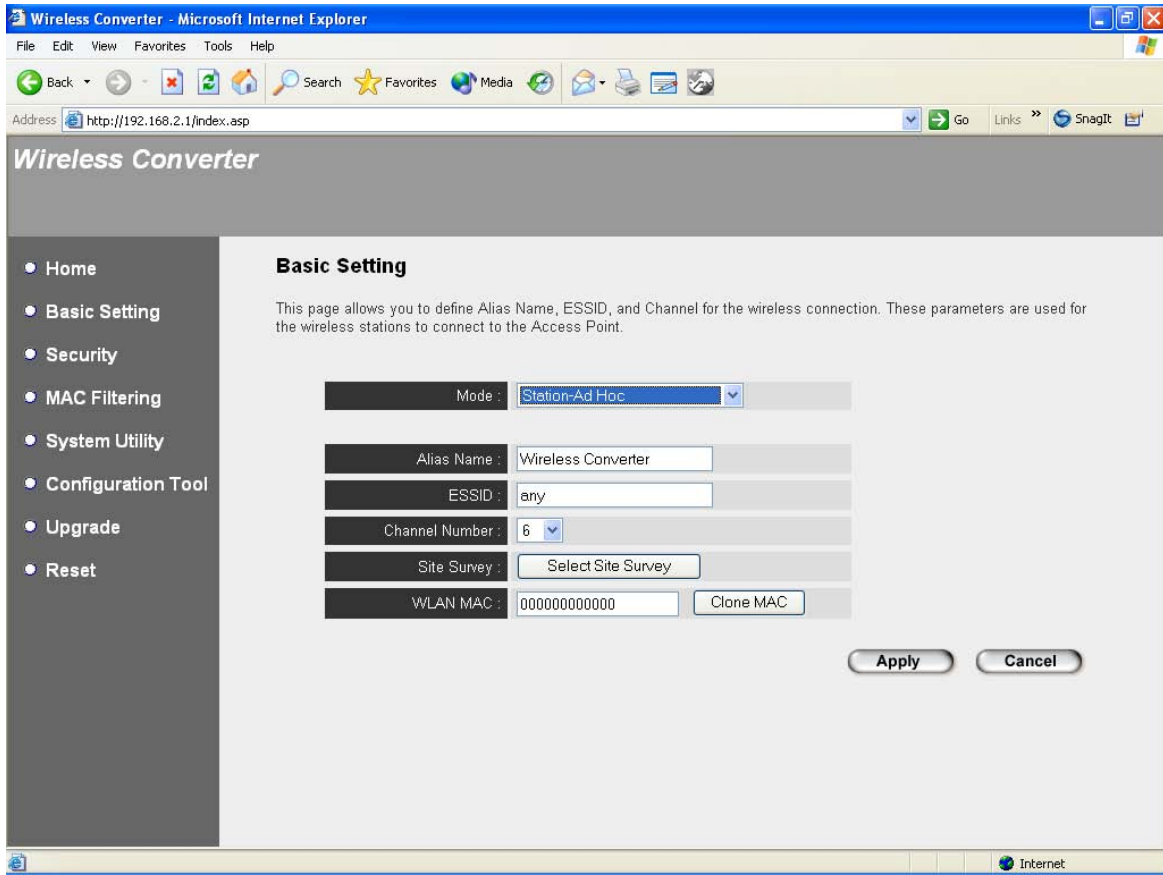
**Encryption Key 3 :** \*~\*~\*~\*~\*

**Encryption Key 4 :** \*~\*~\*~\*~\*

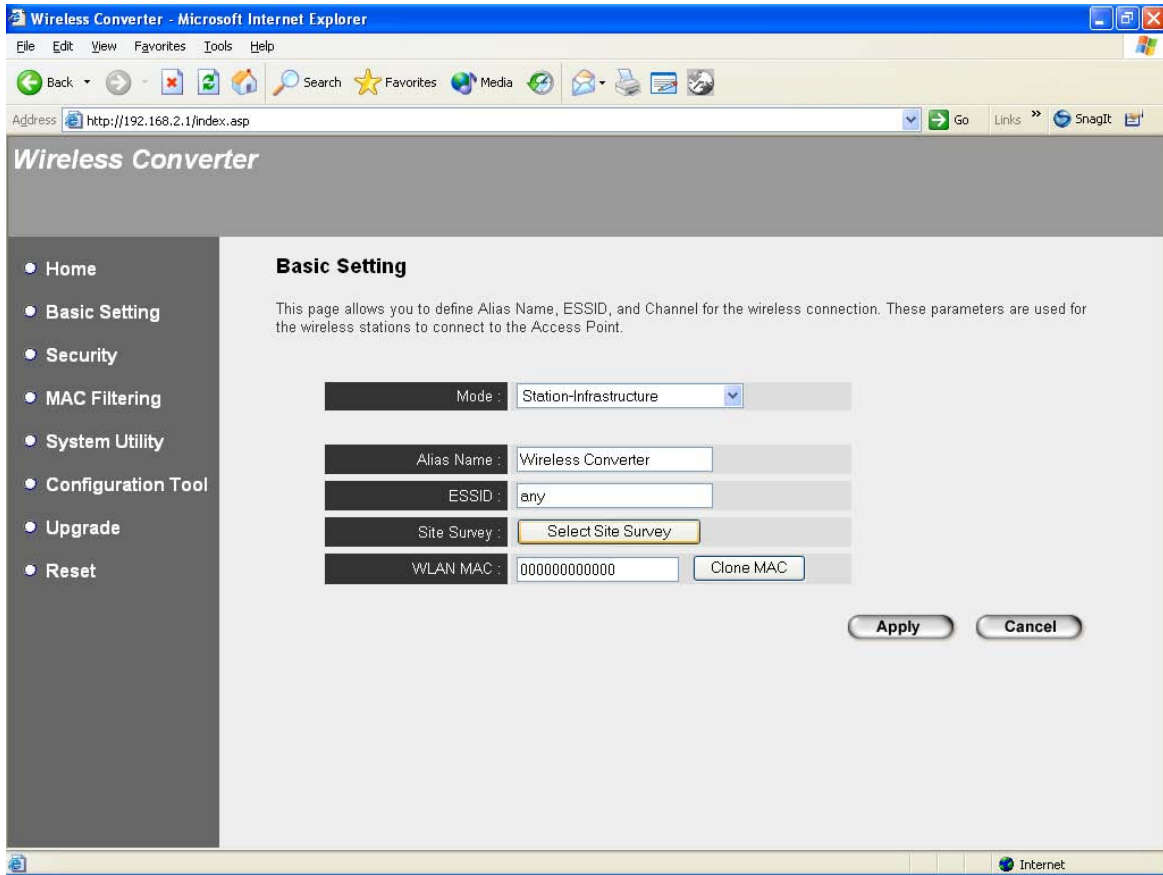
**Apply** **Cancel**

### 3.2.2.2 Station-Ad-Hoc/Infrastructure Mode

#### Station-Ad Hoc Mode Setting Page:

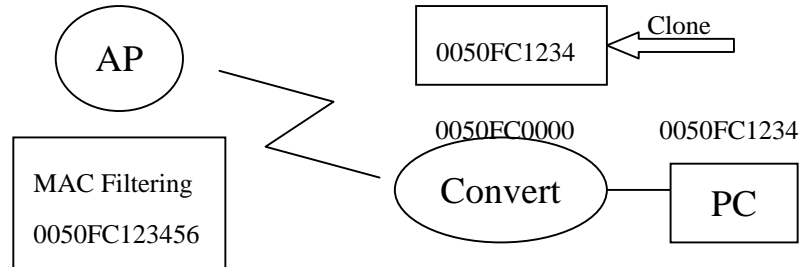


**Station-Infrastructure Mode Setting Page:**



Parameter	Description
Alias Name	Define a recognizable name to be the alias name for this Wireless Converter.
ESSID	The ESSID (up to 32 printable ASCII characters) is the unique name identified in a WLAN. The ID prevents the unintentional merging of two co-located WLANs. Please make sure that the ESSID of all stations in the same WLAN network are the same. The default ESSID is “ <b>default</b> ”.
Wireless Site Survey	When you use this wireless converter as a wireless station for wired network device to have wireless capability, you have to associate it will a working access point. Click “Select Site Survey” button, then a “Wireless Site Survey Table” will pop up. It will list all available access points near by. You can select one access point in the table and it will join wireless LAN through this access point.
WLAN MAC	If you wan to change the MAC Address of the converter to the PC’s MAC Address that the Converter is connecting to, please select “Clone MAC”.

When the MAC address filtering function of AP is enabled, the AP can filter the PC, but not the converter.



Instruction:

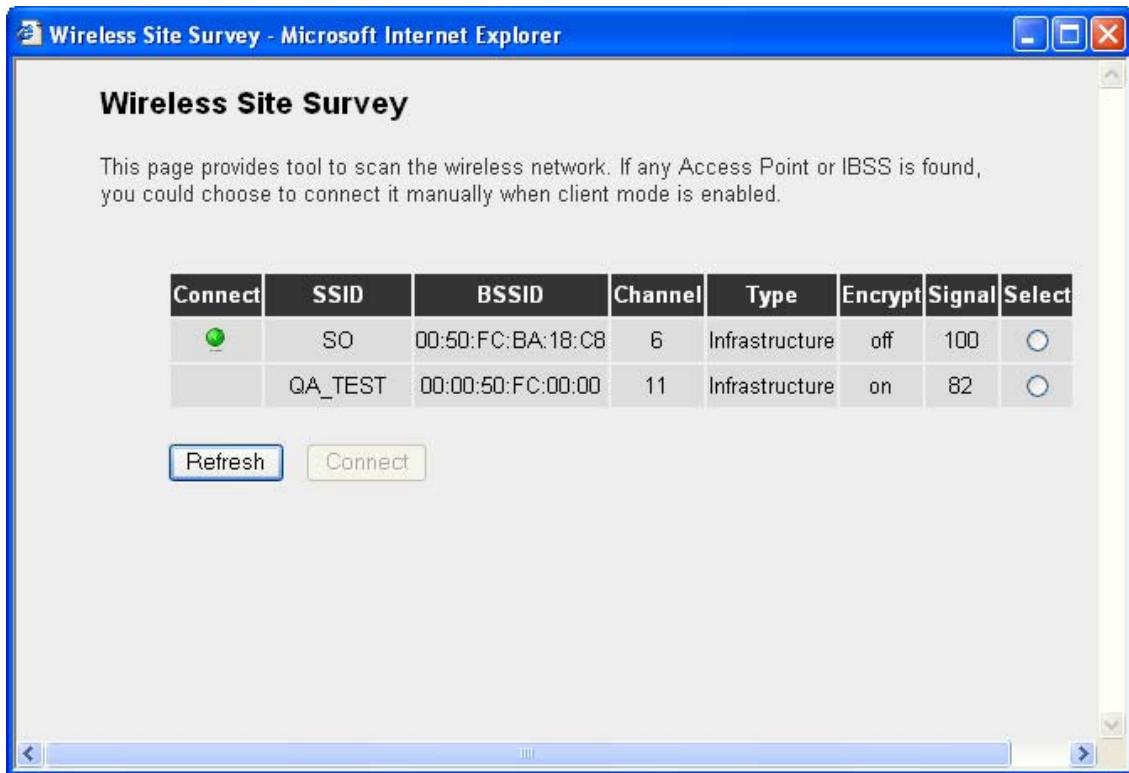
1. Enter "000000000000" in WLAN MAC and click "Clone MAC" the MAC Address is based on Converter's.
2. Enter "xxxxxxxxxxxx" in WLAN MAC and click "Clone MAC" the MAC Address is based on the MAC Address you entered.
3. Let the text box blank and click "Clone MAC", the MAC Address is based on the PC's MAC Address.

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Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

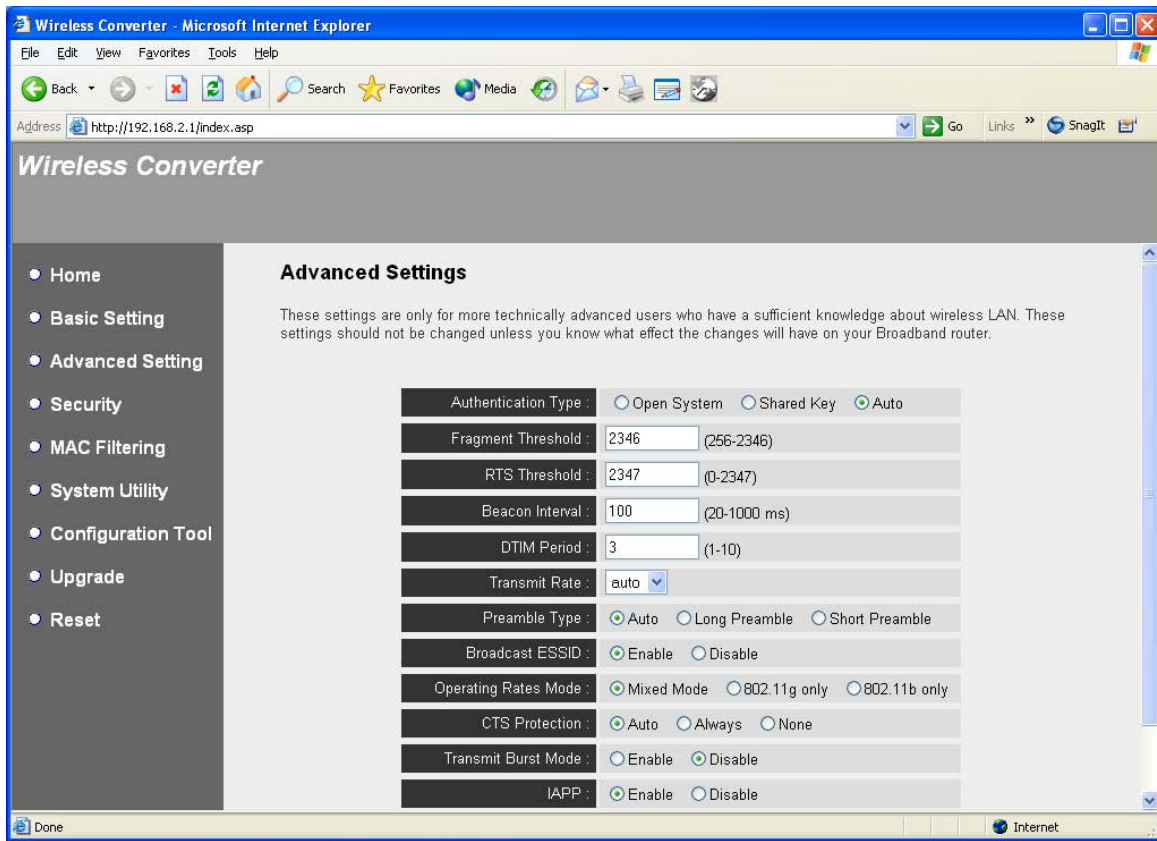
## Select Site Survey

When this wireless converter is in "Station-Ad Hoc mode" or "Station-Infrastructure mode", it should associate with a wireless station or an access point. "Wireless Site Survey" searches for all available access points and wireless stations nearby. You can select one of wireless devices listed in this table.



### 3.2.3 Advanced Setting

You can set advanced parameters of this Wireless Converter. The parameters include Authentication Type, Fragment Threshold, RTS Threshold, Beacon Interval, DTIM Period, Transmit Rate, Broadcast ESSID, Operating Rates Mode, CTS Protection, Transmit Bust Mode. You should not change these parameters unless you know what effect the changes will have on this Wireless Converter.



Parameter	Description
Authentication Type	There are two authentication types: “Open System” and “Shared Key”. When you select “Open System”, wireless stations can associate with this Wireless Converter without WEP encryption. When you select “Shared Key”, you should also setup WEP key in the “Encryption” page and wireless stations should use WEP encryption in the authentication phase to associate with this Wireless Converter. If you select “Both”, the wireless client can associate with this Wireless Converter by using any one of these two authentication types.
Fragment Threshold	“Fragment Threshold” specifies the maximum size of packet during the fragmentation of data to be transmitted. If you set this value too low, it will result in bad performance.
RTS Threshold	When the packet size is smaller the RTS threshold, the Wireless Converter will not use the RTS/CTS mechanism to send this packet.



Beacon Interval	The interval of time that this Wireless Converter broadcast a beacon. Beacon is used to synchronize the wireless network.
DTIM Period	Determines the interval the Wireless Converter will send its broadcast traffic.
Transmit Rate	The "Transmit Rate" is the rate this Wireless Converter uses to transmit data packets. The Wireless Converter will use the highest possible selected transmission rate to transmit the data packets.
Preamble Type	Preamble type defines the length of preamble block in the frames during the wireless communication. "Short Preamble" is suitable for high traffic wireless network. "Long Preamble" can provide more reliable communication.
Broadcast ESSID	If you enable "Broadcast ESSID", every wireless station located within the coverage of this Wireless Converter can discover this Wireless Converter easily. If you are building a public wireless network, enabling this feature is recommended. Disabling "Broadcast ESSID" can provide better security.
Operating Rates Mode	It allows to select the "Mixed Mode(11g/b)" or "11g only mode".
CTS Protection	<p>It is recommended to enable the protection mechanism. This mechanism can decrease the rate of data collision between 802.11b and 802.11g wireless stations. When the protection mode is enabled, the throughput of the AP will be a little lower due to many of frame traffic should be transmitted.</p> <p><b>Auto</b> – Based on the status of the network and automatically disable/enable protection mode.</p> <p><b>Always</b> – Always enable the protection mode.</p> <p><b>None</b> – Always disable the protection mode.</p>

**Transmit Burst Mode**                      Transmit Burst enables the AP to deliver the better throughput in the same period and environment.

**IAPP**    If you enable “IAPP”, the wireless converter will automatically broadcast information of associated wireless stations to its neighbors. This will help wireless station roaming smoothly between access points. If you have more than one wireless converters in your wireless LAN and wireless stations have roaming requirements, enabling this feature is recommended. Disabling “IAPP” can provide better security.

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Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

### **3.2.4 Security**

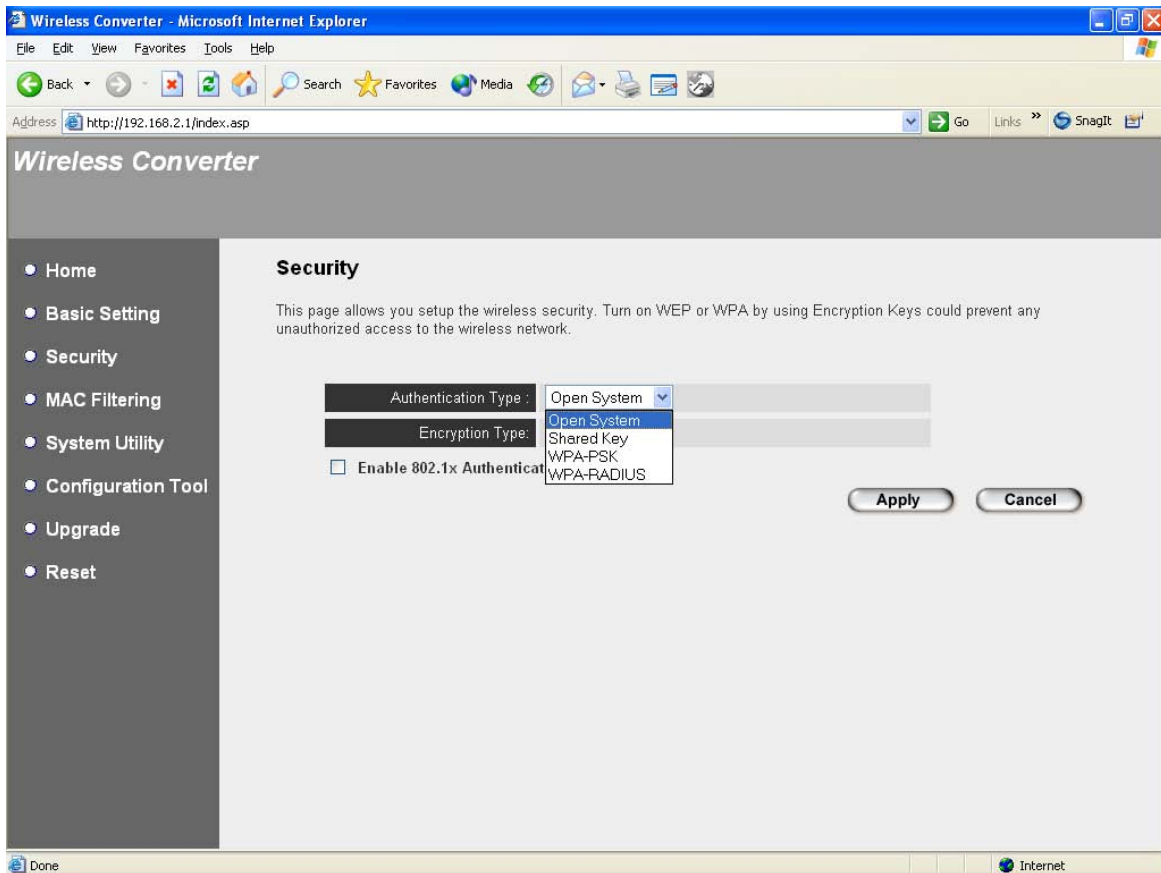
This Wireless Converter provides complete wireless LAN security functions, the authentication methods including Open System, Shared Key, WPA-PSK, WPA-RADIUS and full function of IEEE 802.1x; the encryption functions including WEP, TKIP and AES. With these security functions, you can prevent your wireless LAN from illegal access. Please make sure your wireless stations use the same security function.

The security setting for Station Mode and AP mode are different. For the security setting in Station Mode including “Station-Ad Hoc Mode” and “Station-Infrastructure Mode”, please refer to section 3.2.4.1. For the security setting in AP mode including “AP Mode”, “AP Bridge-Point to Point Mode”, “AP Bridge-Point to Multi-Point Mode” and “AP Bridge-WDS Mode, please refer to section 3.2.4.2.

#### **3.2.4.1 Security Setting in Station Mode**

##### **Authentication Type**

The authentication type defines the way that the access point recognizes the identity of wireless clients.



Parameter	Description
Open System	No authentication is needed among the wireless network. Open System mode only supports WEP encryption way.
Shared Key	Only wireless devices using a shared key (WEP Key identified) are allowed to connect each other. Shared Key mode only supports WEP encryption way.
WPA-PSK	It is a special mode designed for home and small business users who do not have access to network authentication servers. In this mode, known as Pre-Shared Key, the user manually enters the starting password in their access point or router, as well as in each station on the wireless network. WPA takes over automatically from that point, keeping unauthorized users that don't have the matching password from joining the network, while encrypting the data traveling between authorized

devices. WPA-PSK mode only supports encryption ways including TKIP and AES.

## WPA-RADIUS

This mode is for enterprise with an Authentication Server (Radius Server), a Certificate Server, WPA-enabled access point/router, and a WPA-enabled wireless station. Once WPA is enabled, all stations and access points on the network must be WPA-enabled in order to access the network. WPA mode only supports encryption ways including TKIP and AES.

## Enable 802.1x Authentication

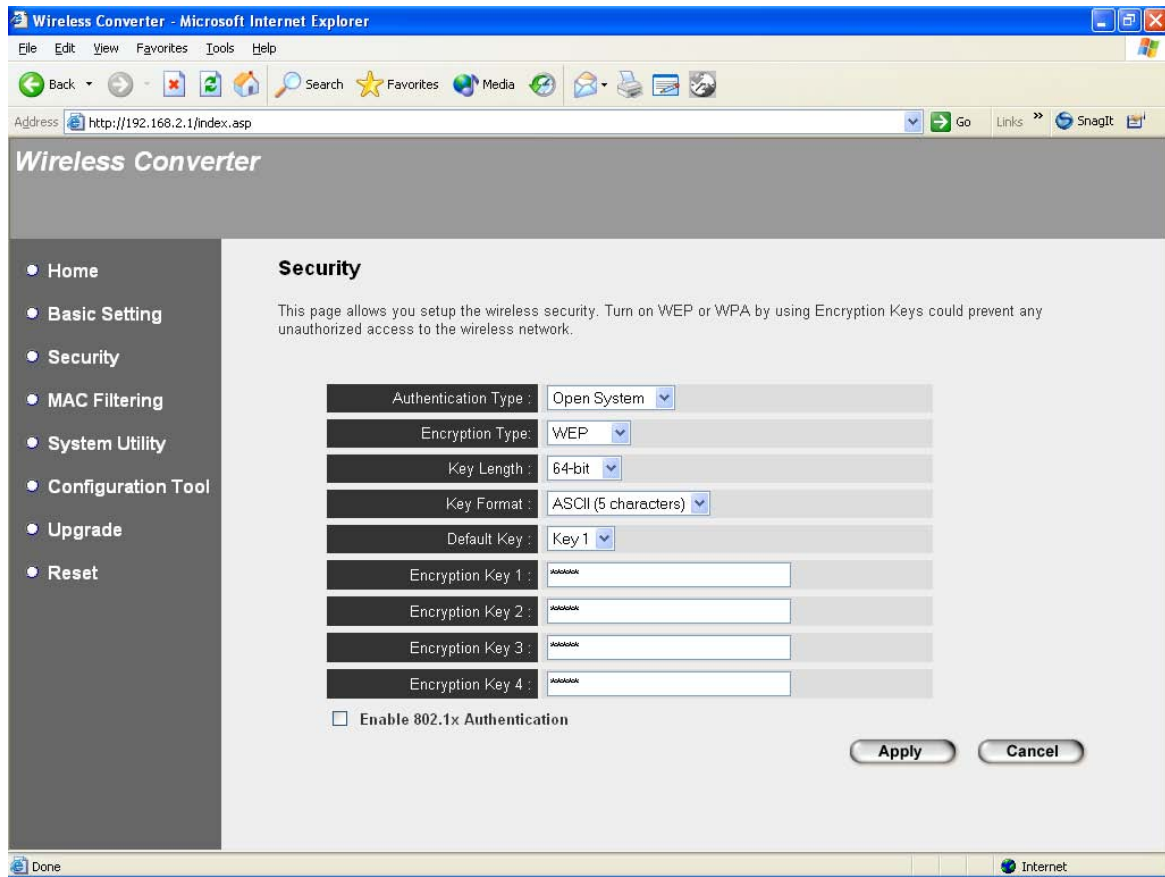
IEEE 802.1x is an authentication protocol. This Wireless Converter supports multiple 802.1x authentication type including PEAP, TLS, TTLS and MD5-Challenge. The authentication conditionally needs an Authentication Server and a Certificate.

---

Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

## WEP

WEP is an encryption algorithm, which protects authorized Wireless LAN users against eavesdropping. The WEP key of wireless stations must be the same with the Wireless Converter. This Wireless Converter supports 64/128-bit WEP Encryption function. With this function, your data will be transmitted over the wireless network securely.



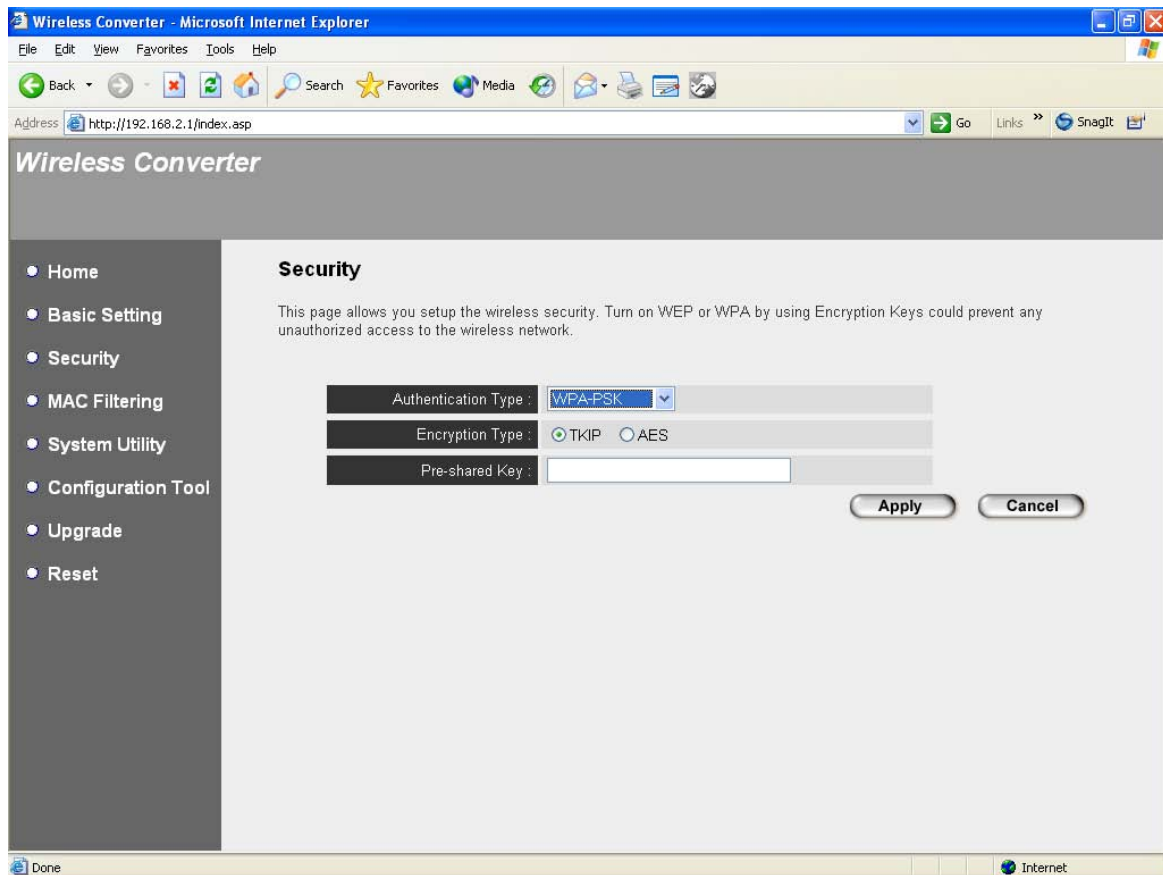
Parameter	Description
Key Length	You can select the 64-bit or 128-bit key to encrypt transmitted data. Larger WEP key length will provide higher level of security, but the throughput will be lower. You can also select <b>Disable</b> to transmit data without encryption.
Key Format	You may select to select ASCII Characters (alphanumeric format) or Hexadecimal Digits (in the “A-F”, “a-f” and “0-9” range) to be the WEP Key. For example: ASCII Characters: guest Hexadecimal Digits: 12345abcde
Default Key	Select one of the four keys to encrypt your data. Only the key you select it in the “Default key” will take effect.
Key 1 - Key 4	The WEP keys are used to encrypt data transmitted in the wireless network. Fill the text box by following the rules below. 64-bit WEP: input 10-digit Hex values (in the “A-F”, “a-f” and “0-9” range)

or 5-digit ASCII character as the encryption keys.

128-bit WEP: input 26-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 13-digit ASCII characters as the encryption keys.

Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

## WPA-PSK



Parameter	Description
Encryption Type	<p>There are two ways for data encryption including TKIP and AES.</p> <p>TKIP – TKIP (Temporal Key Integrity Protocol) changes the temporal key every 10,000 packets. This insures much greater security than the standard WEP security.</p> <p>AES – AES has been developed to ensure the highest degree of security and authenticity for digital information and it is the most advanced solution defined by IEEE 802.11i for the security in the wireless network.</p>

**Pre-shared Key** It is the setting for WPA-PSK mode. Enter 8 to 63 digits of ASCII format to be the password for the authentication within the network.

Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

## WPA-RAIUS

Wi-Fi Protected Access (WPA) is an advanced security standard. You can use an external RADIUS server to authenticate wireless stations and provide the session key to encrypt data during communication. It uses TKIP and AES to change the encryption key frequently. This can improve security very much.

The screenshot shows the 'Security' configuration page in the Wireless Converter web interface. The page title is 'Security' and it includes a descriptive paragraph: 'This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to the wireless network.'

The configuration form contains the following fields and options:

- Authentication Type:** WPA-RADIUS (selected)
- Encryption Type:**  TKIP  AES
- EAP Type:** TTLS (selected)
- Identity:** (empty text field)
- Tunnel Protocol:** MSCHAPv2 (selected)
- Tunnel ID:** CHAP, MSCHAP, MSCHAPv2 (dropdown menu)
- Tunnel Password:** EAP-MD5 (dropdown menu)
- Enable Client Certificate**
- Private Key Password:** (empty text field)
- Client Certificate:** Add (button)

At the bottom right of the form, there are two buttons: **Apply** and **Cancel**.

## Get the Client Certificate

Before using EAP-TLS to login the RADIUS server, you have to get the Client Certificate first. In general, there are three steps.

1. Use Microsoft Internet Explore to import or install a Client Certificate issued from the Certificate Server.
2. Export the Client Certificate from the Microsoft Internet Explore into a PFX file.
3. Use the tool transfer.exe to transform the PFX Client Certificate into a CLTCER.TGZ file that you have to upload to the Wireless Converter.

**Note:** If you already have Client Certificate files in DER/PEM or PFX format. You can just skip step 1 and 2 and directly jump to step 3.

**Note:** Your Internet Explore version should 5.0 or above.

Below are the detail descriptions about the three steps.

### **Step 1**

Use Microsoft Internet Explore to import or install a Client Certificate issued from the Certificate Server. The Client Certificate installation method depends on the Certificate Server. Please refer to the user's manual of the Certificate Server.

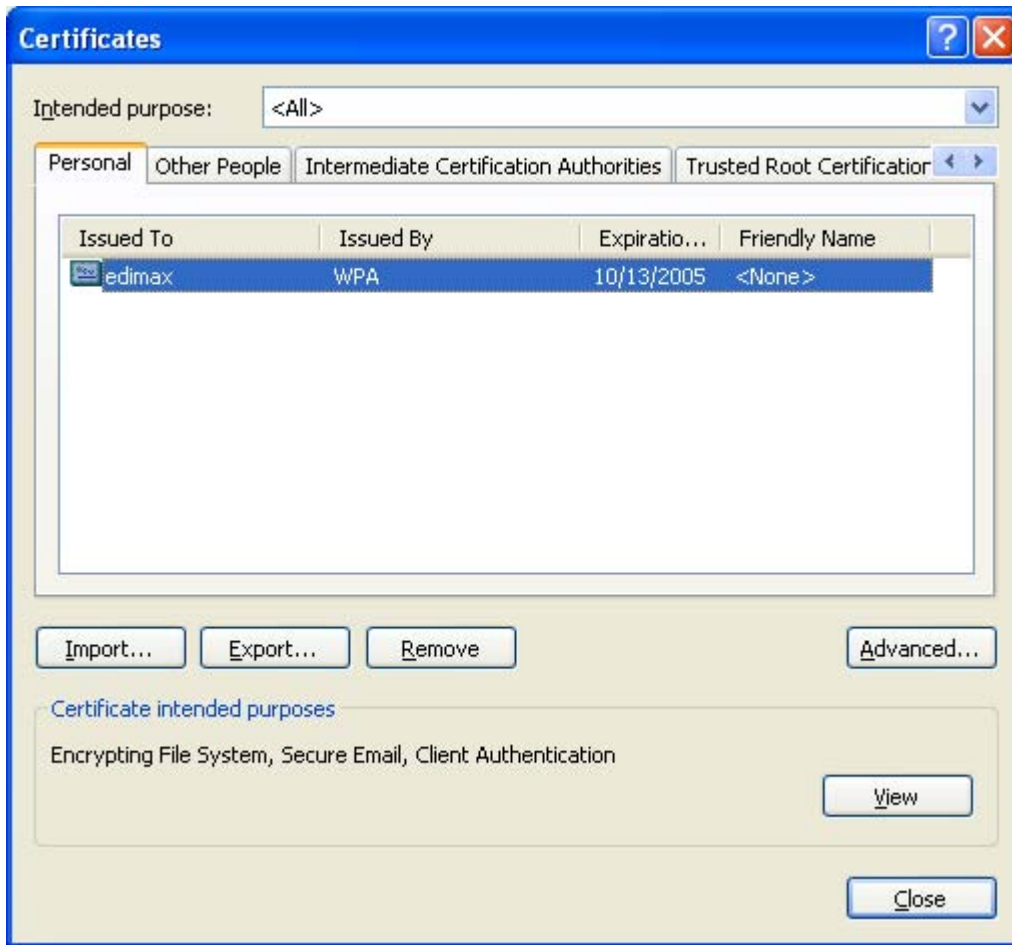
### **Step 2**

Export the Client Certificate from the Microsoft Internet Explore into a PFX file. In the Microsoft Internet Explore, go to the "Tools → Internet Options". In the "Internet Options" window, go to tab "Content".





Click “Certificates” button, then pop-up the “Certificates” window. In the “Certificates” window, you can find the Client Certificate that you just import or install.



Select the Client Certificate that you want to export and then click “Export”, then the “Certificate Export Wizard” will pop-up. The “Certificate Export Wizard” will guide you through all the procedures to export the Client Certificate.



Click “Next”.



Select “Yes, export the private key” and click “Next”.



Check “Enable strong protection” and click “Next”.



Enter the password used to protect the private key and then click “Next”.



Assign the path and file name to save the exported Client Certificate and then click “Next”. A window will pop-up to display the conclusion information about the Client Certificate export procedure.



Click “Finish” to confirm, then pop-up a window to hint the success.



You have successfully export the Client Certificate from the Microsoft Internet Explore.

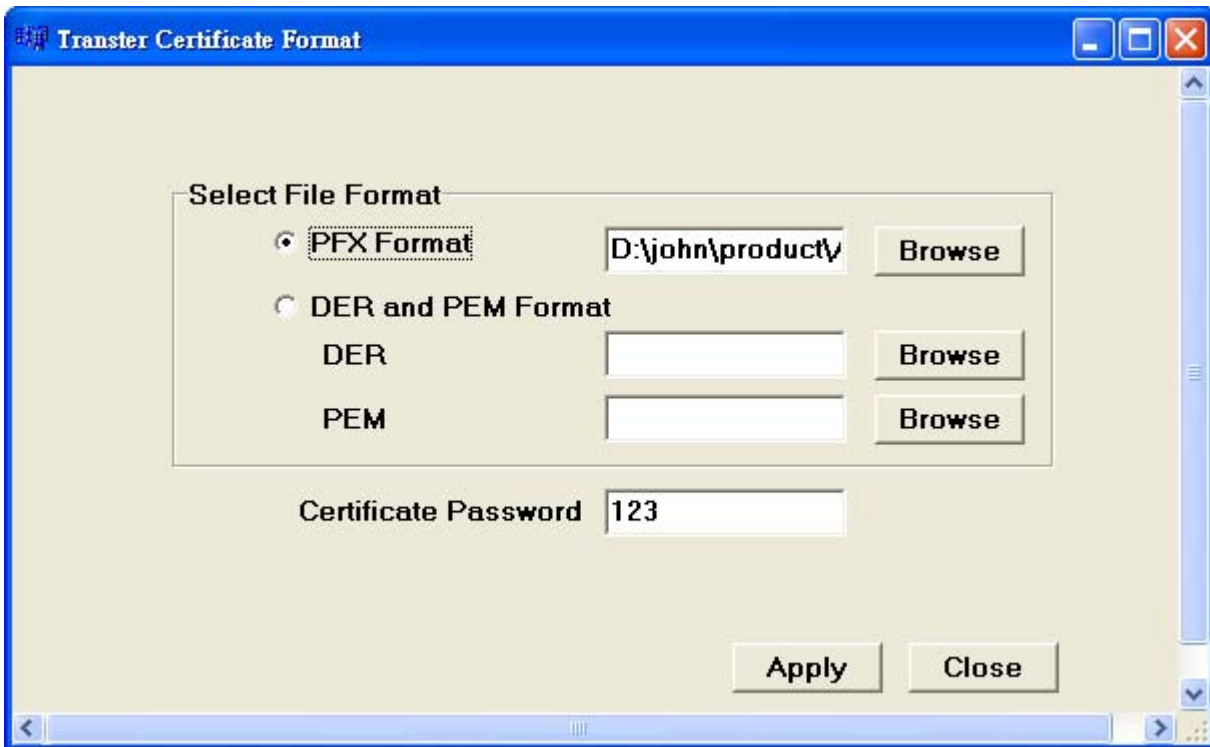
### Step 3

Before uploading the Client Certificate into the Wireless Converter, you have to transform the Client Certificate to the format used by the Wireless Converter. You can use the transformation utility, shipped with this Wireless Converter, to do this transformation.

To install the transformation utility, just unzip transfer.zip into a folder. You can see a executable file transfer.exe in the folder. The transfer.exe is the main program of the transformation utility.

transfer.exe can transform DER/PEM or PFX format Client Certificate into the format used by this Wireless Converter. If your Client Certificate is not one of these two formats, please transform it into one of these two formats first. (Microsoft Internet Explore is a good option to do this kind of transformation.)

Before the transformation, you have to copy the Client Certificate to be transformed into the same folder as the transfer.exe. Then execute transfer.exe.

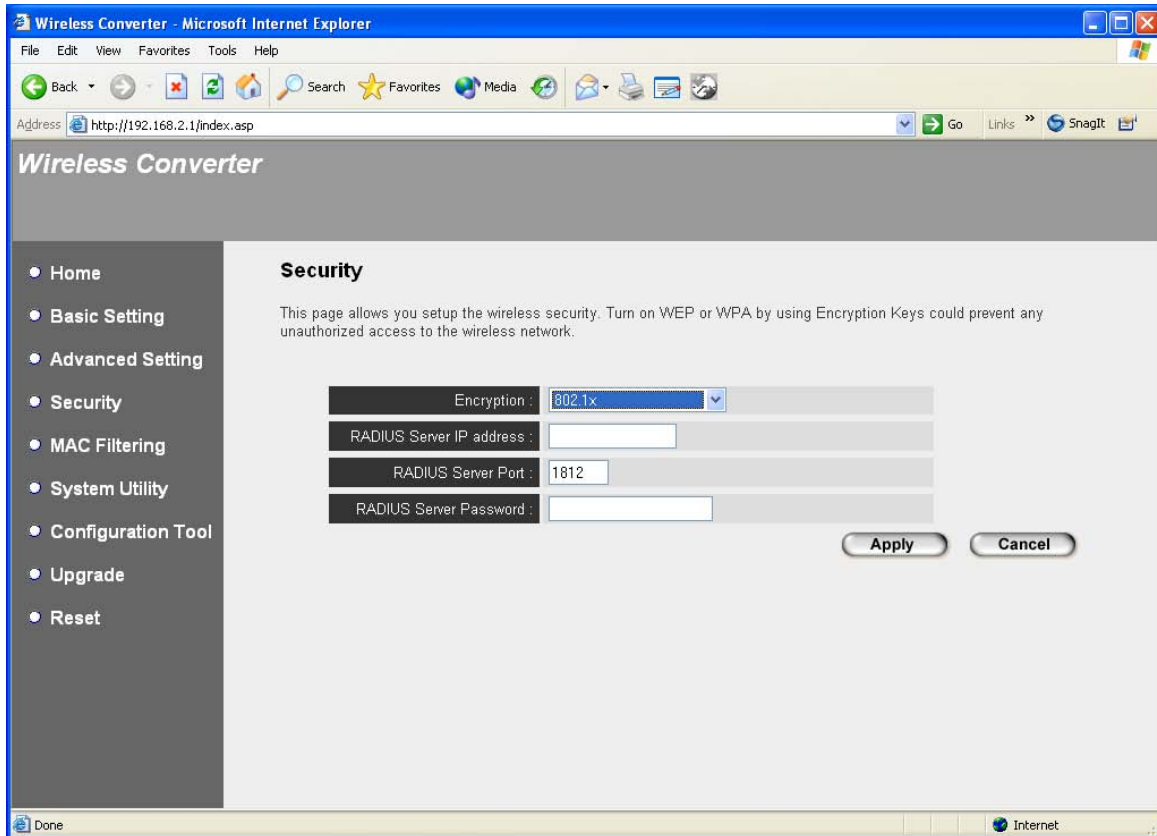


1. Select the Client Certificate format according the format of your Client Certificate.
2. If your Client Certificate is PFX format, there is only one .PFX file. If your Client Certificate is CER/PEM format, there are two files – .DER file and .PEM file. Click “Browse” button to assign the path of you Client Certificate files.
3. Enter the password used to protect the private key of Client Certificate.
4. Click “Apply”.
5. After a few seconds, there exists a file CLTCER.TGZ in the installation folder of transfer.exe. You have finished the Client Certificate transformation. You have to upload CLTCER.TGZ file into the Wireless Converter.
6. Click “Close” to close the transformation utility.



## 802.1x

IEEE 802.1x is an authentication protocol. Every user must use a valid account to login to this Wireless Converter before accessing the wireless LAN. The authentication is executed by a RADIUS server. You have to build up an external RADIUS server within the network.



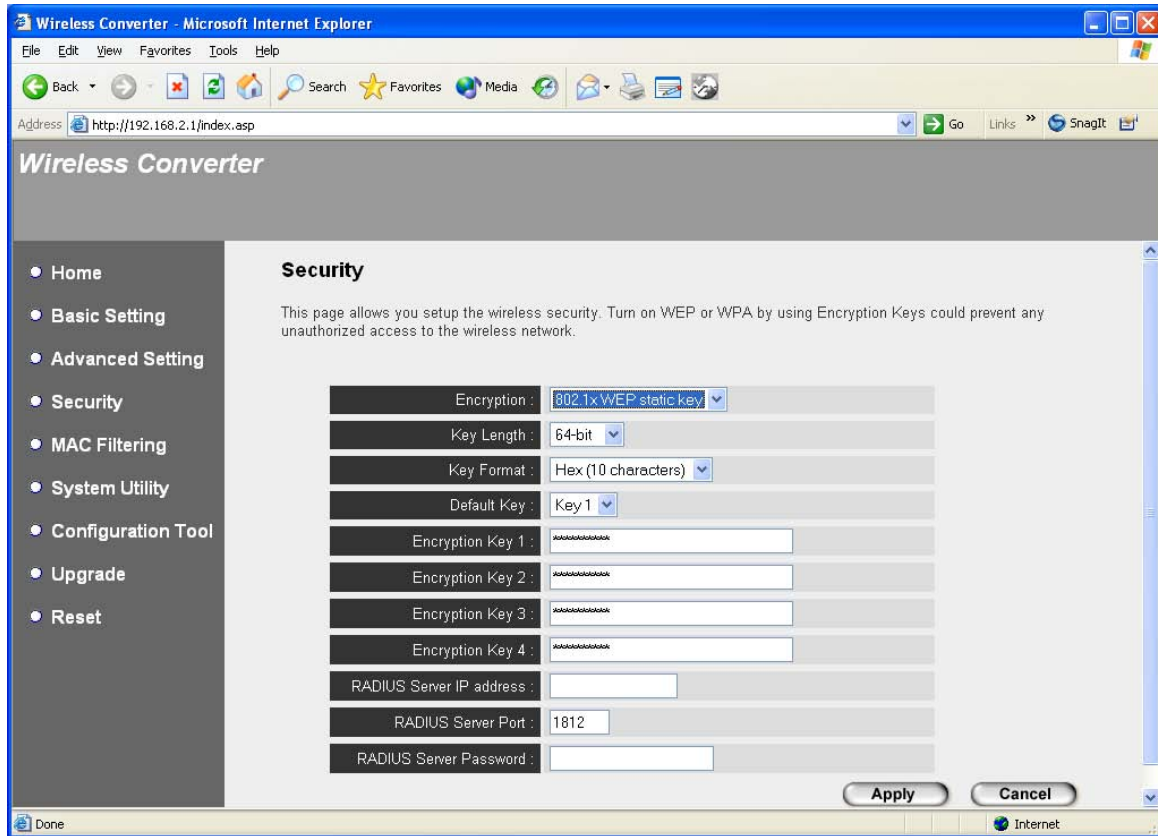
Parameter	Description
RADIUS Server IP address	Enter the IP address of external RADIUS server.
RADIUS Server Port	The service port of the external RADIUS server.
RADIUS Server Password	The password used by external RADIUS server.

Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

## 802.1x WEP static key



IEEE 802.1x is an authentication protocol, while WEP is a data encryption protocol. Using IEEE 802.1x to authenticate a valid account and also protect the data communication within the wireless network by WEP encryption.



Parameter	Description
Key Length	You can select the 64-bit or 128-bit key to encrypt transmitted data. Larger WEP key length will provide higher level of security, but the throughput will be lower. You also can select <b>Disable</b> to transmit data without encryption.
Key Format	You may select to select ASCII Characters (alphanumeric format) or Hexadecimal Digits (in the "A-F", "a-f" and "0-9" range) to be the WEP Key. For example: ASCII Characters: guest Hexadecimal Digits: 12345abcde
Default Key	Select one of the four keys to encrypt your data. Only the key you select it in the "Default key" will take effect.

**Key 1 - Key 4**                      The WEP keys are used to encrypt data transmitted in the wireless network. Fill the text box by following the rules below.  
64-bit WEP: input 10-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 5-digit ASCII character as the encryption keys.  
128-bit WEP: input 26-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 13-digit ASCII characters as the encryption keys.

**RADIUS Server IP address**    The IP address of external RADIUS server.

**RADIUS Server Port**            The service port of the external RADIUS server.

**RADIUS Server Password**    The password used by external RADIUS server.

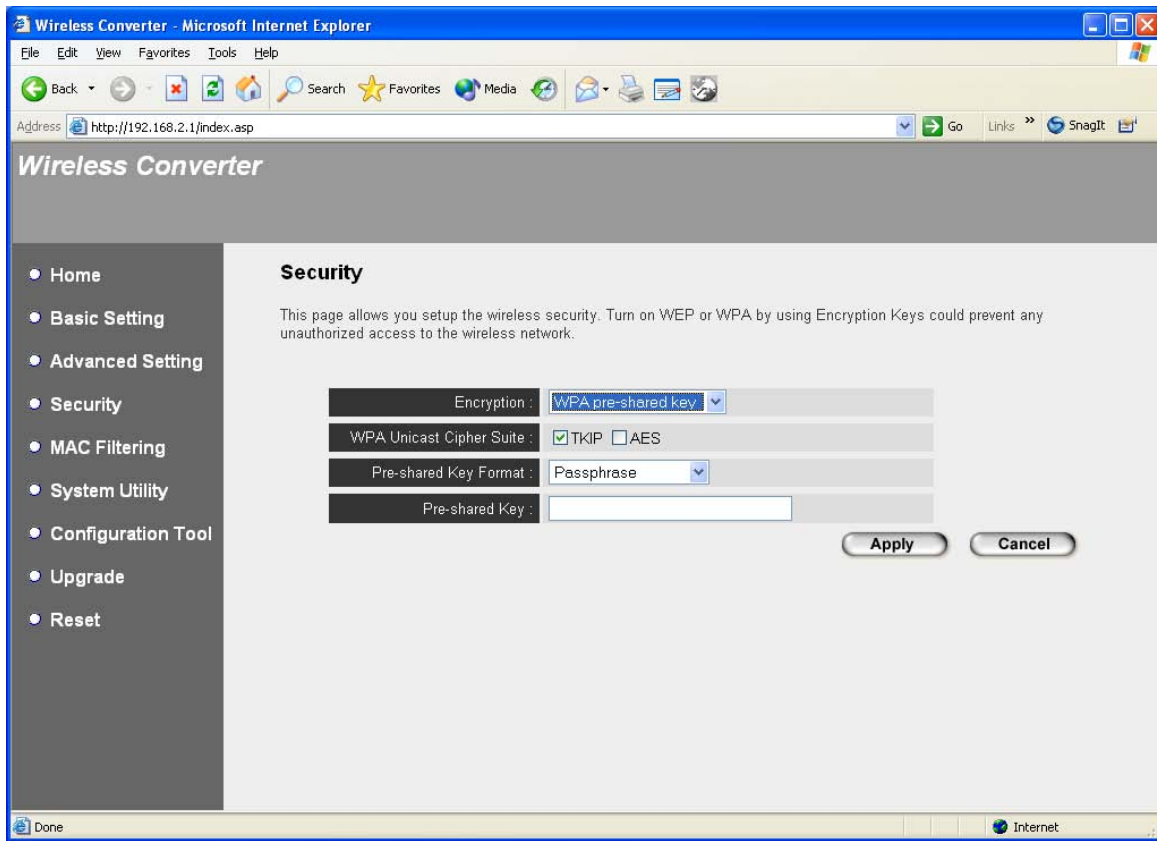
---

Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

### **WPA pre-shared key**

Wi-Fi Protected Access (WPA) is an advanced security standard. You can use a pre-shared key to authenticate wireless stations and encrypt data during communication. It uses TKIP to change the encryption key dynamically, so it can improve security significantly.

**Note:** This Wireless Converter does not provide AES encryption method.



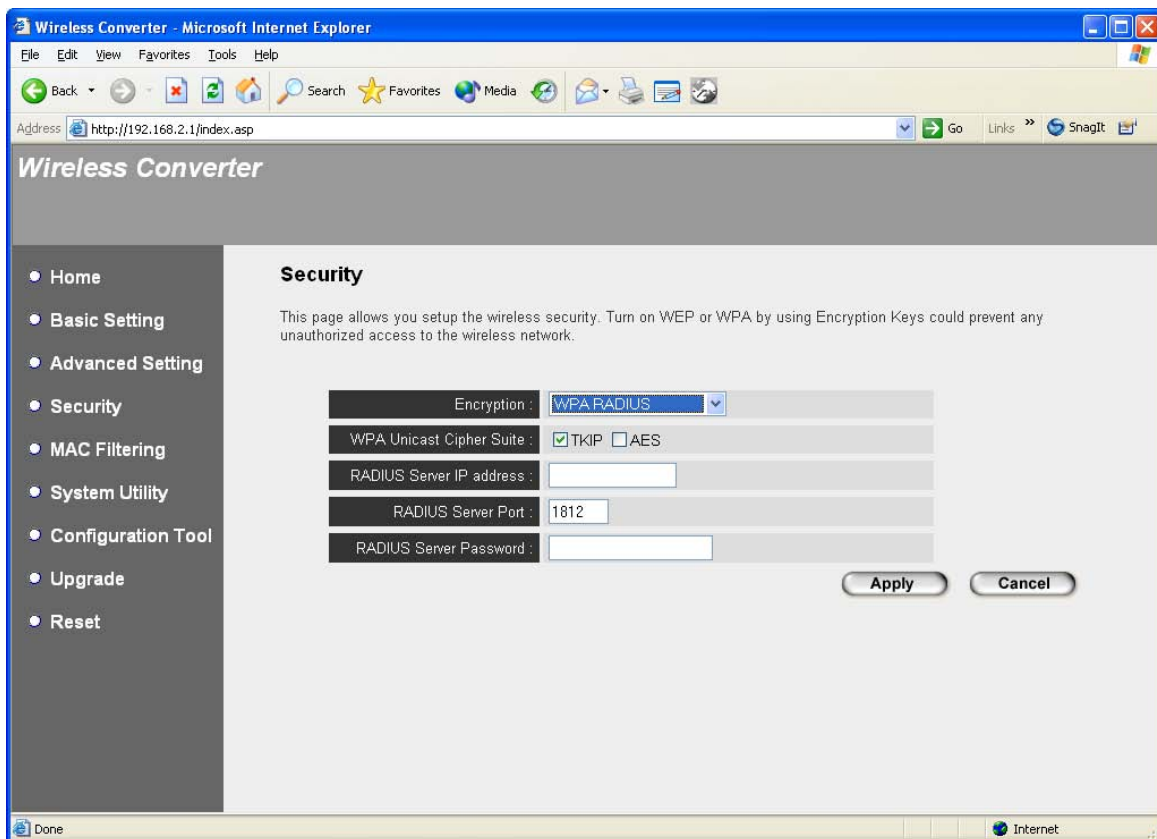
Parameter	Description
WPA Unicast Cipher Suite	<p>There are two ways for data encryption including TKIP and AES. AES will be supported in the near future.</p> <p>TKIP can change the encryption key frequently to enhance the wireless LAN security.</p>
Pre-shared Key Format	<p>You may select to select ASCII Characters (alphanumeric format) or Hexadecimal Digits (in the “A-F”, “a-f” and “0-9” range) to be the Pre-shared Key. For example:</p> <p>ASCII Characters: iamguest</p> <p>Hexadecimal Digits: 12345abcde</p>
Pre-shared Key	<p>The Pre-shared key is used to authenticate and encrypt data transmitted in the wireless network. Fill the text box by following the rules below.</p> <p>Hex WEP: input 64-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or at least 8 characters pass phrase as the pre-shared keys.</p>

Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

## WPA RAIUS

Wi-Fi Protected Access (WPA) is an advanced security standard. You can use an external RADIUS server to authenticate wireless stations and provide the session key to encrypt data during communication. It uses TKIP to change the encryption key frequently. This can improve security very much.

Note: This Wireless Converter does not provide AES encryption method.



Parameter	Description
WPA Unicast Cipher Suite	There are two ways for data encryption including TKIP and AES. AES will be supported in the near future. TKIP can change the encryption key frequently to enhance the wireless LAN security.
RADIUS Server IP address	The IP address of external RADIUS server.

**RADIUS Server Port**            The service port of the external RADIUS server.

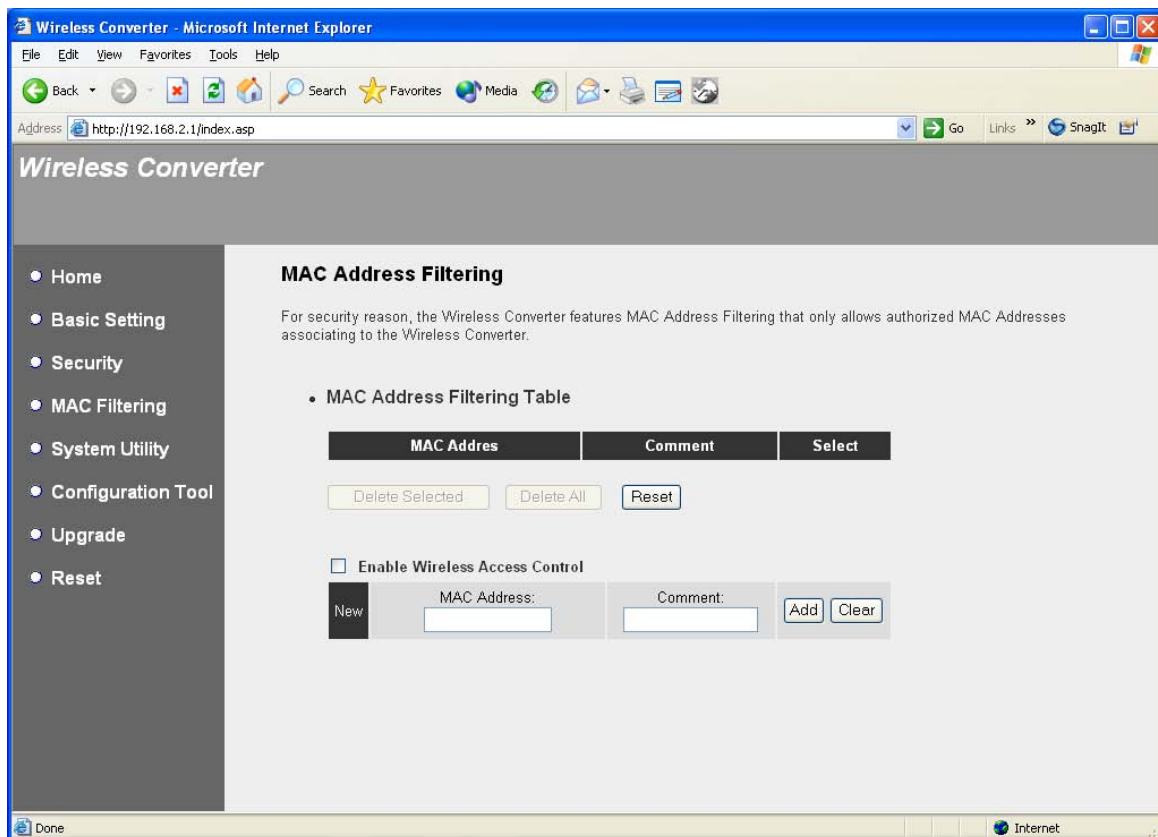
**RADIUS Server Password**    The password used by external RADIUS server.

---

Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

### 3.2.5 MAC Address Filtering

This Wireless Converter provides MAC Address Filtering, which prevents the unauthorized MAC Addresses from accessing your wireless network.



Parameter	Description
Filtering	Enable or disable the MAC Address Filtering function.
MAC Address Filtering Table	This table records the MAC addresses of wireless stations you want to allow to access your network. The "Comment" field is the description of the wireless station associated with the "MAC Address" and is helpful for you to recognize the wireless station.
Add MAC address into the table	In the bottom "New" area, fill in the "MAC Address" and "Comment" of the wireless station to be added and then click "Add". Then this wireless station will be added into the "MAC Address Filtering Table" above. If you find any typo before adding it and want to retype again. Just click "Clear"

and both "MAC Address" and "Comment" fields will be cleared.

**Remove MAC address from the table** If you want to remove some MAC address from the "MAC Address Filtering Table", select the MAC addresses you want to remove in the table and then click "Delete Selected". If you want remove all MAC addresses from the table, just click "Delete All" button.

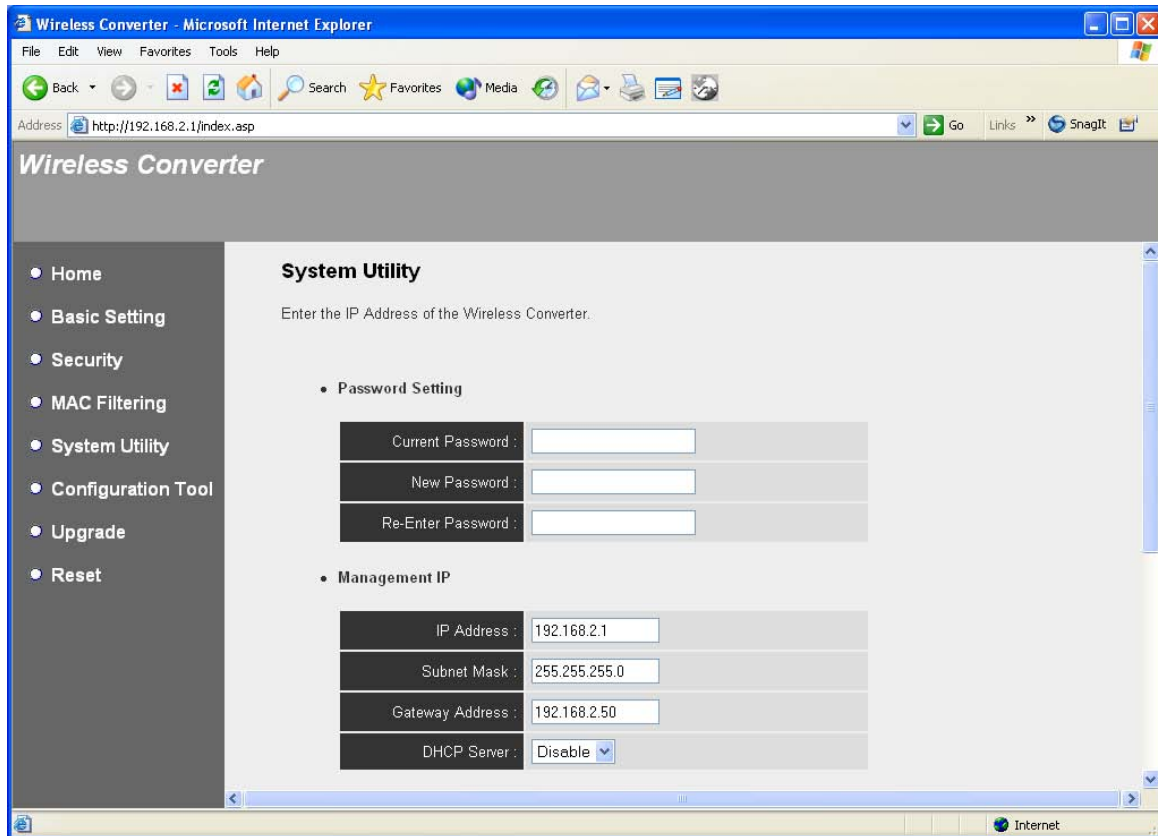
**Reset** Click "Reset" will clear your current selections.

---

Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

### 3.2.6 System Utility

From here, you can define the Wireless Converter's IP Address and Login Password and enable the Wireless Converter to be a DHCP Server.



Parameter	Description
Current Password	Enter the current password (up to 15-digit alphanumeric string) of the Wireless Converter. The default password for the Wireless Converter is <b>1234</b> . Note that the password is case-sensitive.
New Password	Enter the password (up to 15-digit alphanumeric string) you want to login to the Wireless Converter. Note that the password is case-sensitive.
Re-Enter Password	Reconfirm the password (up to 15-digit alphanumeric string) you want to login to the Wireless Converter. Note that the password is case-sensitive.
IP Address	Designate the Wireless Converter's IP Address. This IP Address should be unique in your network. The default IP Address is <b>192.168.2.1</b> .



**Subnet Mask** Specify a Subnet Mask for your LAN segment. The Subnet Mask of the Wireless Converter is fixed and the value is **255.255.255.0**.

**DHCP Server** Enable or disable the DHCP Server.

---

Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

### 3.2.6.1 [DHCP Server Setting](#)

DHCP Server will automatically give your LAN client an IP address. If the DHCP is not enabled then you'll have to manually set your LAN client's IP address.

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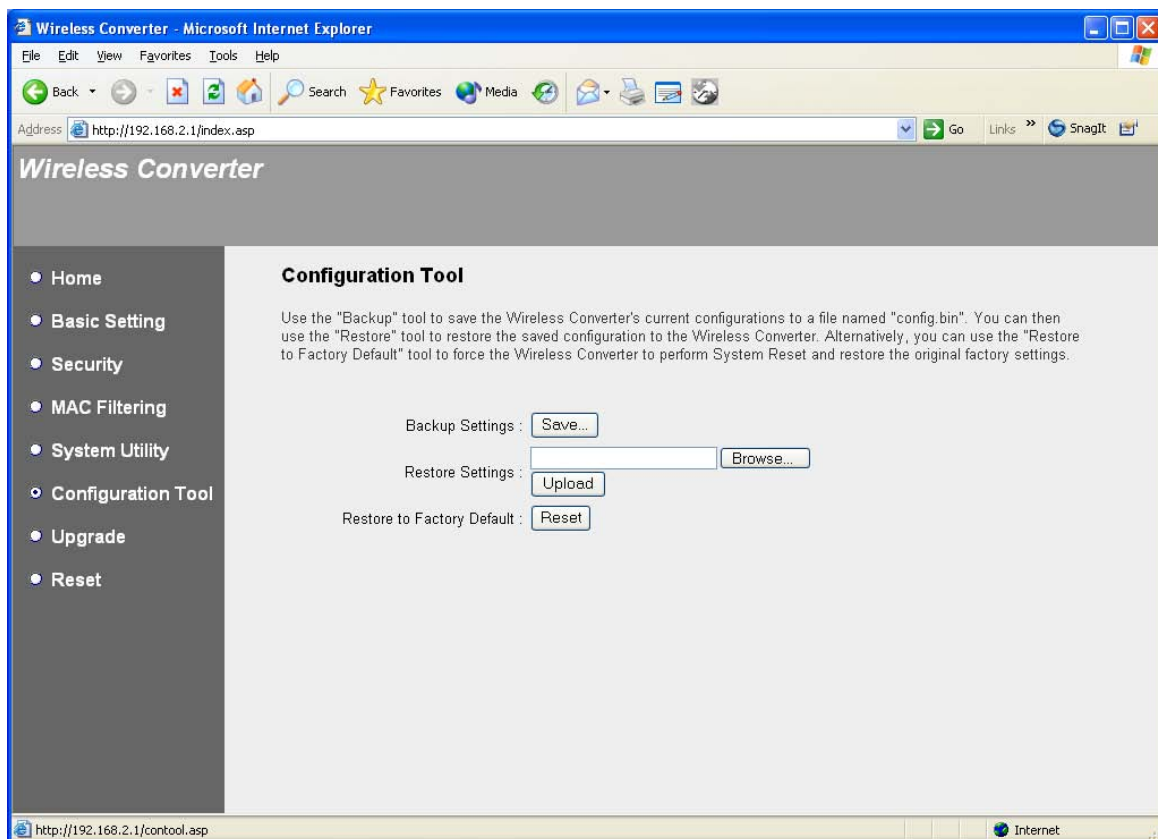
Parameter	Description
Default Gateway IP	Specify the gateway IP in your network. This IP address should be different from the Management IP.
Domain Name Server IP	This is the ISP's DNS server IP address that they gave you; or you can specify your own preferred DNS server IP address.
Start IP/End IP	You can designate a particular IP address range for your DHCP server to issue IP addresses to your LAN Clients. By default the IP range is from: Start IP <b>192.168.2.100</b> to End IP <b>192.168.2.200</b> .
Domain Name	You can specify the Domain Name for your Wireless Converter.
Lease Time	The DHCP Server when enabled will temporarily give your LAN client an IP address. In the Lease Time setting you can specify the time period that the DHCP Server lends an IP address to your LAN clients. The DHCP Server will change your LAN client's IP address when this time threshold period is reached.

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Click **Apply** button at the bottom of the screen to save the above configurations. You can now configure other advance sections or start using the Wireless Converter.

### 3.2.7 Configuration Tool

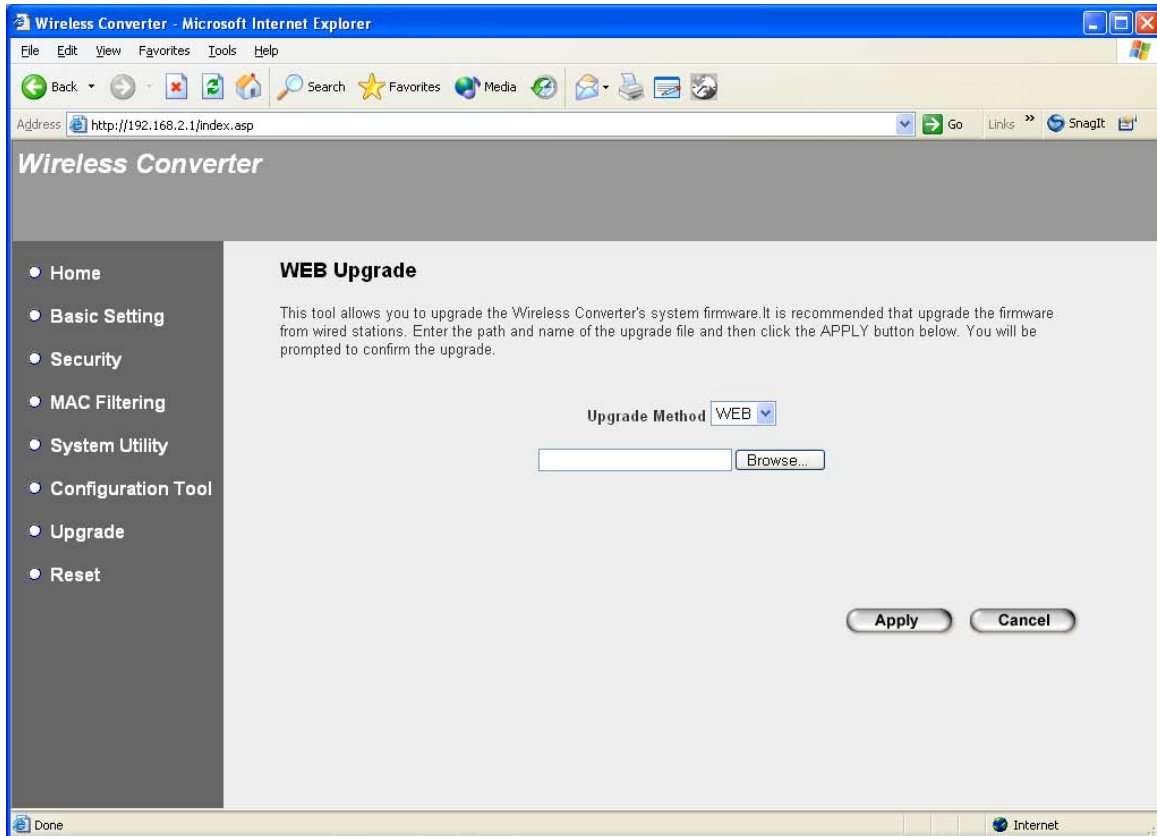
The Configuration Tools screen allows you to save (**Backup**) the Wireless Converter's current configuration setting. Saving the configuration settings provides an added protection and convenience should problems occur with the Wireless Converter and you have to reset to factory default. When you save the configuration setting (Backup) you can re-load the saved configuration into the Wireless Converter through the **Restore** selection. If extreme problems occur you can use the **Restore to Factory Default** selection, this will set all configurations to its original default settings (e.g. when you first purchased the Wireless Converter).



Parameter	Description
Configuration Tools	Use the <b>"Backup"</b> tool to save the Wireless Converter's current configuration to a file named "config.bin" on your PC. You can then use the <b>"Restore"</b> tool to upload and restore the saved configuration to the Wireless Converter. Alternatively, you can use the <b>"Restore to Factory Default"</b> tool to force the Wireless Converter to perform a power reset and restore the original factory settings.

### 3.2.8 Firmware Upgrade

This page allows you to upgrade the Wireless Converter's firmware.

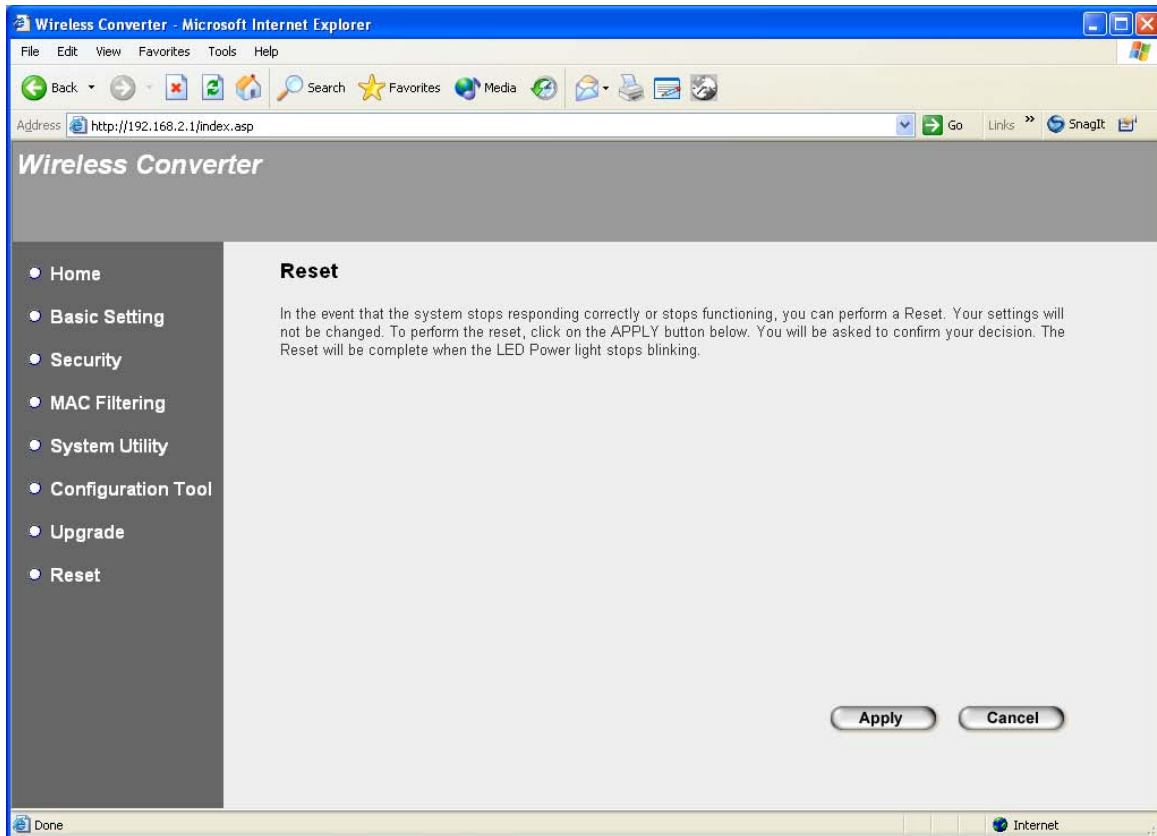


Parameter	Description
Firmware Upgrade	This tool allows you to upgrade the Wireless Converter's system firmware. To upgrade the firmware of your Wireless Converter, you need to download the firmware file to your local hard disk, and enter that file name and path in the appropriate field on this page. You can also use the <b>Browse</b> button to find the firmware file on your PC. Please reset the Wireless Converter when the upgrade process is complete.

Once you've selected the new firmware file, click **Apply** button at the bottom of the screen to start the upgrade process. (You may have to wait a few minutes for the upgrade to complete). Once the upgrade is complete you can start using the Wireless Converter.

### 3.2.9 Reset

You can reset the Wireless Converter's system should any problem exist. The reset function essentially Re-boots your Wireless Converter's system.



Parameter	Description
Reset	In the event that the system stops responding correctly or in some way stops functioning, you can perform a reset. <b>Your settings will not be changed.</b> To perform the reset, click on the <b>Apply</b> button. You will be asked to confirm your decision. Once the reset process is complete you may start using the Wireless Converter again.

## 4. Troubleshooting

This chapter provides solutions to problems usually encountered during the installation and operation of the Wireless Converter.

### 1. How to manually find your PC's IP and MAC Address?

- 1) In Windows, open the Command Prompt program
- 2) Type **ipconfig /all** and **Enter**
  - Your PC's IP address is the one entitled **IP address**
  - Your PC's MAC Address is the one entitled **Physical Address**

### 2. What is BSS ID?

A group of wireless stations and an Wireless Converter compose a Basic Service Set (BSS). Computers in a BSS must be configured with the same BSSID.

### 3. What is ESSID?

An Infrastructure configuration could also support roaming capability for mobile workers. More than one BSS can be configured as an Extended Service Set (ESS). Users within an ESS could roam freely between BSSs while maintaining a continuous connection to the wireless network stations and the Wireless LAN Wireless Converters.

### 4. Can data be intercepted while transmitting through the air?

WLAN features two-fold protection in security. On the hardware side, as with Direct Sequence Spread Spectrum technology, it has the inherent scrambling security feature. On the software side, the WLAN series offers the encryption function (WEP) to enhance security and access control.

### 5. What is WEP?

WEP stands for Wired Equivalent Privacy, a data privacy mechanism based on a 64(40)-bit shared key algorithm.

### 6. What is a MAC Address?

The Media Access Control (MAC) address is a unique number assigned by the manufacturer to any Ethernet networking device, such as a network adapter, that allows the network to identify it at the hardware level. For all practical purposes, this number is usually permanent. Unlike IP addresses, which can change every time a computer logs on to the network, the MAC address of a device stays the same, making it a valuable identifier for the network.

## **FEDERAL COMMUNICATIONS COMMISSION**

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.

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

### **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 radiated radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Note:

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

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation.