LevelOne

WNC-0301USB

11g Wireless USB adapter

User Manual

CONTENTS

1 Installation Procedure

Before you proceed with the installation, please notice following descriptions.

Note1: Please do not install the WNC-0301USB into your computer before installing the software program from the CD.

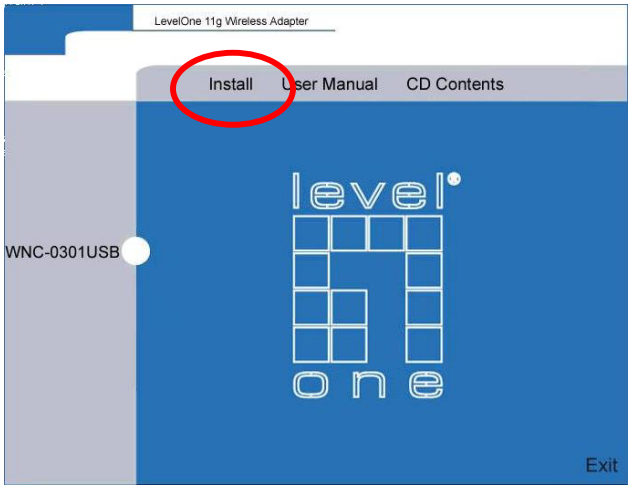
Note2: The following installation was operated in Windows XP. (Procedures are similar for Windows 98SE/Me/2000/2003 Server.)

Note3: If you have installed the Wireless PC Card driver & utility before, please uninstall the old version first.

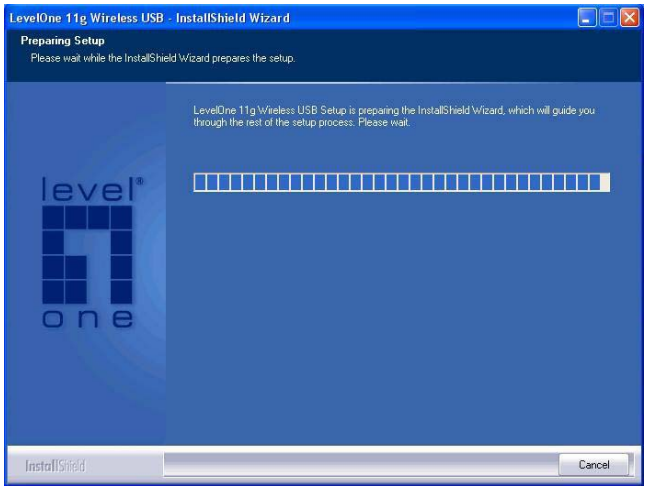
Please follow below instructions to install the WNC-0301USB.

I. Install the Configuration Utility

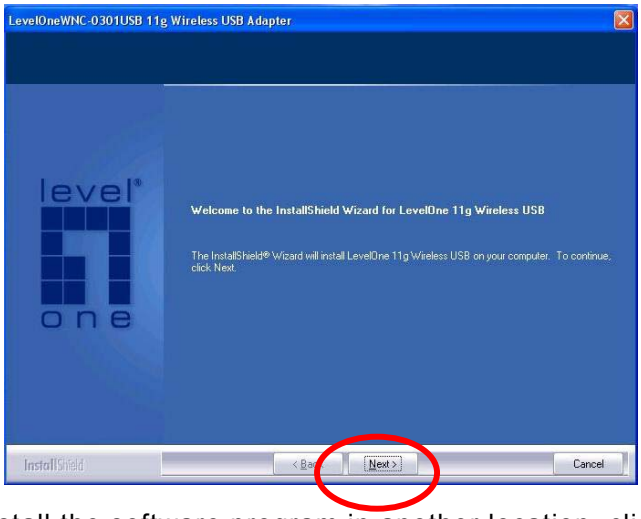
A. Insert the **WNC-0301USB** CD into the CD-ROM drive. The **WNC-0301USB** installation menu will start up automatically from the CD. Click "**Install**".



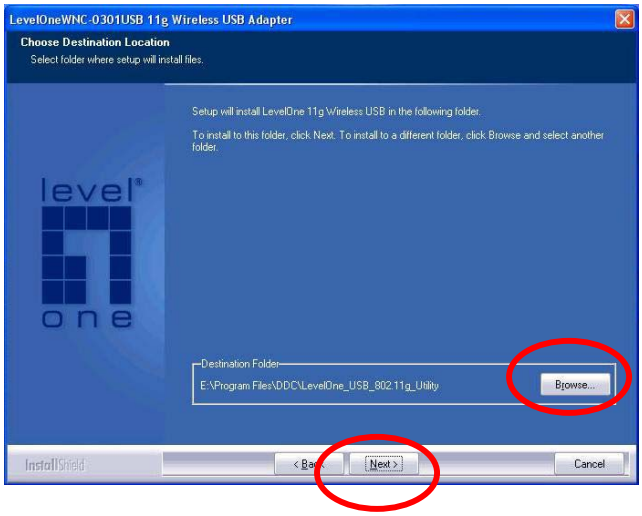
B. If the CD does not startup automatically (this function may be disabled in the Windows operating system), simply access the CD from Windows and click on the **setup.exe** program to access the installation menu

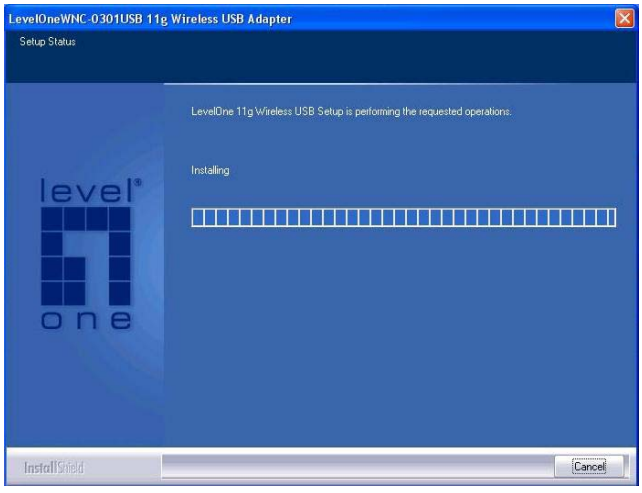


Then, click “**Next**”.

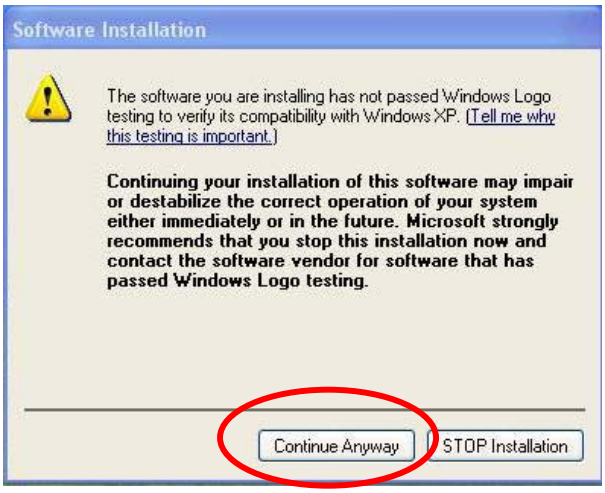


C. If you want to install the software program in another location, click “**Browser**” and select an alternative destination. Then, click “**Next**”.

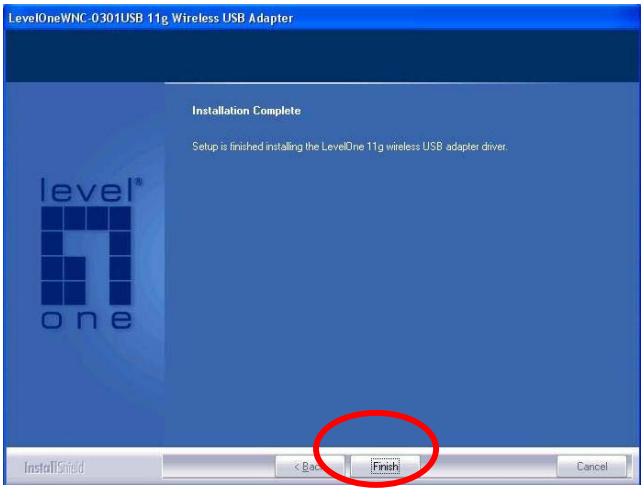




D. The system will display “**Software Installation**” screen. Click “**Continue Anyway**” to continue.



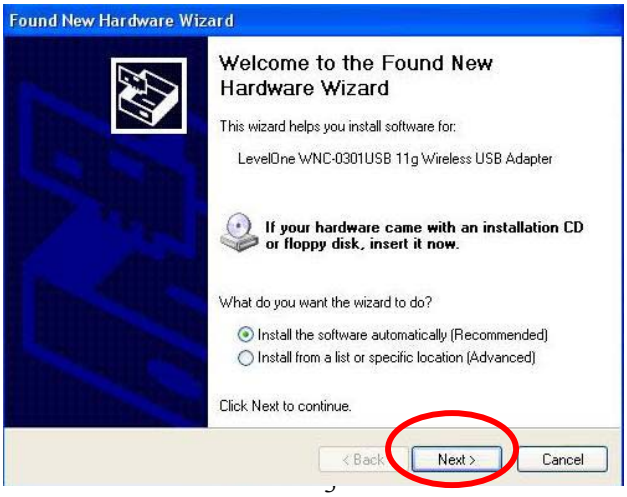
E. Click “**Finish**” to complete the installation.

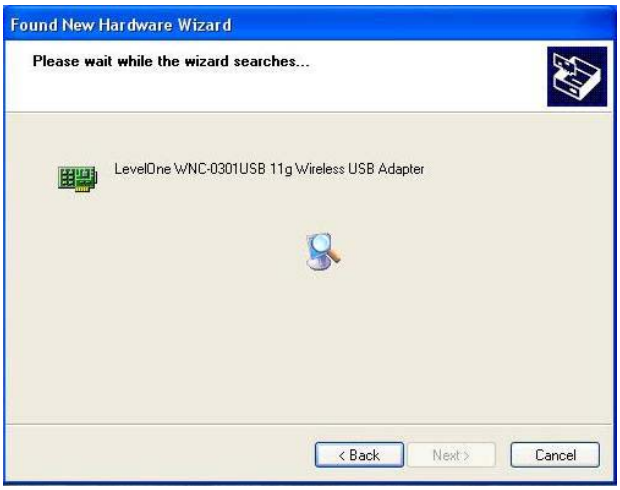


II. Install the USB adapter

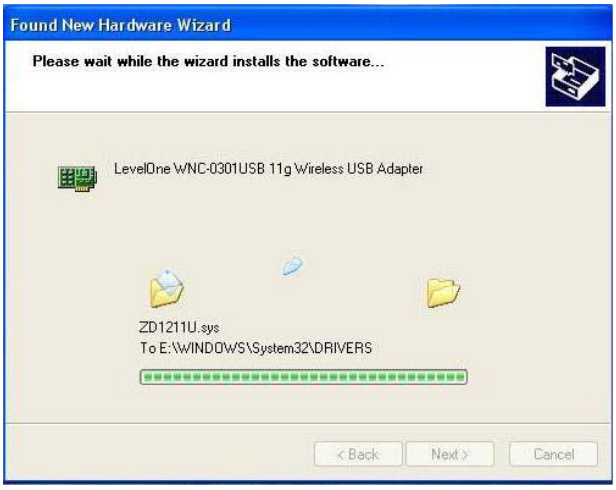
A. Plug the **WNC-0301USB** into the USB port of your computer.

B. The “**Found New Hardware Wizard**” is displayed, select “**Install the software automatically (Recommended)**” and click “**Next**”.

