IEEE 802.11n
Wireless PCI Express Adapter

User's Manual

FCC Warning

This equipment has been tested and found to comply with the limits for a Class B digital device,

pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

‒ Reorient or relocate the receiving antenna.

‒ Increase the separation between the equipment and receiver.

‒ Connect the equipment into an outlet on a circuit different from that to which

‒ Consult the dealer or an experienced radio/TV technician for help. the receiver is connected.

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

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of about eight inches (20cm) between the radiator and your body.

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

IMPORTANT NOTE:

In the event that these conditions cannot 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 cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Revision History

Revision	History
V1.1	2nd release

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Contents

1. Introduction

This is a wireless PCI Express adapter that delivers unrivaled wireless performance for your Desktop PC.　It complies with IEEE 802.11n draft standard and backward compatible with IEEE 802.11b/g.　With this adapter, you can easily upgrade your Desktop PC wireless connectivity.　Once connected, access the network with high-speed Internet connection while sharing photos, files, music, video, printers, and storage. Get a better Internet experience with a faster wireless connection so you can enjoy smooth digital phone calls, gaming, downloading, and video streaming.　This wireless adapter also provides peer-to-peer communication among any compatible wireless users and no Access Point required.

This wireless PCI Express adapter provides maximum transfer rate up to 300Mbps and supports WEP, WPA, WPA2 and WPS high-level WLAN security features that guarantee the best security for users.

This product is made in ISO9001 approved factory and complies with FCC part 15 regulations and CE approval.

1.1 Features

- Complies with draft IEEE 802.11n standard
- Up to 300Mbps data transfer rates in 802.11n mode
- Backward compatible with IEEE 802.11b/g
- Legacy and High Throughput Modes
- Supports 64/128-bit WEP Data Encryption
- Supports WPA, WPA2 (802.11i), WPS advanced security
- Supports both Infrastructure and Ad-Hoc Networking Modes
- Supports Quality of Service (QoS) - WMM, WMM-PS
- Supports Multiple BSSID
- Supports Windows 2000/XP/Vista
- Simple user setup and diagnostics utilities

1.2 LED Indicator

LED	Light Status	Description
ACT	Blinking	Data is being transmitted or received.

1.3 Package Contents

- One Wireless PCI Express Adapter
- Three External Antennas
- One CD-ROM (Drivers / Utility, User's Manual)

If any of the above items is missing, contact your dealer immediately.
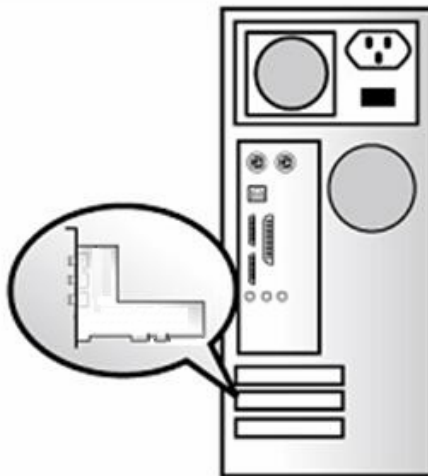
1.4 Before you start

You must have the requirements as follow,

- A computer with an available PCI Express slot
- At least a 300MHz processor and 32MB memory
- Windows 2000/XP/Vista support
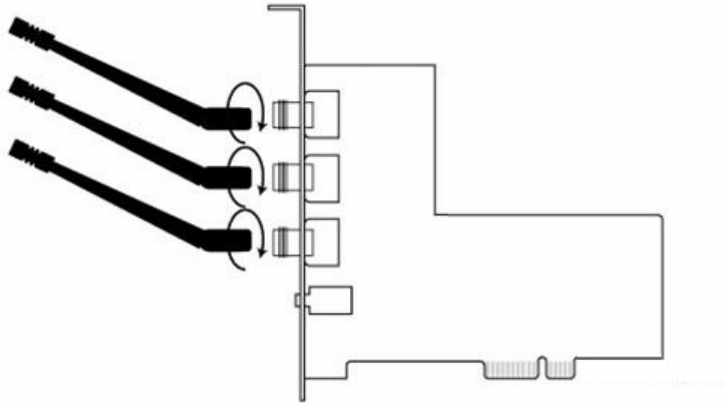- A CD-ROM drive
- Wireless PCI Express Adapter properly installed

1.5 Hardware Installation

STEP1: Turn off your computer and remove its cover

STEP2: Insert the wireless PCI Express card to an available PCI Express slot firmly. Please refer to the illustration below:

STEP3: Secure this card to the rear of the computer chassis and put back the cover.

STEP4: Secure the antenna to antenna connector of the card. Please refer to the illustration below:

STEP5: Turn on the computer.

[Guidelines for the Hardware Installation]

Please observe the following guidelines when you are installing the wireless PCI Express adapter to the Desktop PC:

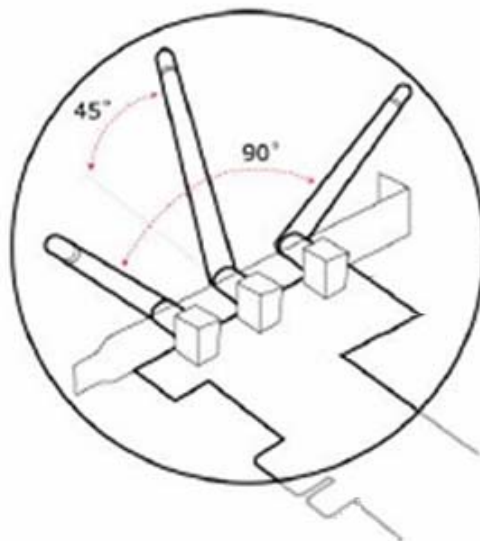- **Avoid placing the PC close to obstacles**

  Obstructions such as concrete and thick walls limit radio signal penetration and reduce the throughput and the coverage range of the wireless PCI Express adapter.

- **Place the PC as high as possible**

  The higher the PC is placed, the better the performance.

- **Adjust the antenna position**

  The wireless PCI Express adapter has two antennas (left/right) for both of signal reception and high power signal transmission. The antennas on the right and left side should be set perpendicular (90 degrees) to each other. The central one is for signal reception and should be pulled up about 45 degree. Please refer to the illustration below:

2. Installation Procedure

Note: If you have installed the Wireless Adapter driver & utility before, please uninstall the old version first.

2.1 For Windows XP and 2000

STEP1: **Found New Hardware Wizard** is displayed after the adapter is installed and the computer is restarted. Please click **Cancel** to continue.
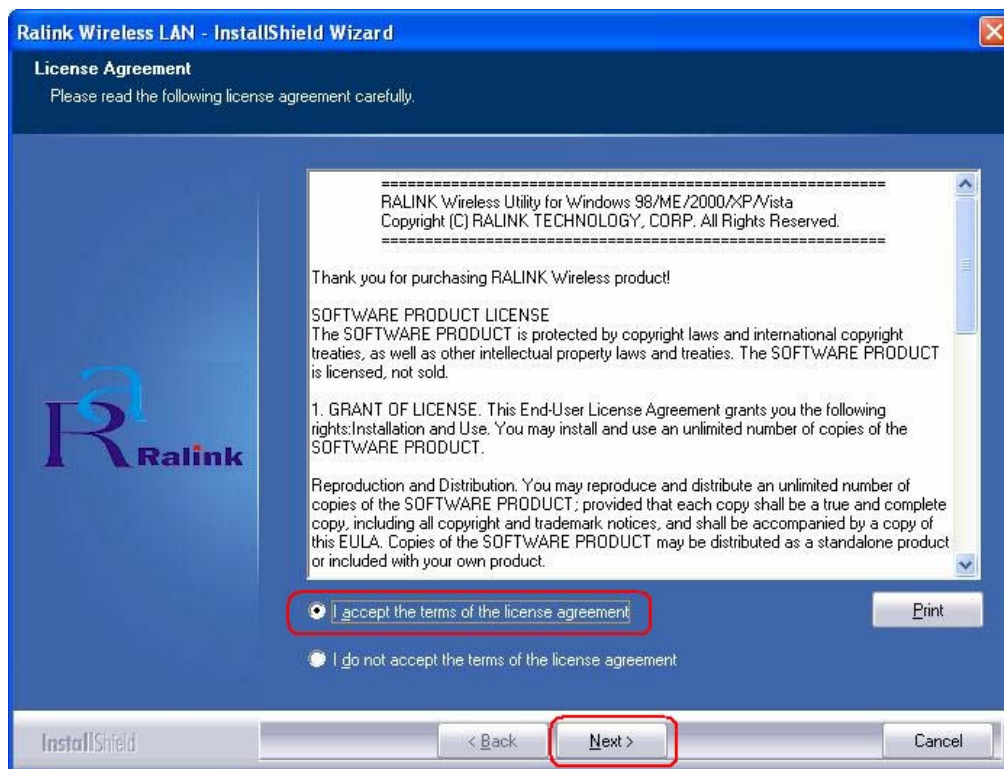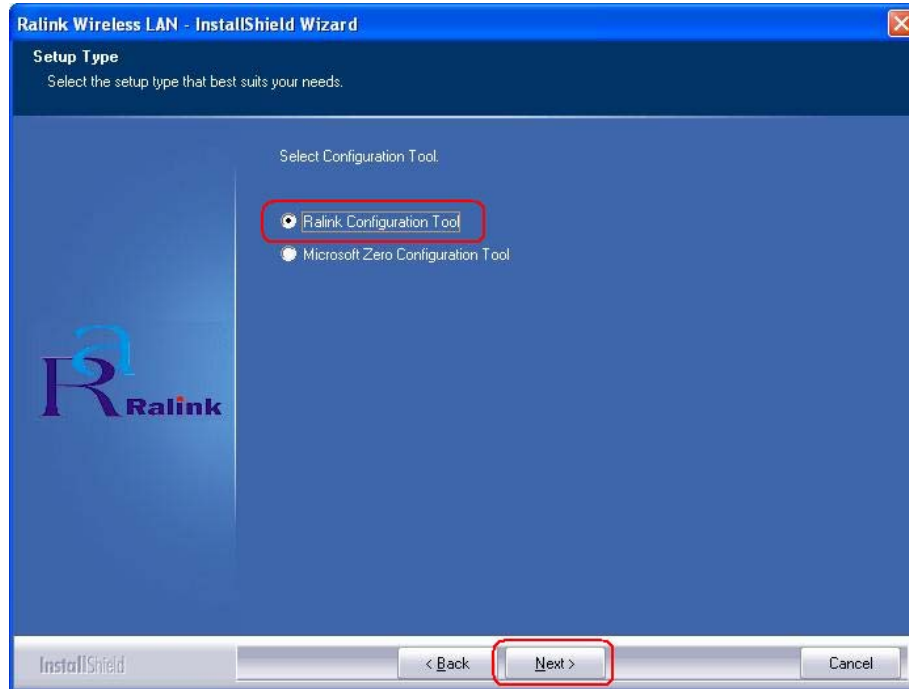

(For Windows XP)

(For Windows 2000)

STEP2: Insert Installation CD into CD-ROM drive then windows below will appear. Click **Install Driver** to begin device driver installation.

STEP3: Please read the following license agreement. Use the scroll bar to view the rest of this agreement. Select **I accept the terms of the license agreement** and click **Next** to continue.
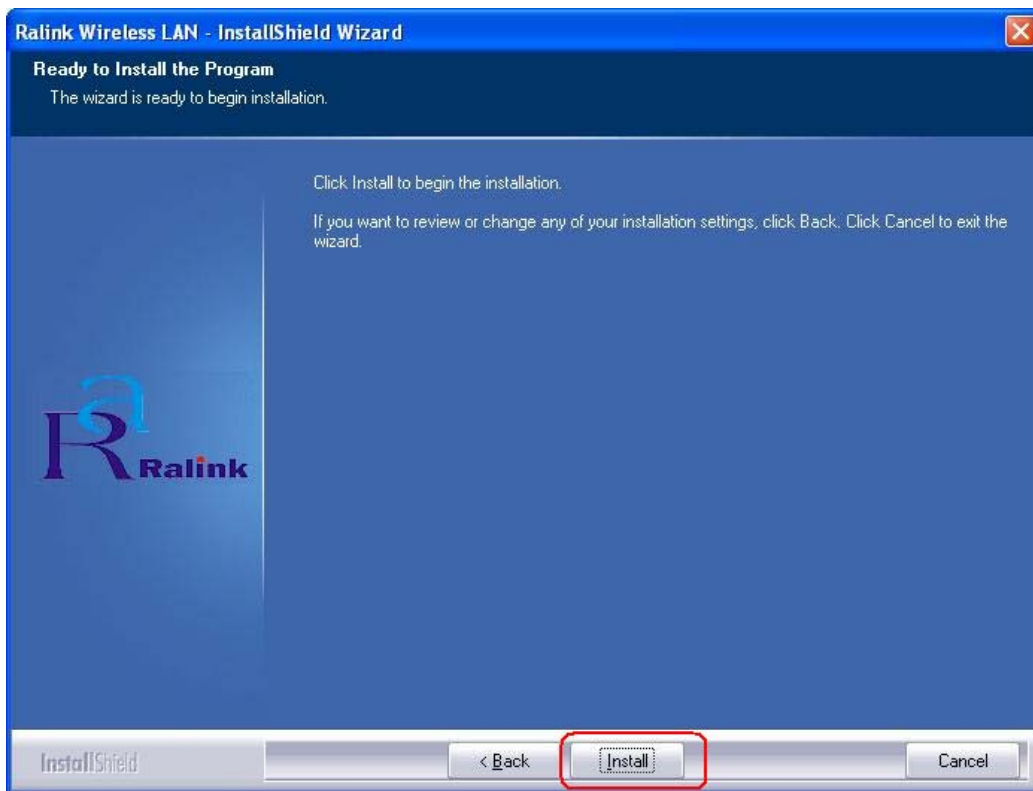
STEP4: In Windows XP, there is a **Windows Zero Configuration Tool** for you to setup wireless adapter. You can choose to configure the adapter through the **Microsoft Zero Configuration Tool** or the **Ralink Configuration Tool**. It is recommended to choose the **Ralink Configuration Tool** for the adapter. Click **Next** to continue.
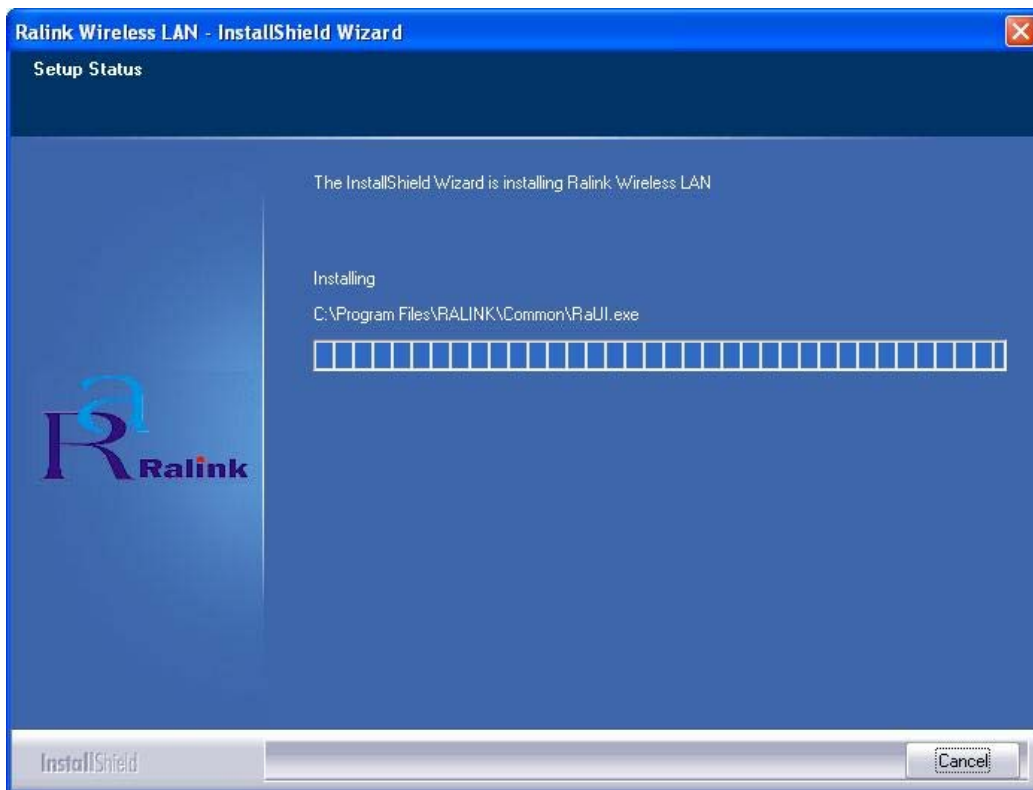

STEP5: If you need the adapter to operate with better performance, please choose **Optimize for performance mode** to enable the **Tx Burst mode**. Or you can choose **Optimize for WiFi mode** to run in standard wireless network.

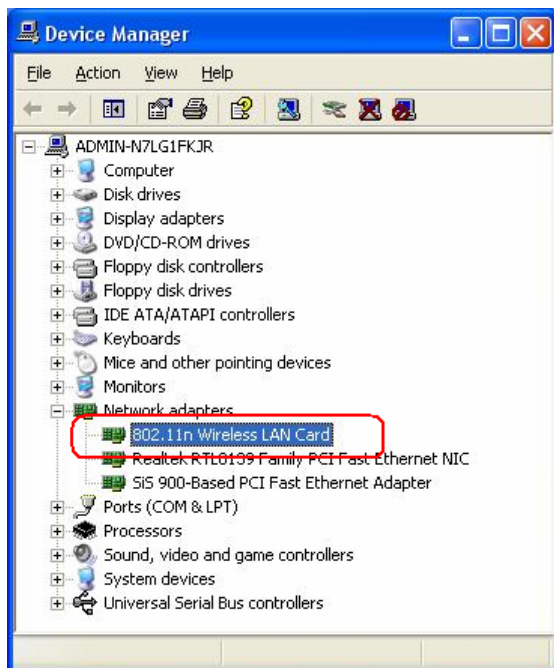**STEP6:** Click **Install** to begin the installation.

STEP7: Please wait for a while during the adapter is configuring your new software installation.
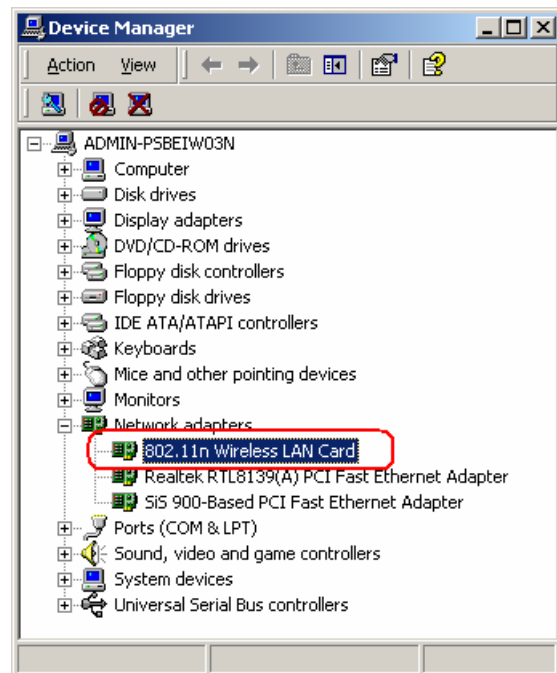
STEP8: After the setup wizard has successfully installed wireless LAN, click **Finish** to exit the wizard.

To check if the adapter is properly installed, you can right-click **My Computer** → choose **Properties** → click **Device Manager**.

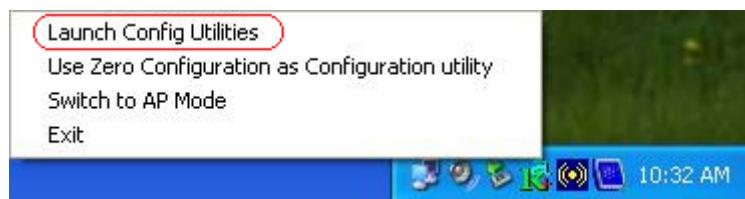(For Widows XP)   (For Widows 2000)

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

Right-click the icon, there are some items for you to operate the configuration utility,

- **Launch Config Utilities** → Select this option to open the Configuration Utility tool.
- **Use Zero Configuration as Configuration utility** → Select this option to use Windows XP built-in wireless configuration utility (Windows Zero Configuration) to configure to card.
- **Switch to AP Mode** → Select this option to change to AP mode.
- **Exit** → Select **Exit** to close the Configuration Utility tool.
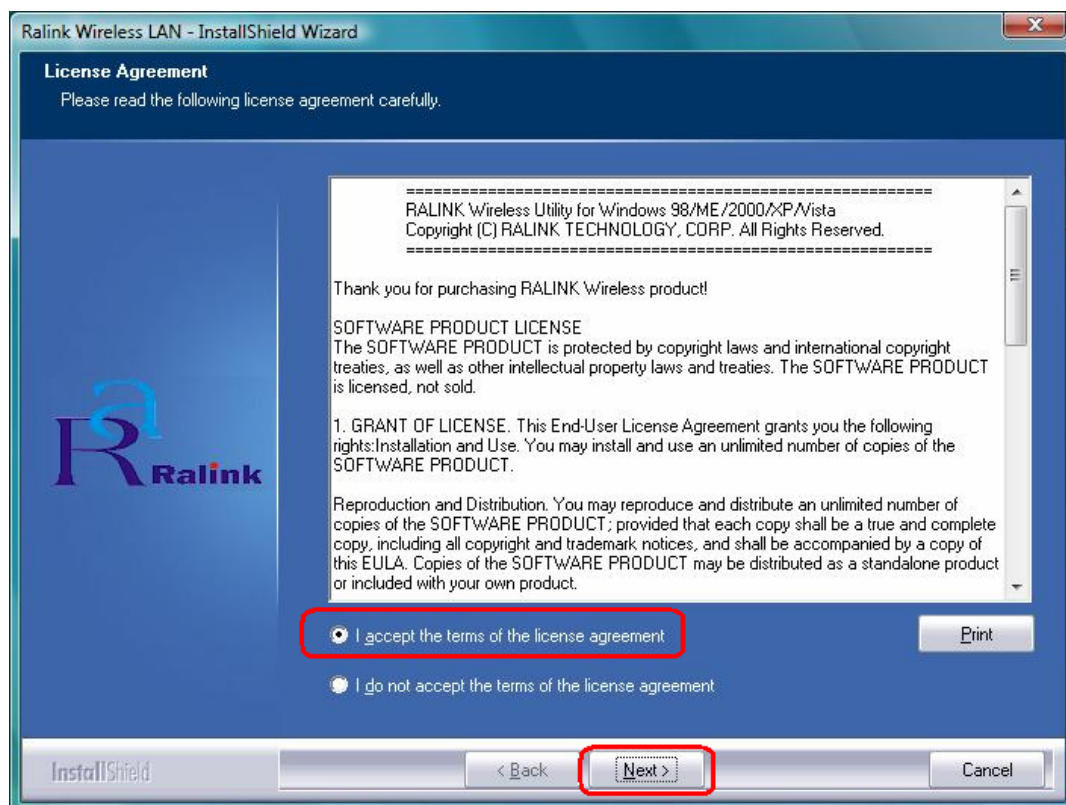

2.2 For Vista

STEP1: Found New Hardware Wizard is displayed after the adapter is installed and the computer is restarted. Please click **Cancel** to continue.
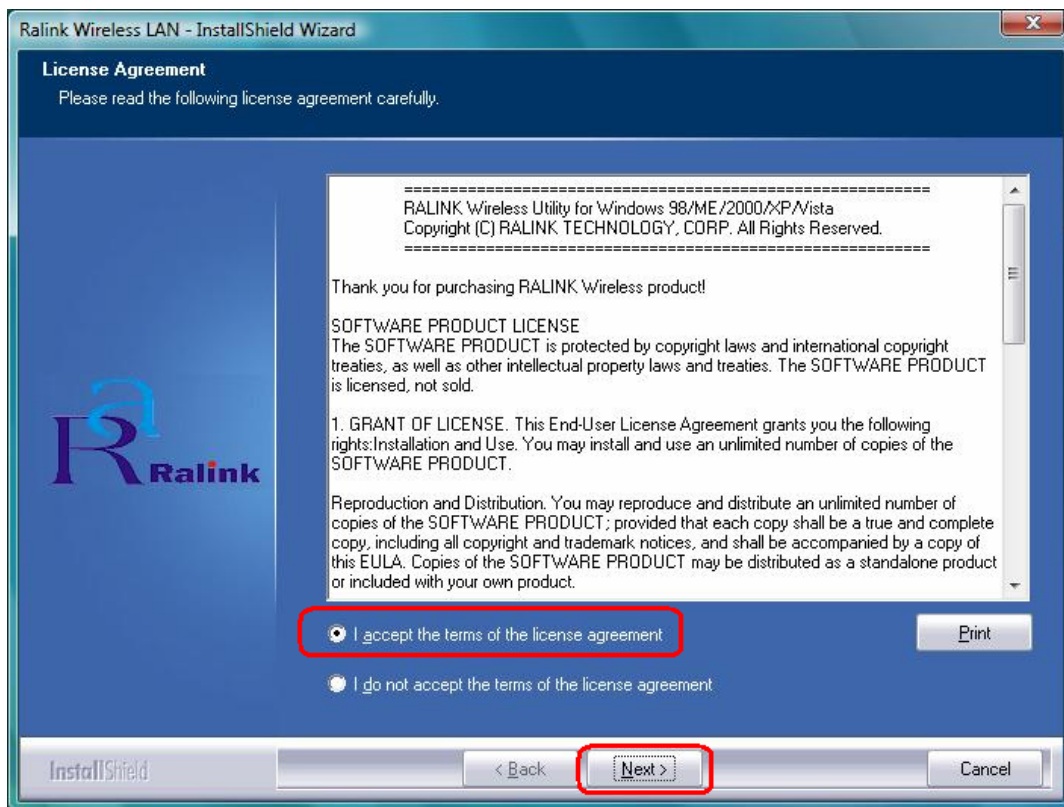
STEP2: Insert Installation CD into CD-ROM drive then windows below will appear. Click **Install Driver** to begin device driver installation.
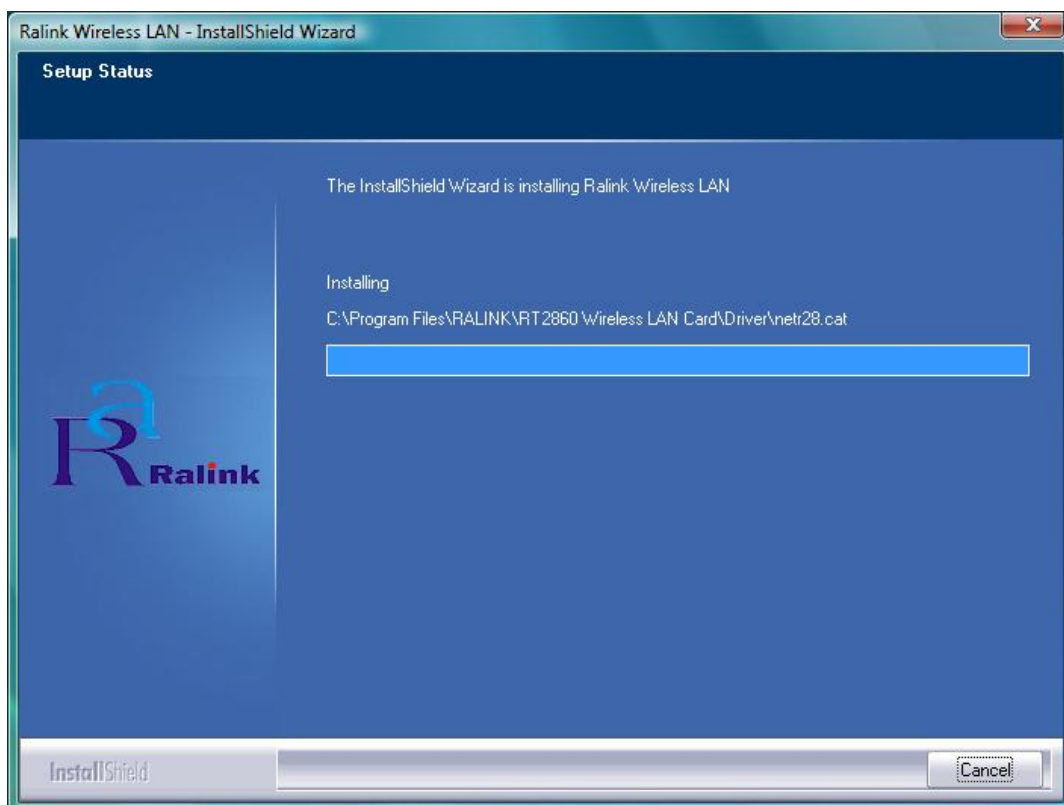

STEP3: Please read the following license agreement. Use the scroll bar to view the rest of this agreement. Select **I accept the terms of the license agreement** and click **Next** to continue.
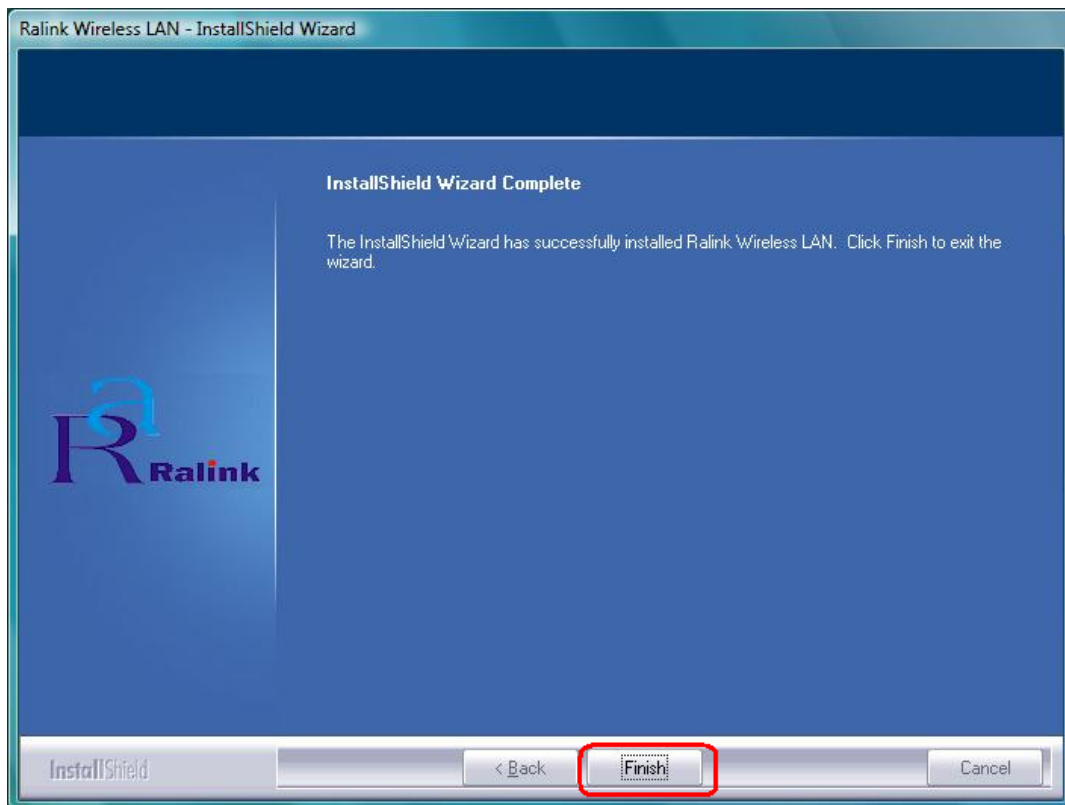
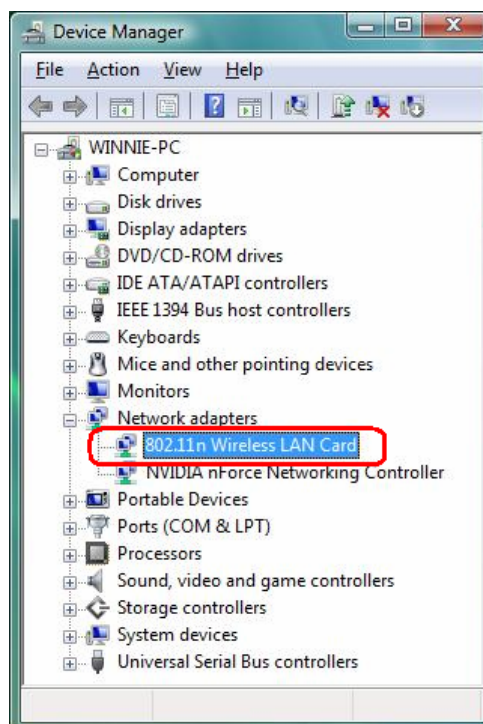**STEP4:** Click **Install** to begin the installation.

STEP5: Please wait for a while during the adapter is configuring your new software installation.

STEP8: After the setup wizard has successfully installed wireless LAN, click **Finish** to exit the wizard.
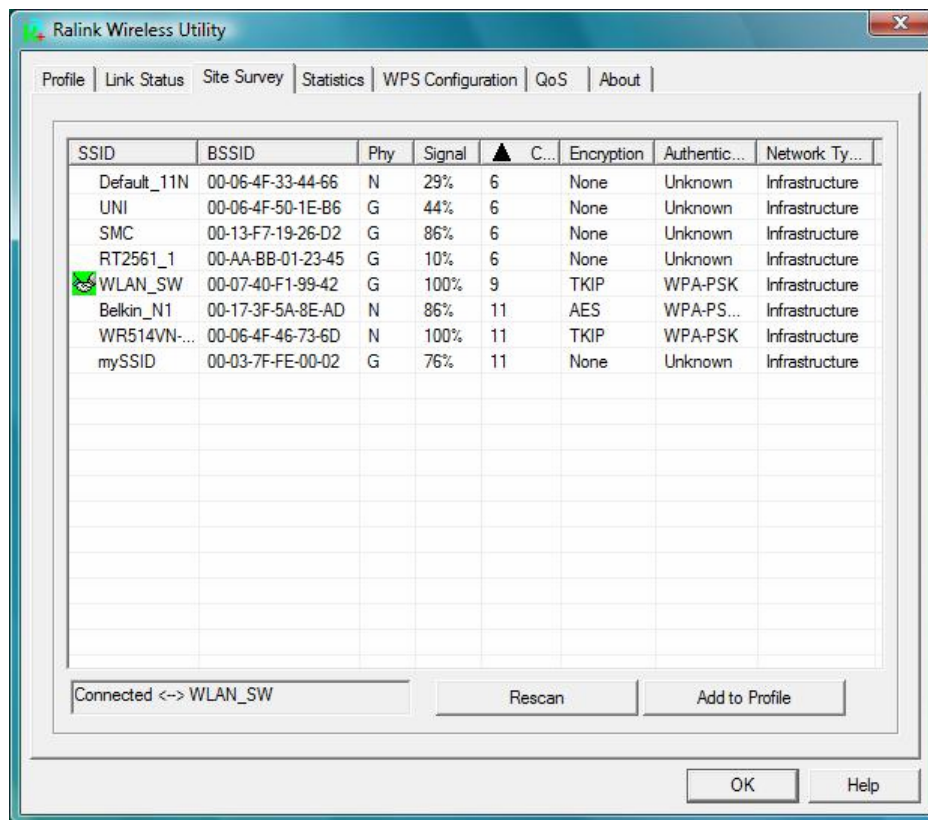

To check if the adapter is properly installed, you can right-click **My Computer** → choose **Properties** → click **Device Manager**.
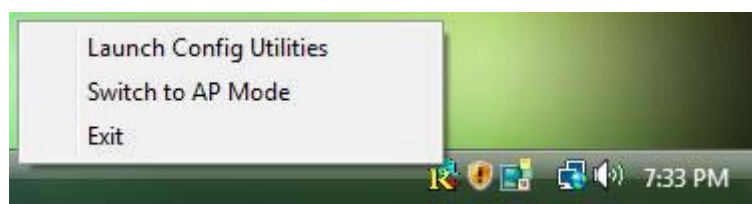
The Configuration Utility appears as an icon on the system tray of Windows while the adapter is running. You can open the utility by double-click on the icon.

Ralink wireless utility needs to cooperate with Microsoft AutoConfig service in order to perform scanning and connecting actions, so the AutoConfig service should be enable beforehand.

Control Menu ➔ Once Ralink wireless utility is minimized, the user can click the Ralink icon on the taskbar to bring up the control menu.

● **Launch Config Utilities** ➔ Restore Ralink wireless utility window.

● **Switch to AP Mode** ➔ Select this option to change to AP mode.

● **Exit** ➔ Select **Exit** to close the Configuration Utility tool.

3. Wireless Network Configuration Utility

3.1 For Windows XP & 2000

The Configuration Utility is a powerful application that helps you to configure the Wireless LAN adapter and monitor the link status and statistics during the communication process.