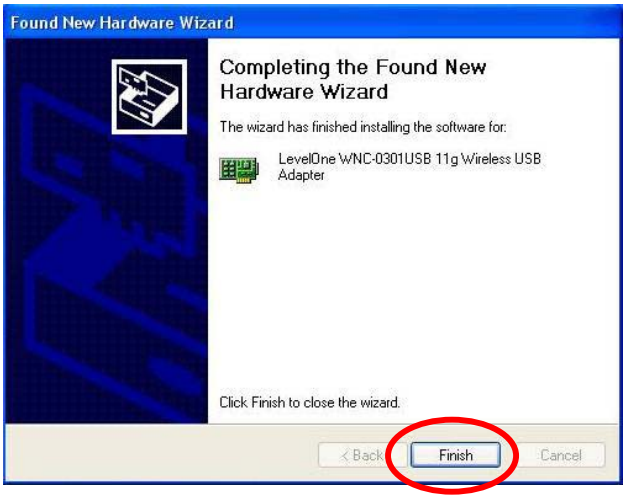




C. Click "**Continue Anyway**" and the system will start to install the **WNC-0301USB**.



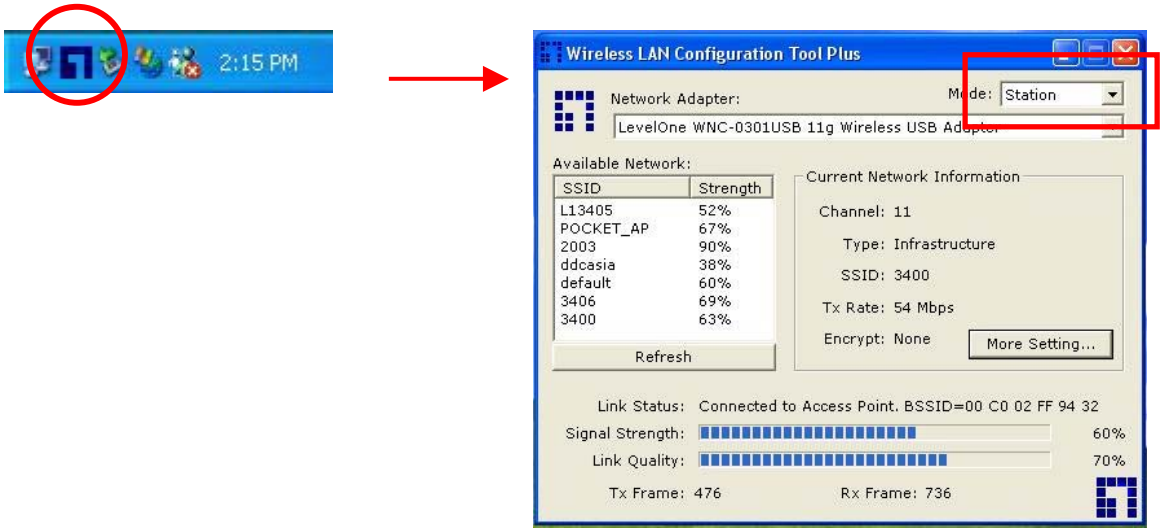
D. Click “**Finish**” to complete the installation.



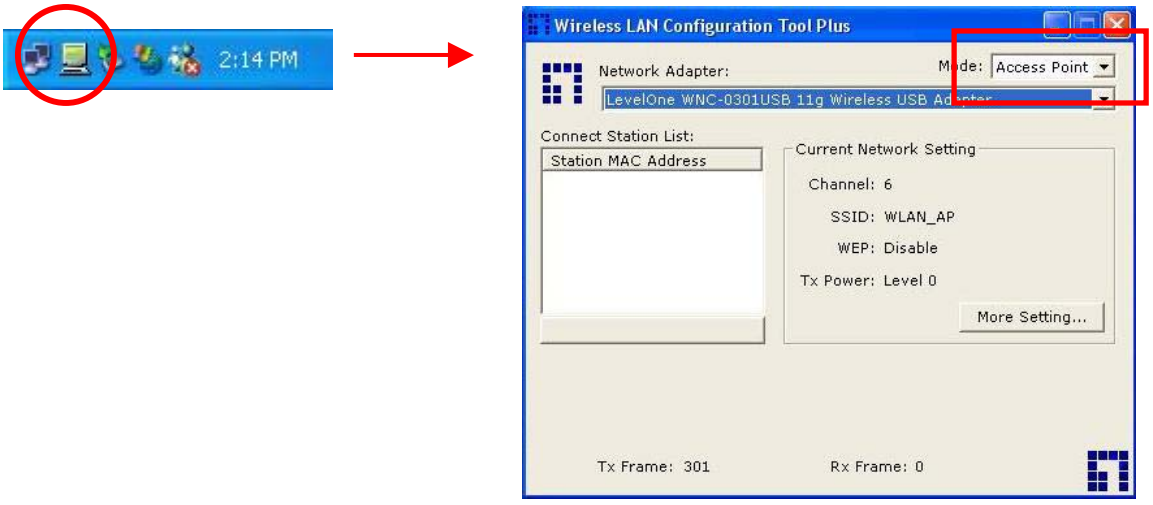
III. Using the Configuration Utility

To setup the **WNC-0301USB**, double-click the icon in the system tray.

Station mode



Access Point mode



2 Configuration Utility

The Configuration Utility is a powerful application that helps you configure the **WNC-0301USB** and monitor the link status during the communication process.

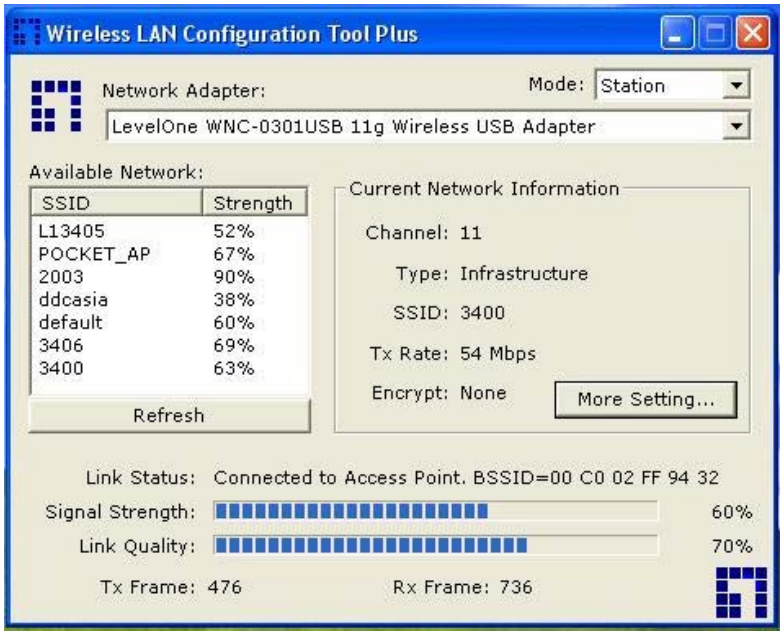
The Configuration Utility appears as an icon on the system tray of Windows while the card is running. You can open it by double-click on the icon.

Before using the utility, you have to know some restrictions of the utility.

1. If you want to connect to 11g (up to 54Mbps) network, please ensure to install the adapter to PC or laptop with USB 2.0 interface. This adapter runs at lower performance while you connect it to the USB 1.1/1.0 port of your computer instead.
2. This adapter will work in 11b mode when the network type is in Ad Hoc mode. It is defines by Wi-Fi organization. If you want to enable the data rate up to 54Mbps (11g), please follow steps listed below.
   A. Go to “Network Connections”.
   B. Right Click the “Wireless Network Connection” and select “Properties”.
   C. From the pop-up screen, click “Configure”.
   D. Enter into “Advanced” page of the “Properties” screen.
   E. Enable the setting of “IBSS_G_Mode”.

2.1 Wireless Connection Status

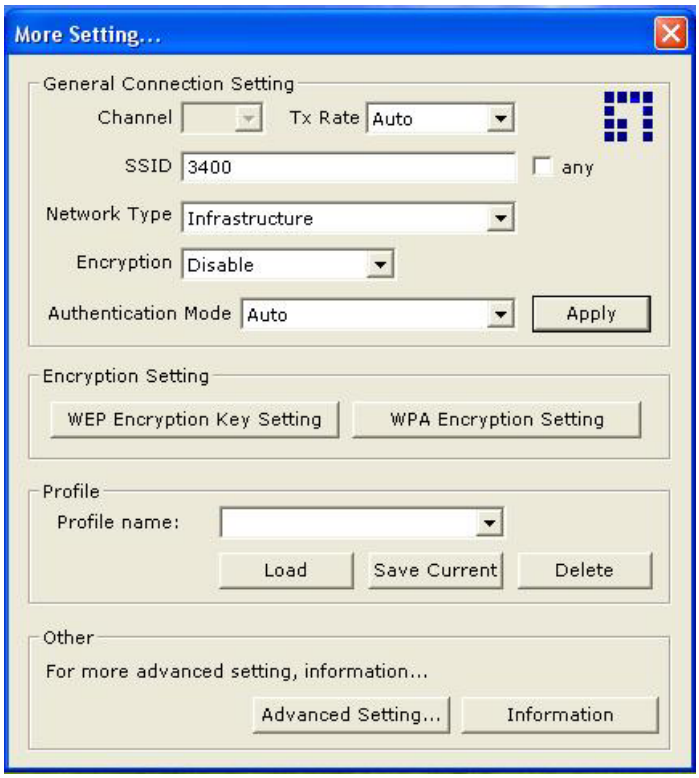
When you open the Configuration Utility, the system will scan all the channels to find all the access points/stations within the accessible range of your card and automatically connect to the wireless device with the highest signal strength. From the screen, you may know all the infomration about the wireless connection.



Parameter	Description
Mode	**Station** – Set the **WNC-0301USB** a wireless client. **Access Point** – Turns the **WNC-0301USB** to function as a wireless AP. Please refer to Section 2.5 for the AP settings.
Network Adapter	Display the product information of the **WNC-0301USB** wireless USB adapter.
Available Network	Display all the SSID and Signal Strength of wireless stations nearby. To re-survey the available wireless devices please click “Refresh”. There are two ways to automatically make the connection between the **WNC-0301USB** and the wireless station on the list. 1. Double-click the wireless station on the list directly. 2. Select the station you intend to connect and then click “Connect this site“.
Current Network Information	Display the information about the wireless network this adapter is connecting to. The information includes Channel, Type, SSID, TX Rate and Encrypt settings. Note: Please refer to Section 2.2 for the description of each item.
More Setting	For setting more functions including disable/enable WEP and Power Saving Mode, etc. Please refer to Section 2.2, 2.3 and 2.4.
Link Status	Display the status of the wireless connection.
BSSID	Display the MAC Address of the network the adapter is connecting to.
Signal Strength	This bar shows the signal strength level. The higher percentage shown in the bar, the more radio signal been received by the adapter. This indicator helps to find the proper position of the wireless station for quality network operation.
Link Quality	This bar indicates the quality of the link. The higher the percentage, the better the quality.
TX Frame	It shows the number of data frames which are transmitted by the adapter successfully.
RX Frame	It shows the number of data frames which are received by the adapter successfully.

2.2 General Connection Setting

Click “More Setting”, users are allowed to setup the wireless connection setting, Encryption Setting of the **WNC-0301USB** and other advanced functions.



Parameter	Description
General Connection Setting	
Channel	Select the number of the radio channel used for the networking. The channel setting of the wireless stations within a network should be the same.
Tx Rate	There are several options including Auto/1/2/5.5/11/6/9/12/18/24/36/48/54Mbps for you to select. When the “Auto” is selected, the device will choose the most suitable transmission rate automatically. The higher data rate you designated in the network, the shorter distance is allowed between the adapter and the wireless stations. When the adapter works in 11b mode, the maximum data rate is 11Mbps so that there are only “Auto/1/2/5.5/11Mbps” options you can select.
SSID	The SSID (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. You may specify a SSID for the adapter and then only the device with the same SSID can interconnect to the adapter.

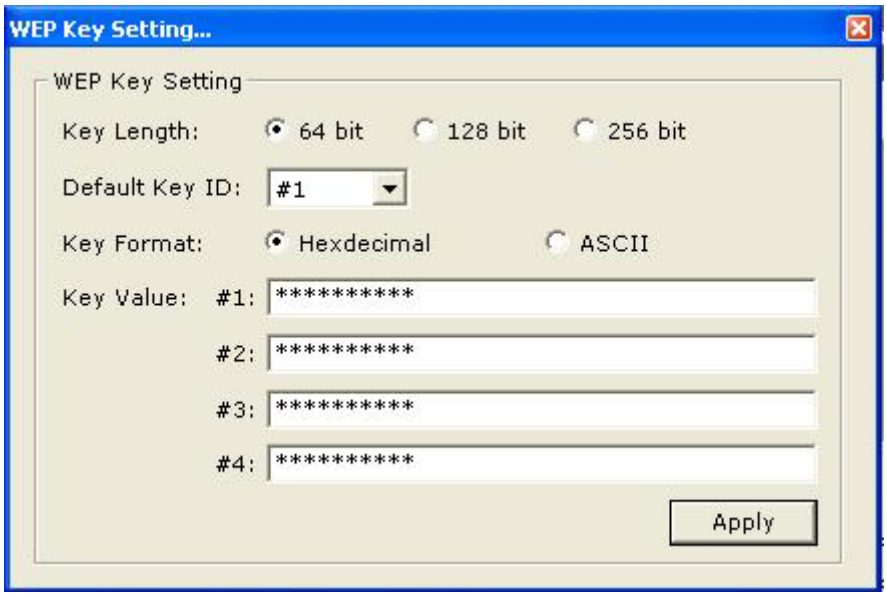
Parameter	Description
Any	If “Any“ check box is enabled, the adapter will survey and connect to one of the available wireless stations without checking the consistency of channel and SSID with the wireless station.
Network Type	**Ad-Hoc** – This mode enables wireless network adapters interconnecting without through AP or Router. Select this mode if there is no AP or Router in the network. **Infrastructure** – This operation mode requires the presence of an 802.11 Access Point. All communication is done via the Access Point or Router.
Change/Apply	Clcik “Change“ will enable you to setup the parameters of “General Connection Setting“. In the meantime, the button will change to “Apply“ for you to confirm your settings.
Encryption Setting	In the block, users may enable/disable WEP and WPA encryption within the network. Please refer to Section 2.3 for more description.
Authentication Mode	This setting has to be consistent with the wireless networks that the adapter intends to connect. **Open System** –Wireless stations can associate with this access point without WEP encryption. **Shared Key** – Only wireless stations using a shared key (WEP Key identified) are allowed to connecting each other. **Auto** – Auto switch the authentication algorithm depending on the wireless networks that the adapter is connecting to.
WEP Encryption Key Setting	Click this button to setup the WEP key. Please refer to Section 2.3 for the details.
WPA Encryption Setting	Click this button to setup the WPA function. Please refer to Section 2.3 for the details.
Profile	
Profile Name	You can save the network setting as a profile. To connect to the network without making additional configuration, you can load the profile.

Parameter		Description
	Load	Load the setting values from the file in the “Profile Name“ list. The new settings will be activated immediately.
	Save Current	Input a file name and click “Save Current“ to write the current setting values to be a profile in the “Profile Name“ list.
	Delete	Delete the profile you select.
Other		
	Advanced Setting...	For more advanced setting, please click it. To know more of the setting, please refer to Section 2.4.
	Information	To view the version of the driver, firmware and the MAC Address of the adapter, click the button.

2.3 WEP and WPA Encryption

WEP is an data encryption algorithm, which protects Wireless LAN data in the network against eavesdropping. WEP has been found that it has some security problems. The adapter supports WPA (Wi-Fi Protected Access) that combines IEEE 802.1x and TKIP (Temporal Key Integrity Protocol) technologies. Client users are required to authorize before accessing to Aps or AP Routers, and the data transmitted in the network is encrypted/decrypted by a dynamically changed secret key. This adapter is also built-in AES engine which 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.

2.3.1 WEP Setting

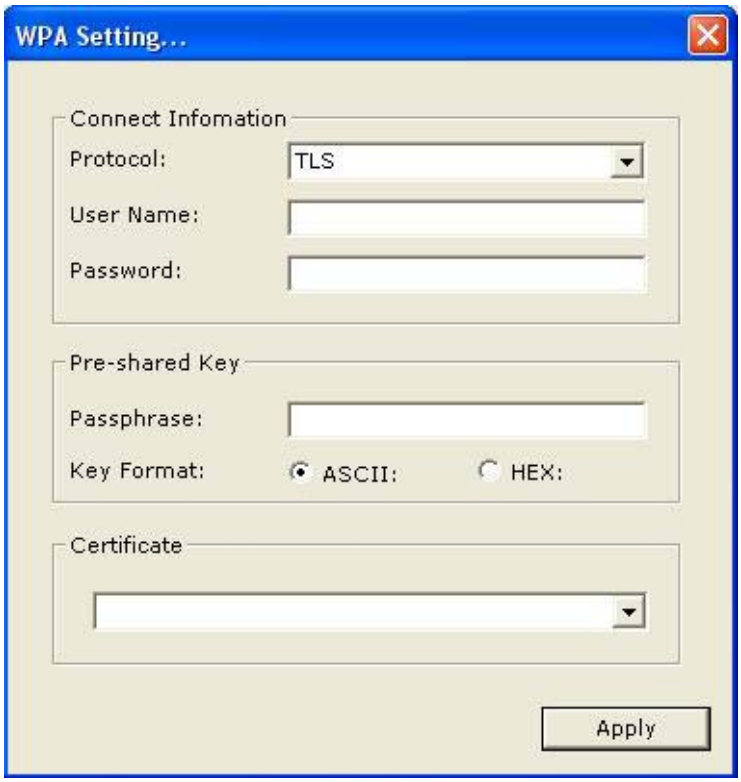


Parameter	Description
Key Length	You may select the 64-bit, 128-bit or 256-bit to encrypt transmitted data. Larger key length will provide higher level of security, but the throughput will be lower.
Default Key ID	Select one of the keys (1~4) as the encryption key.
Key Format	**Hexdecimal** – Only “A-F“, “a-f“ and “0-9“ are allowed to be set as WEP key. **ASCII** –Numerical values, characters or signs are allowed to be the WEP key. It is more recognizable for user.
Key1 ~ Key4	The keys are used to encrypt data transmitted in the wireless network. Fill the text box by following the rules below. **64-bit** – Input 10-digit Hex values or 5-digit ASCII values as the encryption keys. For example: “0123456aef“ or “Guest“. **128-bit** – Input 26-digit Hex values or 13-digit ASCII values as the encryption keys. For example: “01234567890123456789abcdef“ or “administrator“. **256-bit** – Input 58-digit Hex values or 29-digit ASCII values as the encryption keys.
Change/Apply	Clcik “Change“ will enable you to setup the WEP key. In the meantime, the button will change to “Apply“ for you to confirm your settings.

2.3.2 WPA Setting

The adapter can automatically detect the WPA setting of the AP which the adapter intends to connect to. To connect to the AP, you should setup the same setting with the AP.

There are two kinds of WPA mode: WPA and WPA-PSK. WPA is designed for enterprise which requires a RADIUS Server and Certificate Server for the authentication. WPA-PSK is a special mode designed for home and small business users who do not have access to network authentication servers. In this mode, the user manually enters the starting password in their access point or gateway, as well as in each wireless stations in the 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.

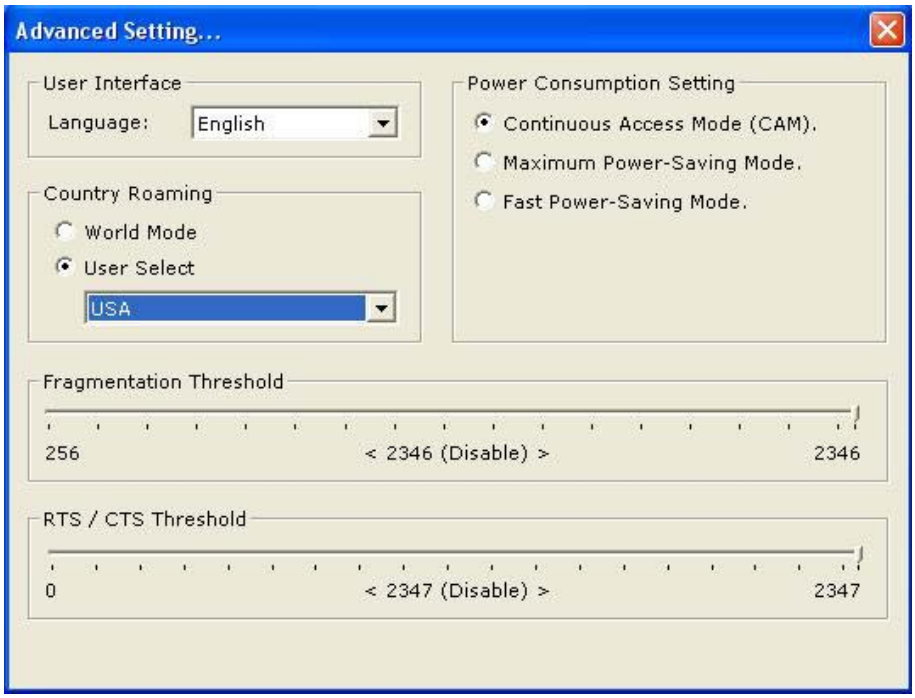


Parameter	Description
Connect Information	It is the setting for WPA mode.
Protocol	This adapter supports two kind of protocol for authentication including TLS and PEAP. TLS and PEAP requires a certificate which is provided by the Certificate Server. PEAP requires a set of user name and password in addition. To get the certificate and the personal user name and password, please contact with your administrator. **TLS** – Select a certificate from the “Certificate“ list. **PEAP** – Input the “User Name“ and “Password“ and also select a certificate from the “Certificate“ list.
User Name	It is the setting for PEAP protocol.
Password	It is the setting for PEAP protocol.
Pre-shared Key	It is the setting for WPA-PSK mode. Input a 8 to 63 digits of ASCII format to be the password for the authentication within the network.
Certificate	All the available certificates for TLS or PEAP will display in the list. Please select a proper certificate for the wireless authentication.

Parameter	Description
WEP Key	If the AP uses WEP data encryption function, please clcik “WEP KEY SETTING“ to setup the WEP key.
WEP KEY SETTING	Setup the four sets of WEP key by clicking the button.
Change/Apply	Clcik “Change“ will enable you to setup the WPA setting. In the meantime, the button will change to “Apply“ for you to confirm your settings.

2.4 Advanced Setting

The “Advanced Setting” allows user to enable/disable country roaming and power consumption mode, setup the fragmentation threshold and RTS/CTS threshold of the adapter.



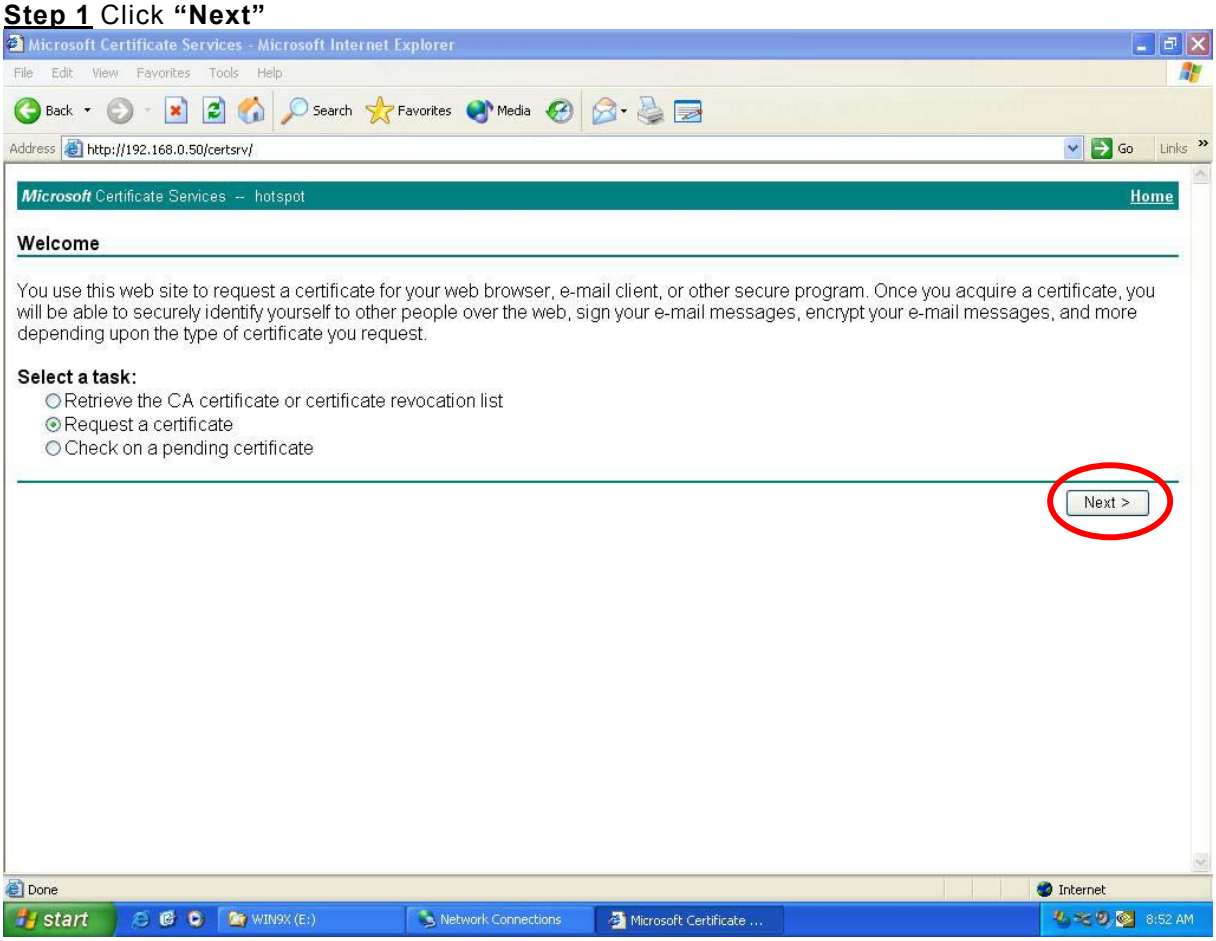
Parameter	Description
User Interface	Select the display language of the utility. Two languages are enabled: English and Chinese.
Country Roaming	IEEE 802.11d (Country Roaming) is a standard that enable the wireless devices work at the proper transmission power and radio channel regulated by the country where the user is located. **World Mode** – Enable the country roaming function, the adapter will follow the setting of the connecting AP automatically. **User Select** – Disable the country roaming function, users can select the country where they are located. The channel setting differs from country user selected.

Parameter	Description
Power Consumption Setting	**Continuous Access Mode (CAM)** – The adapter will always set in active mode. **Maximum Power-Saving Mode** – Enable the adapter in the power saving mode when it is idle. **Fast Power-Saving Mode –** Enable the adapter in the power saving mode when it is idle, but some components of the adapter is still alive. In this mode, the power consumption is larger than “Max“ mode.
Fragementation Threshold	The value defines the maximum size of packets, any packet size larger than the value will be fragmented. If you have decreased this value and experience high packet error rates, you can increase it again, but it will likely decrease overall network performance. Select a setting within a range of 256 to 2346 bytes. Minor change is recommended.
RTS / CTS Threshold	Minimum packet size required for an RTS/CTS (Request To Send/Clear to Send). For packets smaller than this threshold, an RTS/CTS is not sent and the packet is transmitted directly to the WLAN. Select a setting within a range of 0 to 2347 bytes. Minor change is recommended

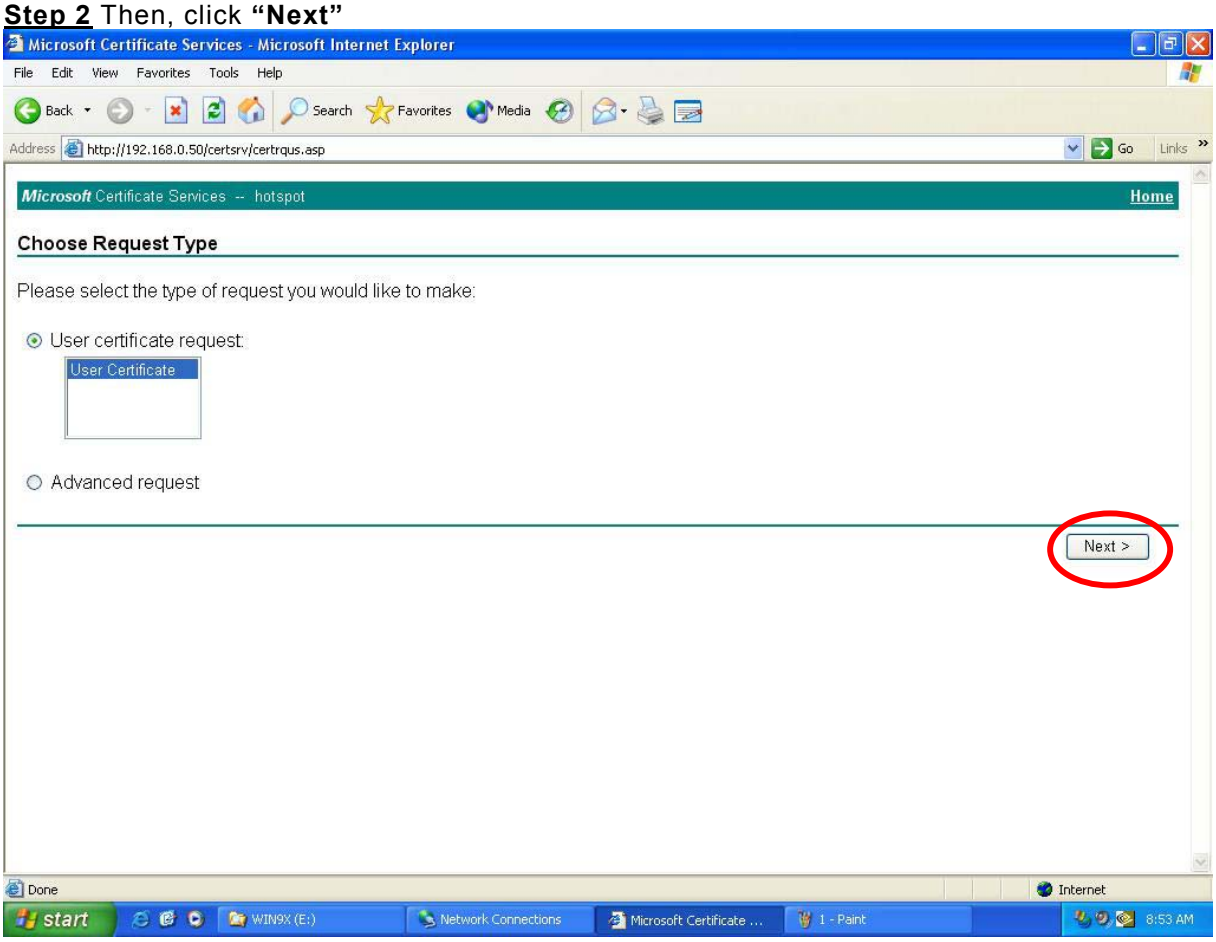
2.4.1 WPA 802.11X Setting

Please connect Microsoft CA (Certificate Authentication) server for WPA 802.11X setting,

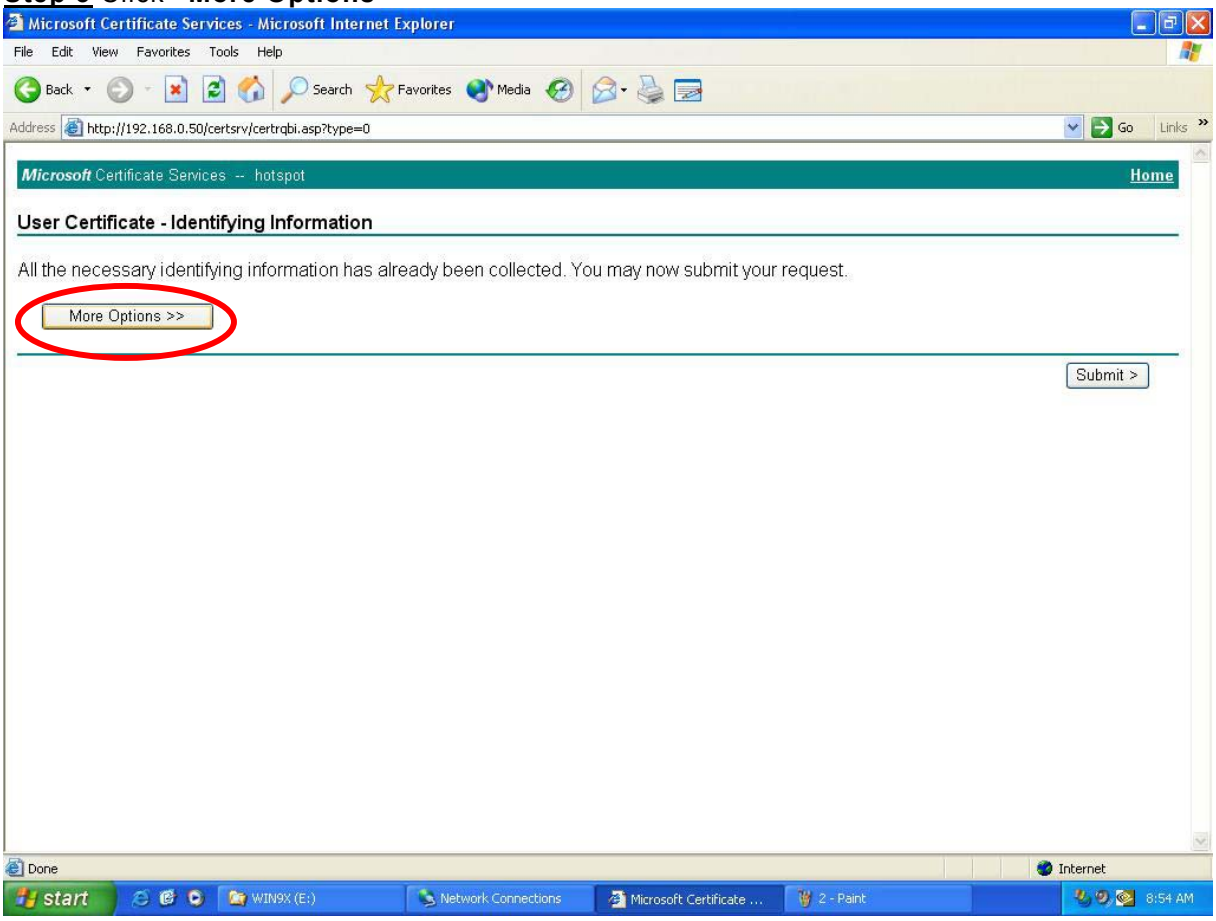
Step 1 Click **"Next"**



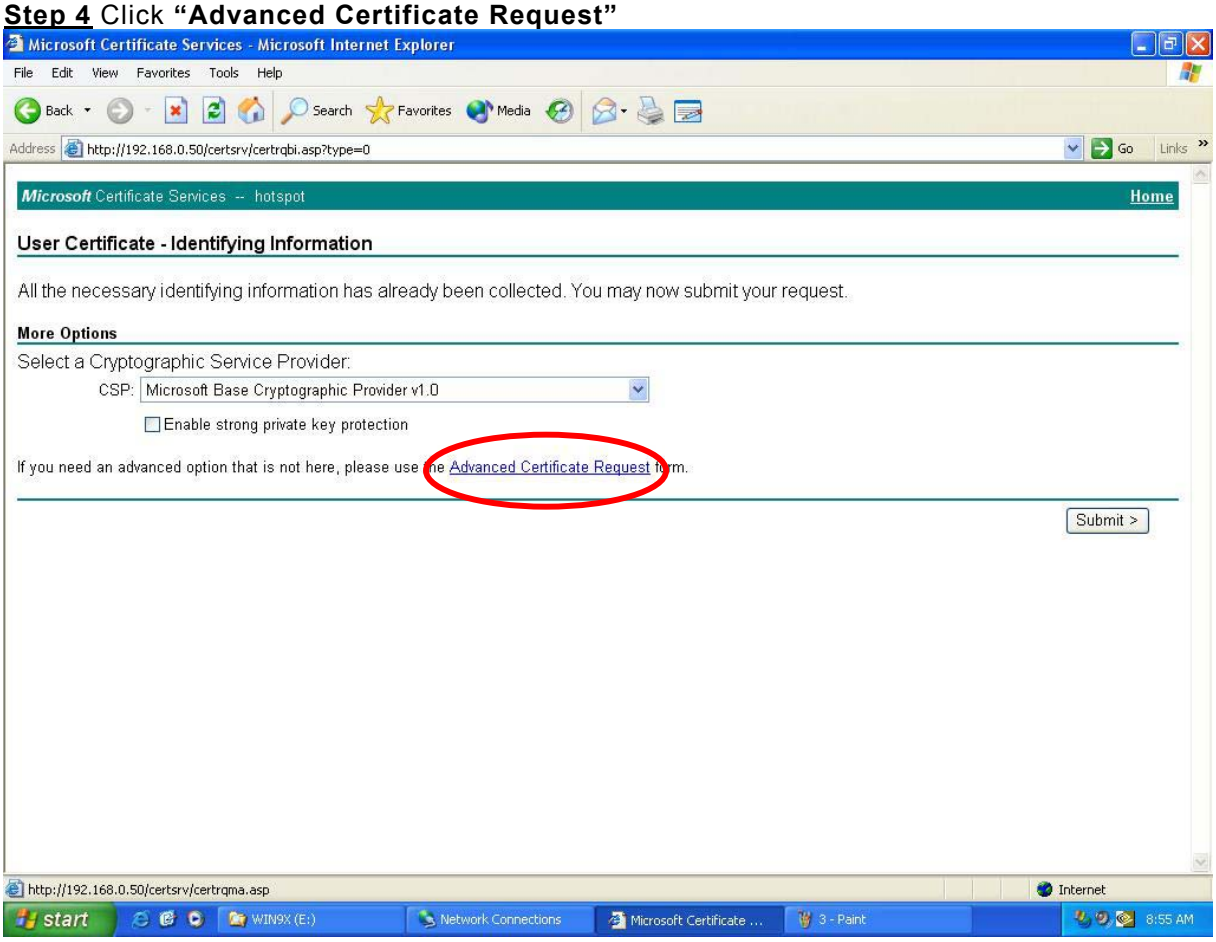
Step 2 Then, click **"Next"**



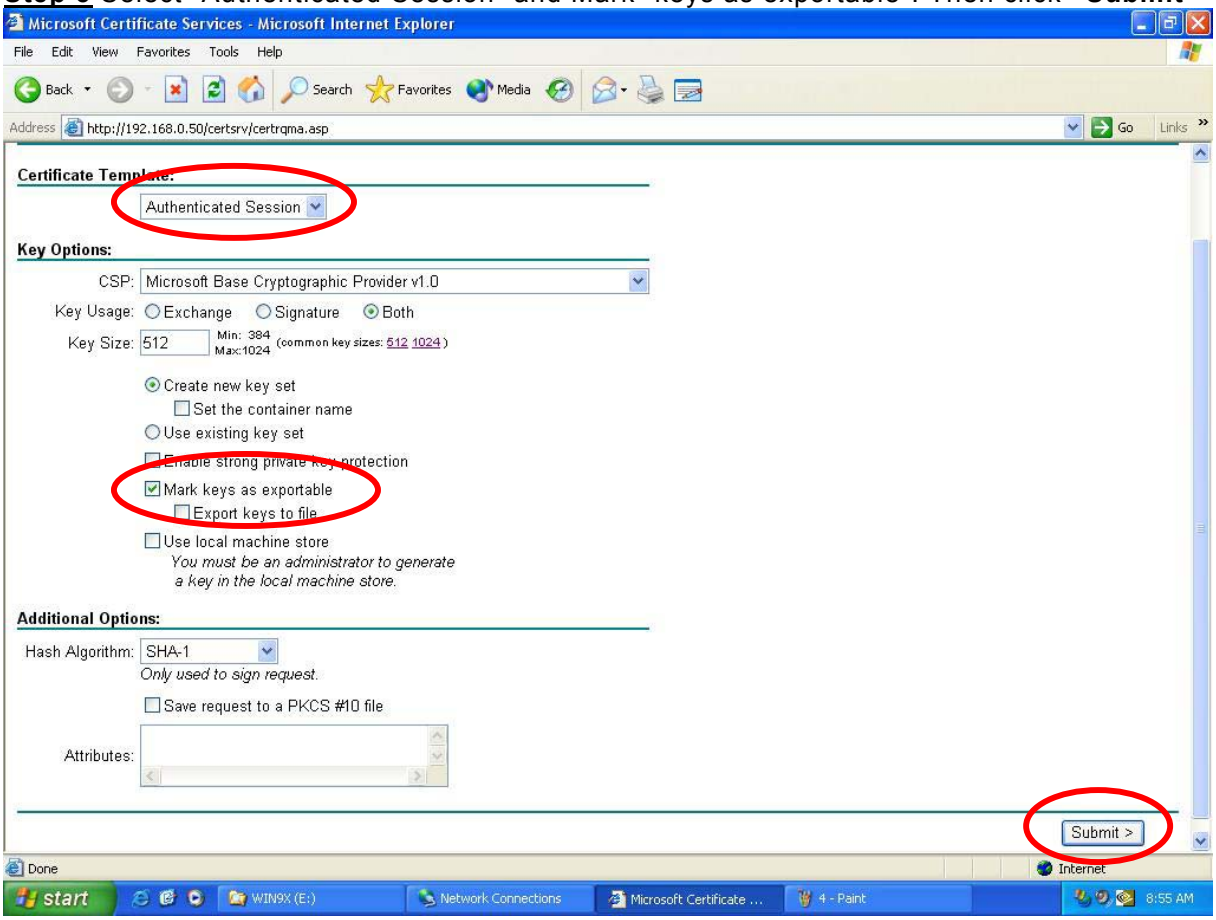
Step 3 Click **"More Options"**



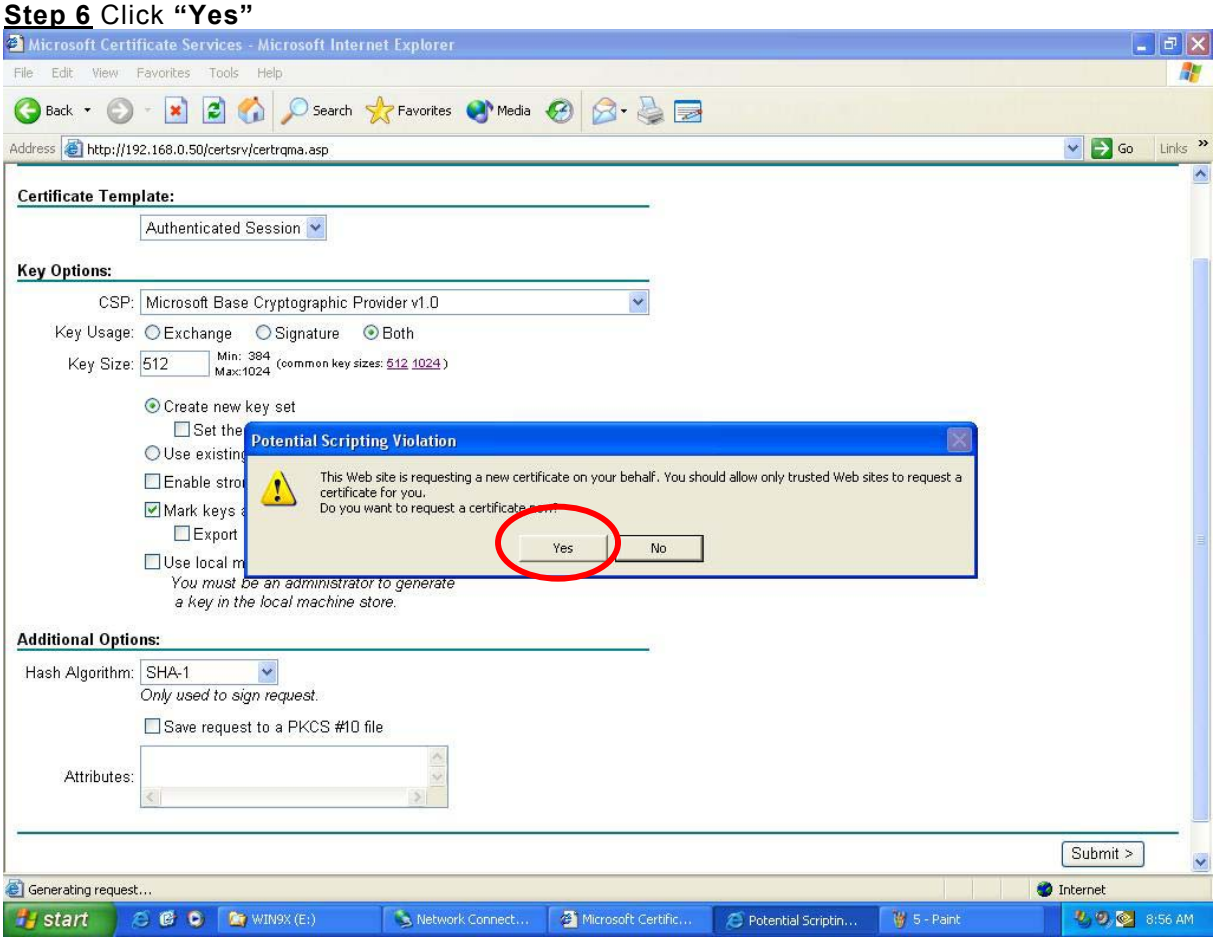
Step 4 Click **"Advanced Certificate Request"**



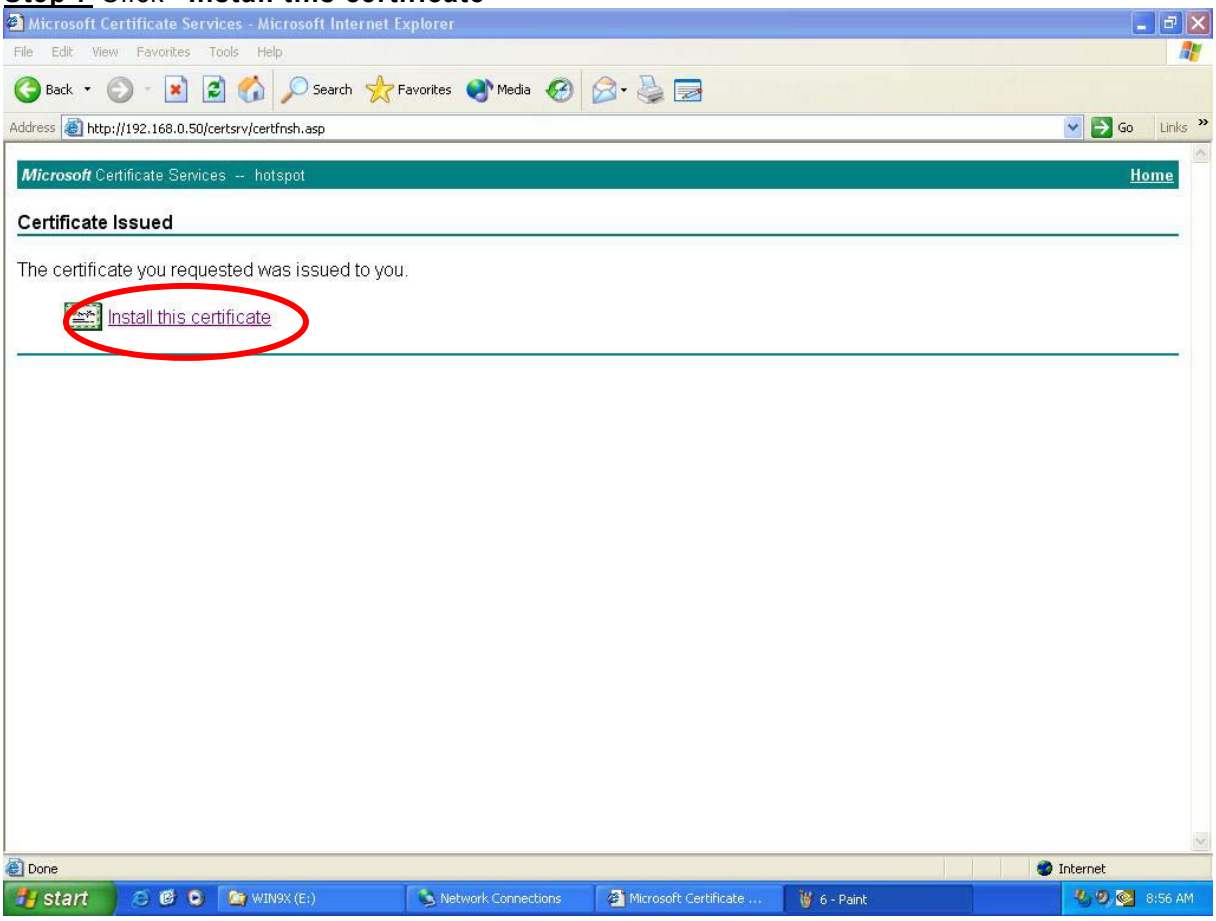
Step 5 Select "Authenticated Session" and Mark "keys as exportable". Then click **"Submit"**



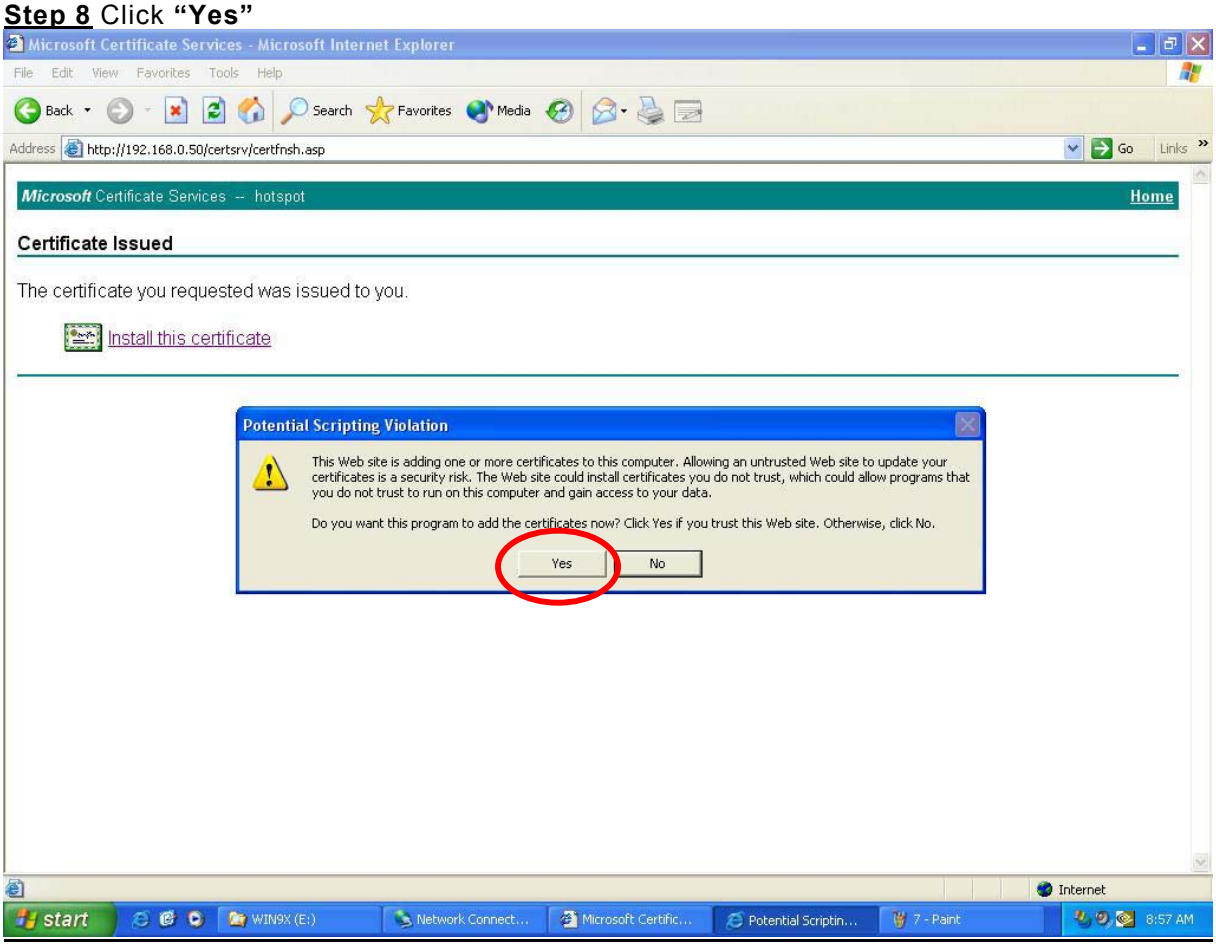
Step 6 Click **"Yes"**



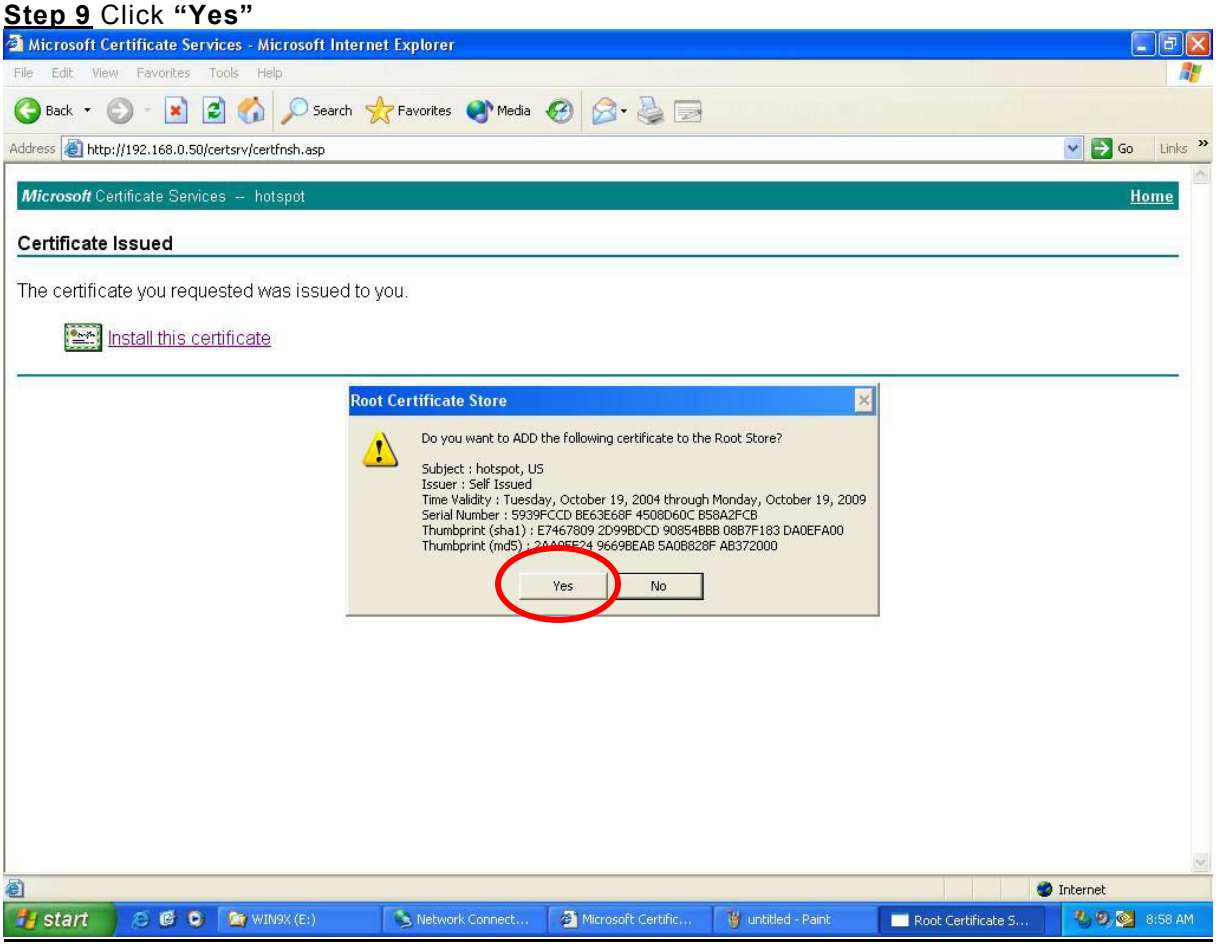
Step 7 Click **"Install this certificate"**



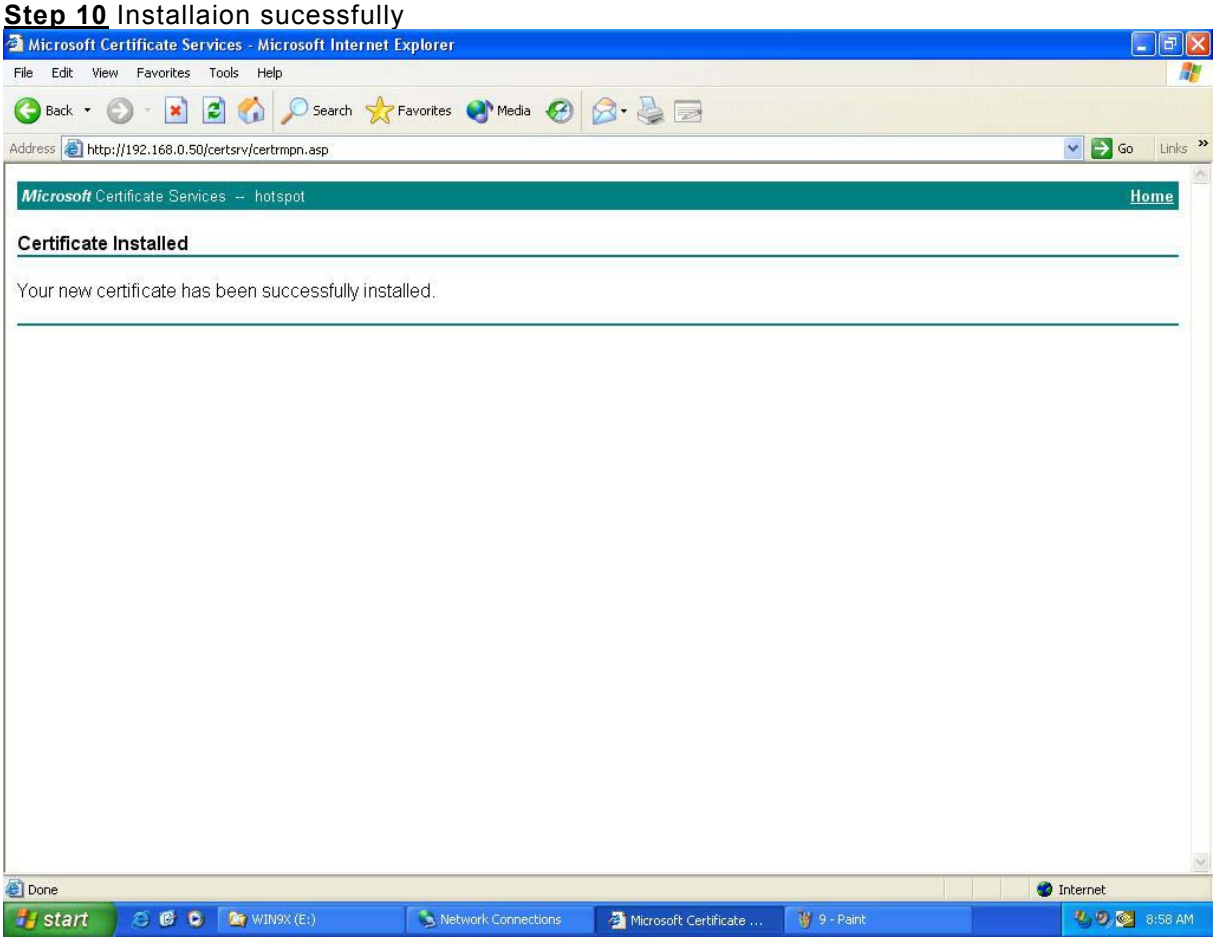
Step 8 Click **"Yes"**



Step 9 Click **"Yes"**

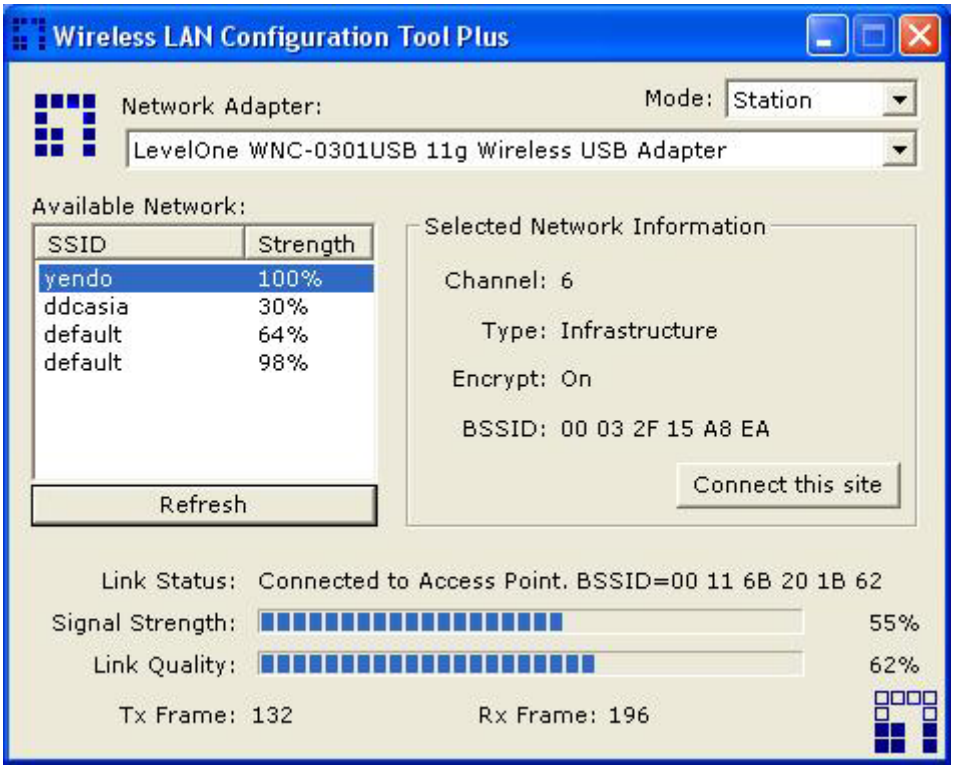


Step 10 Installaion sucessfully

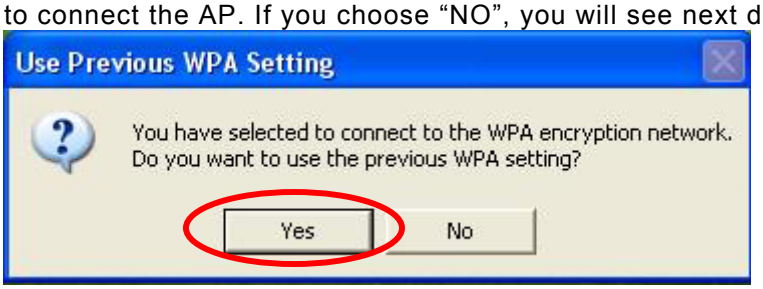


2.4.2 Use WPA 802.11X Function of Configuration Utility

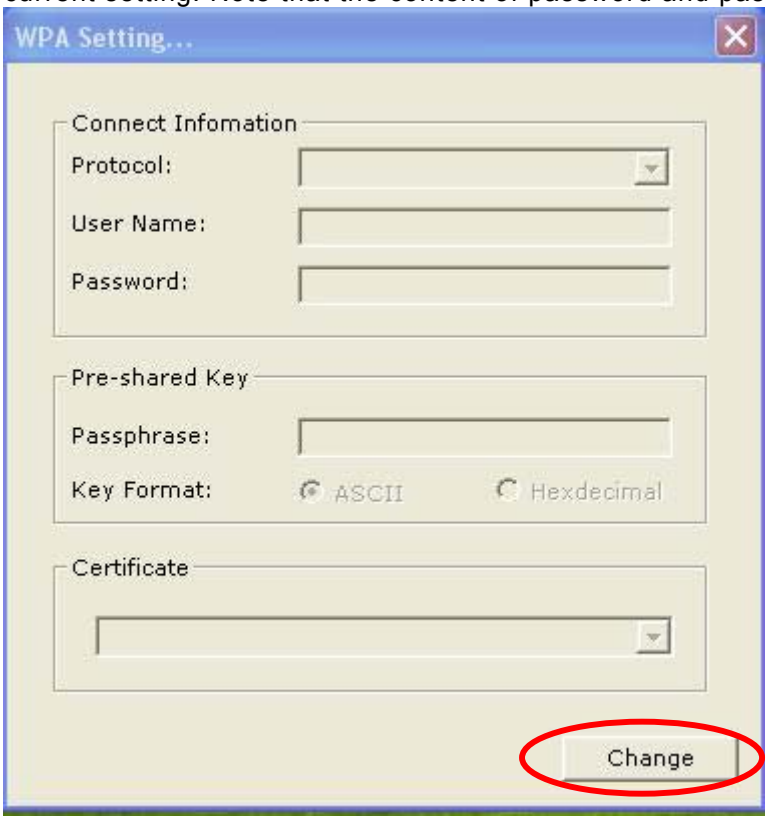
1. Double Click the desired item of Available Netwok



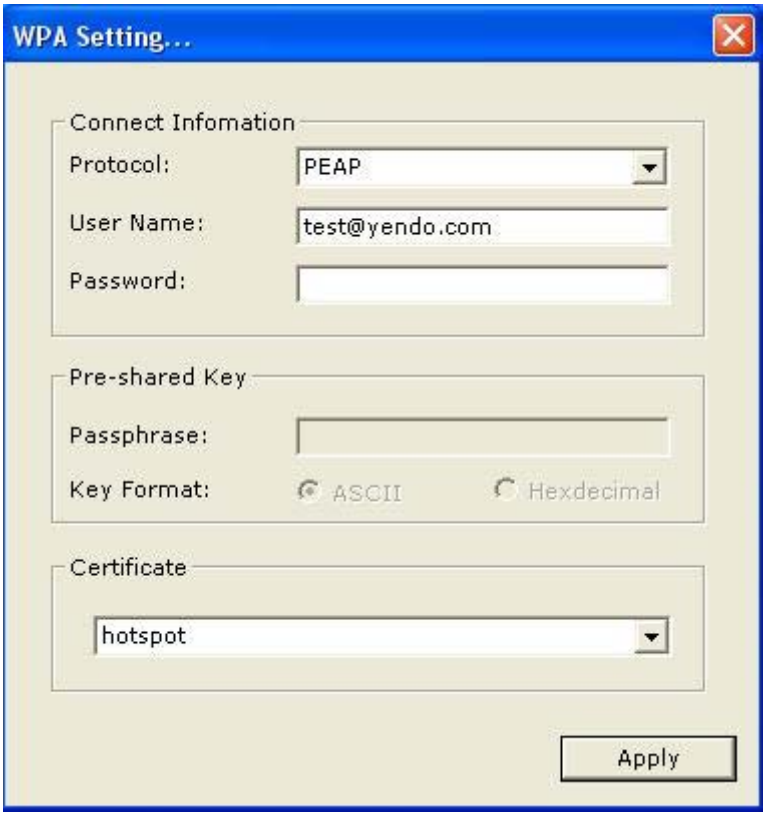
2. Configuration Utility will detect this is WPA encryption network and ask you want to use the previous WPA setting or not. If you choose **"YES"**, Configuration Utility will begin to try to connect the AP. If you choose "NO", you will see next dialogue.



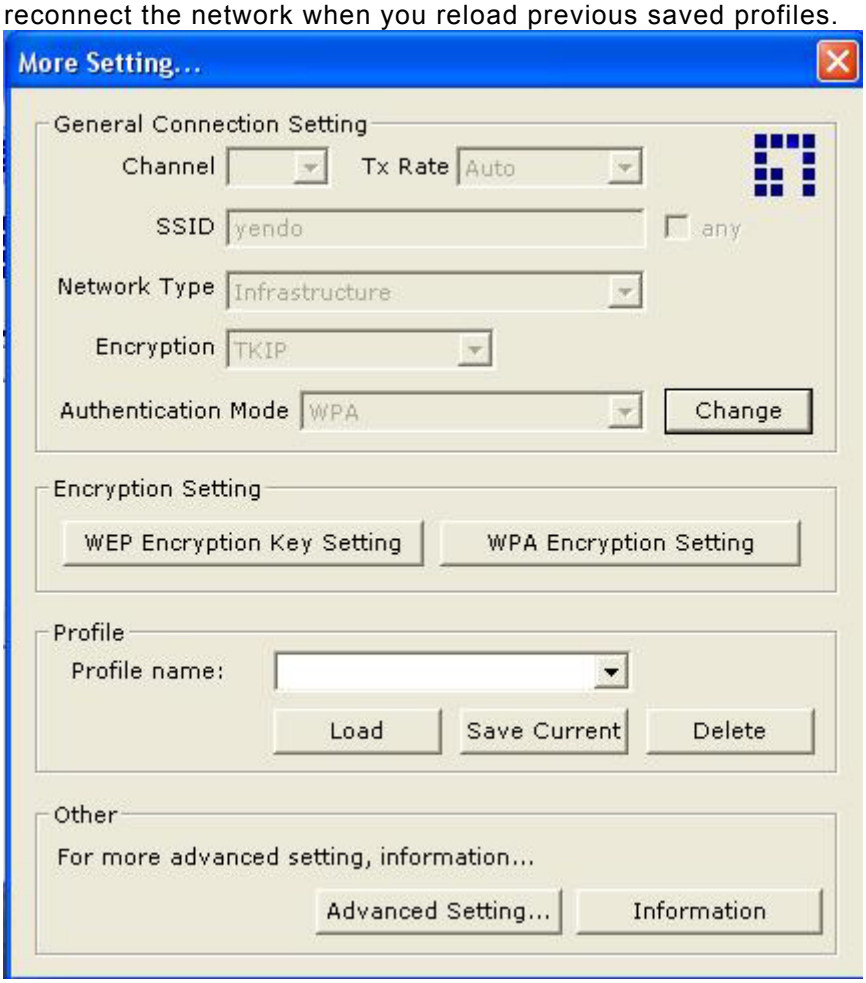
3. This is the dialogue of 802.1x setting. Before you click **"Change"**, you just can see the current setting. Note that the content of password and passphrase won't be shown.



4.After you click **“Change”**, you will see following dialogue. Depend on the encryption mode of the desired network, only related items will be enabled and can be selected or key in.
If the desire network is WPA-PSK, you can only key in “Passphrase”.
If the desire network is WPA , you must choose Protocol first.
If you choose “TLS” , you only need to select certificate.
If you choose “PEAP”, you need to select certificate and key in User Name and Password.
Note the certificate lists will be different in TLS and PEAP. In TLS mode, it shows “My” category , and In PEAP mode, it shows “Root” category. You can also use **IE5.5->Internet Options->Content->Certificates** to see details. They will be shown as **“Personal”** and **“Trusted Root Certification Authorities**“.

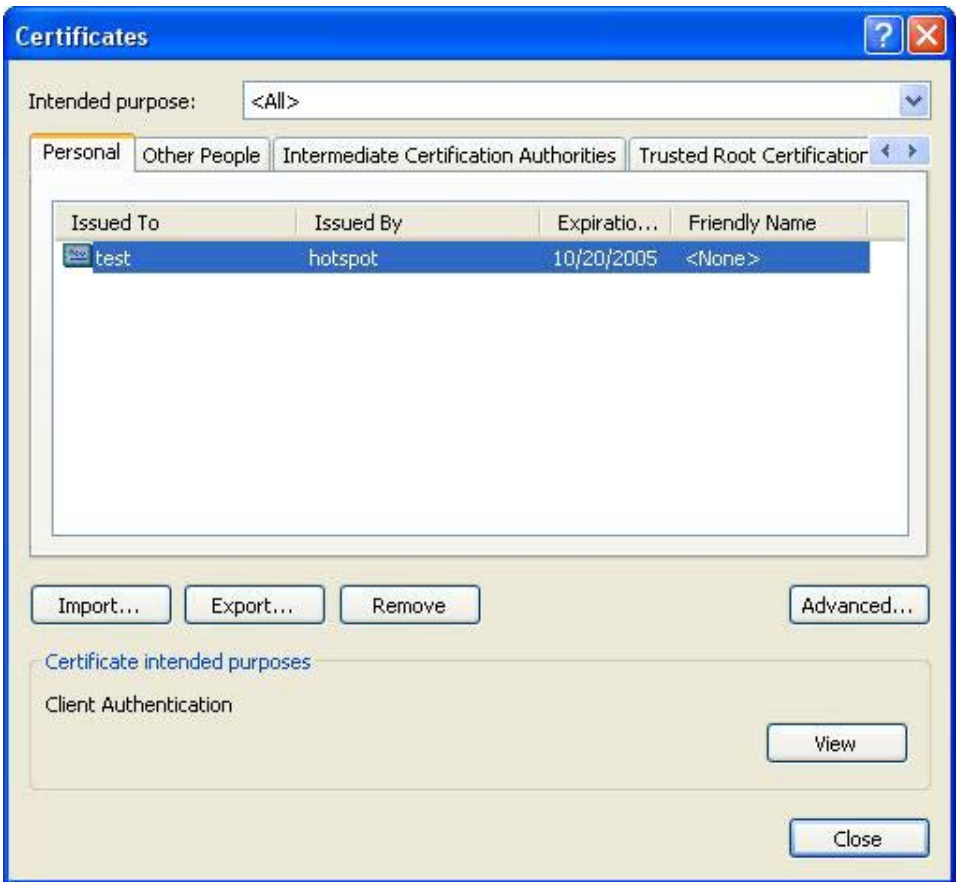


5.In More Setting dialogue , there is another way to set 802.setting by clicking “IEEE802.1x Setting”. The page shown as above, but it will have no any selected constraint. And any setting changed will not cause effect until you re-click the item of Available Network or Configuration Utility is restarted. The last thing needed to notice is that Profile function with 802.1x also works. You can save your current setting and Configuration Utility will try to reconnect the network when you reload previous saved profiles.



Special Note:

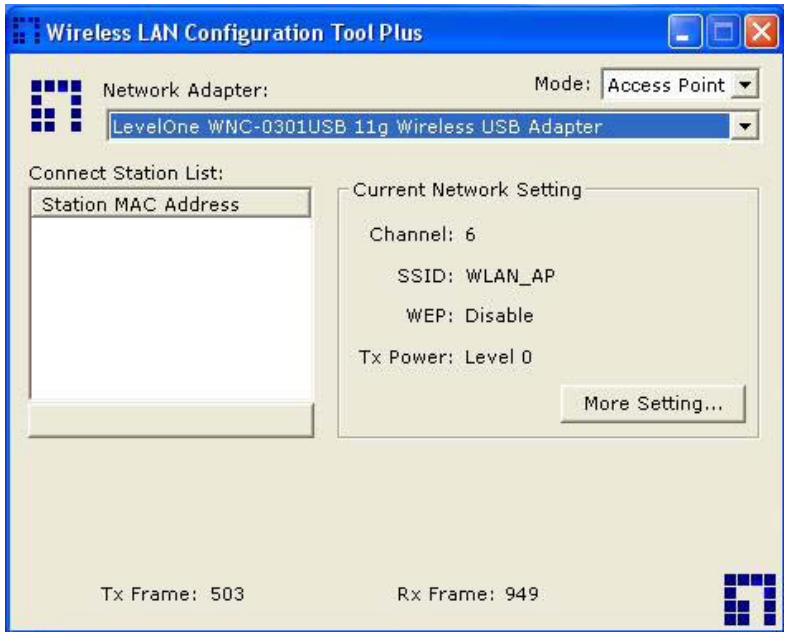
The certificates should be able to export private keys, otherwise the authentication process would be fail. To know your certificate can be able to export private keys or not, you can use **IE5.5->Internet Options->Content->Certificates**. And try to export it with private keys like following pictures. If you can not , you may connect the administrator of your CA Root to re-issue the new certificate with ability of private key exported to you.



2.5 Software AP Mode

This adapter can run as a wireless AP. The relative configurations of the AP including channel, SSID, MAC Address Filtering, WEP encryption and so on are described as follows.

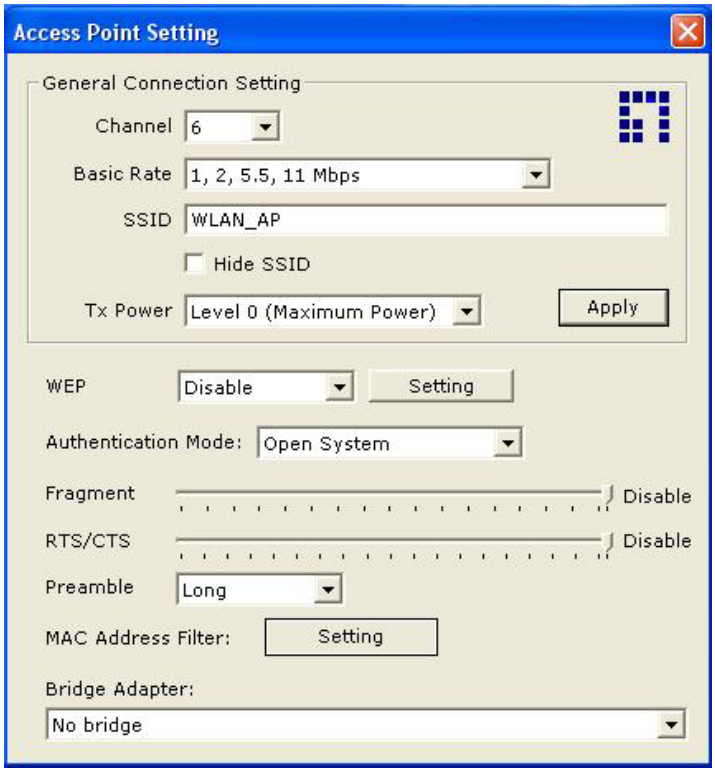
2.5.1 AP Connection Status



Parameter	Description
Mode	**Station** – Set the WNC-0301USB USB adapter a wireless client. **Access Point** – Turns the WNC-0301USB USB adapter to function as a wireless AP.
Network Adapter	Display the product information of the WNC-0301USB USB adapter.
Connect Station List	Display all the MAC Addresses of the wireless adapters which are connecting to the AP.
Current Network Setting	Display the connection setting of the current network. It includes Channel, SSID, WEP and TX Power Level.
More Setting	For setting more functions including disable/enable WEP, MAC Address Filter and Bridge Adapter, etc. Please refer to Section 3.5.2.
TX Frame	It shows the number of data frames which are transmitted by the AP successfully.
RX Frame	It shows the number of data frames which are received by the AP successfully.

2.5.2 AP General Connection Setting

Click “More Setting”, users are allowed to setup the AP connection setting, Encryption Setting and other advanced functions.

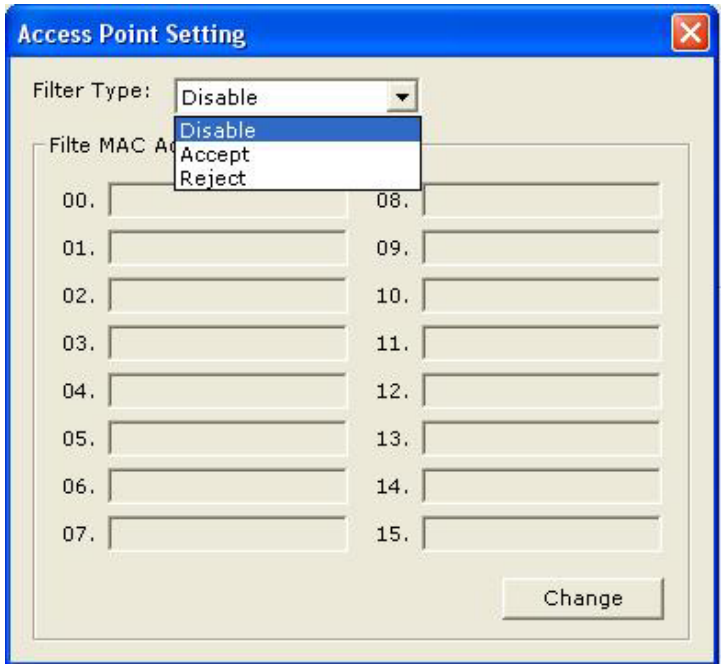


Parameter	Description
General Connection Setting	
Channel	Select the number of the radio channel used by the AP. The wireless adapters which connects to the AP should set up the same channel.
Basic Rate	Select the basic data transmission speed supports by the AP. When the AP works in 11b mode, the maximum data rate is 11Mbps so that there are two options including “1, 2 Mbps“ and “1, 2, 5.5, 11Mbps” you can select.
SSID	The SSID (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. The default SSID of the AP is WLAN_AP. Wireless adapters connect to the AP should set up the same SSID as the AP.
Hide SSID	If “Hide SSID“ check box is enabled, the AP will not appear in the site survey list of any wireless adapters. It means Only the wireless adapters set the same SSID can connect to the AP. It aviods the AP being connected by unauthorized users.

Parameter	Description
Tx Power	There are four levels for you to setup the transmission power of the AP. The higher transmission power, the larger transmission distance and wireless coverage.
Change/Apply	CIcik “Change“ will enable you to setup the parameters of “General Connection Setting“. In the meantime, the button will change to “Apply“ for you to confirm your settings.
WEP	Enable or disable WEP encryption function. If the WEP function is enabled, only wireless adapters with the same default key and WEP key setting can connect to the AP.
Setting	Click “Setting“ to setup the WEP key. Please refer to Section 3.3 for more description.
Authentication Mode	**Open System** –Wireless stations can associate with this access point without WEP encryption. **Shared Key** – Only wireless adapters using a shared key (WEP Key identified) are allowed to connecting to the AP.
Fragement	The value defines the maximum size of packets, any packet size larger than the value will be fragmented. If you have decreased this value and experience high packet error rates, you can increase it again, but it will likely decrease overall network performance. Select a setting within a range of 256 to 2346 bytes. Minor change is recommended.
RTS / CTS	Minimum packet size required for an RTS/CTS (Request To Send/Clear to Send). For packets smaller than this threshold, an RTS/CTS is not sent and the packet is transmitted directly to the WLAN. Select a setting within a range of 0 to 2347 bytes. Minor change is recommended.

Parameter	Description
Preamble	The preamble defines the length of the CRC block for communication among the wireless networks. There are two modes including Long and Short. High network traffic areas should use the shorter preamble type.
MAC Address Filter	This AP can protect from the unauthorized users by MAC Address filtering. Please refer to Section 2.5.3.
Bridge Adapter	Wireless adapters connect to the AP can access to the wired network through the bridge adapter. You can select an Ethernet adapter in the list be the bridge between the wireless and wired networks.

2.5.3 MAC Address Filter



Parameter	Description
Filter Type	**Disable** – Disable the MAC Address filter function. **Accept** – Only the wireless adapters with the MAC Address setup in the table can connect to the AP. **Reject** – The wireless adapters with the MAC Address setup in the table will be rejected to connect to the AP.
Filter MAC Address	MAC Address is a unique identification for hardware devices in the network. It is a 12-digit hexadecimal values. There are fifty sets of MAC Address can setup in the table. Fill the MAC Addresses of wireless adapters you want to accept or reject to access the AP in this table.

3 Troubleshooting

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

1. What is the IEEE 802.11g standard?

802.11g is the new IEEE standard for high-speed wireless LAN communications that provides for up to 54 Mbps data rate in the 2.4 GHz band. 802.11g is quickly becoming the next mainstream wireless LAN technology for the home, office and public networks. 802.11g defines the use of the same OFDM modulation technique specified in IEEE 802.11a for the 5 GHz frequency band and applies it in the same 2.4 GHz frequency band as IEEE 802.11b. The 802.11g standard requires backward compatibility with 802.11b.

The standard specifically calls for:

A. A new physical layer for the 802.11 Medium Access Control (MAC) in the 2.4 GHz frequency band, known as the extended rate PHY (ERP). The ERP adds OFDM as a mandatory new coding scheme for 6, 12 and 24 Mbps (mandatory speeds), and 18, 36, 48 and 54 Mbps (optional speeds). The ERP includes the modulation schemes found in 802.11b including CCK for 11 and 5.5 Mbps and Barker code modulation for 2 and 1 Mbps.

B. A protection mechanism called RTS/CTS that governs how 802.11g devices and 802.11b devices interoperate.

2. What is the IEEE 802.11b standard？

The IEEE 802.11b Wireless LAN standard subcommittee, which formulates the standard for the industry. The objective is to enable wireless LAN hardware from different manufactures to communicate.

3. What does IEEE 802.11 feature support？

The product supports the following IEEE 802.11 functions:

- CSMA/CA plus Acknowledge Protocol
- Multi-Channel Roaming
- Automatic Rate Selection
- RTS/CTS Feature
- Fragmentation
- Power Management

4. What is Ad-hoc？

An Ad-hoc integrated wireless LAN is a group of computers, each has a Wireless LAN adapter, Connected as an independent wireless LAN. Ad hoc wireless LAN is applicable at a departmental scale for a branch or SOHO operation.

5. What is Infrastructure？

An integrated wireless and wireless and wired LAN is called an Infrastructure configuration. Infrastructure is applicable to enterprise scale for wireless access to central database, or wireless application for mobile workers.

6. What is BSS ID？

A specific Ad hoc LAN is called a Basic Service Set (BSS). Computers in a BSS must be configured with the same BSS ID.

7. What is WEP？

WEP is Wired Equivalent Privacy, a data privacy mechanism based on a 40 bit shared key algorithm, as described in the IEEE 802 .11 standard.

8. What is TKIP?

TKIP is a quick-fix method to quickly overcome the inherent weaknesses in WEP security, especially the reuse of encryption keys. TKIP is involved in the IEEE 802.11i WLAN security standard, and the specification might be officially released by early 2003.

9. What is AES?

AES (Advanced Encryption Standard), a chip-based security, has been developed to ensure the highest degree of security and authenticity for digital information, wherever and however communicated or stored, while making more efficient use of hardware and/or software than previous encryption standards. It is also included in IEEE 802.11i standard. Compare with AES, TKIP is a temporary protocol for replacing WEP security until manufacturers implement AES at the hardware level.

10. Can Wireless products support printer sharing？

Wireless products perform the same function as LAN products. Therefore, Wireless products can work with Netware, Windows 2000, or other LAN operating systems to support printer or file sharing.

11. Would the information be intercepted while transmitting on air？

WLAN features two-fold protection in security. On the hardware side, as with Direct Sequence Spread Spectrum technology, it has the inherent security feature of scrambling. On the software side, WLAN series offer the encryption function (WEP) to enhance security and Access Control. Users can set it up depending upon their needs.

12. What is DSSS？What is FHSS？And what are their differences？

Frequency-hopping spread-spectrum (FHSS) uses a narrowband carrier that changes frequency in a pattern that is known to both transmitter and receiver. Properly synchronized, the net effect is to maintain a single logical channel. To an unintended receiver, FHSS appears to be short-duration impulse noise. Direct-sequence spread-spectrum (DSSS) generates a redundant bit pattern for each bit to be transmitted. This bit pattern is called a chip (or chipping code). The longer the chip is, the greater the probability that the original data can be recovered. Even if one or more bits in the chip are damaged during transmission, statistical techniques embedded in the radio can

recover the original data without-the need for retransmission. To an unintended receiver, DSSS appears as low power wideband noise and is rejected (ignored) by most narrowband receivers.

13. What is Spread Spectrum？

Spread Spectrum technology is a wideband radio frequency technique developed by the military for use in reliable, secure, mission-critical communication systems. It is designed to trade off bandwidth efficiency for reliability, integrity, and security. In other words, more bandwidth is consumed than in the case of narrowband transmission, but the trade off produces a signal that is, in effect, louder and thus easier to detect, provided that the receiver knows the parameters of the spread-spectrum signal being broadcast. If a receiver is not tuned to the right frequency, a spread –spectrum signal looks like background noise. There are two main alternatives, Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS).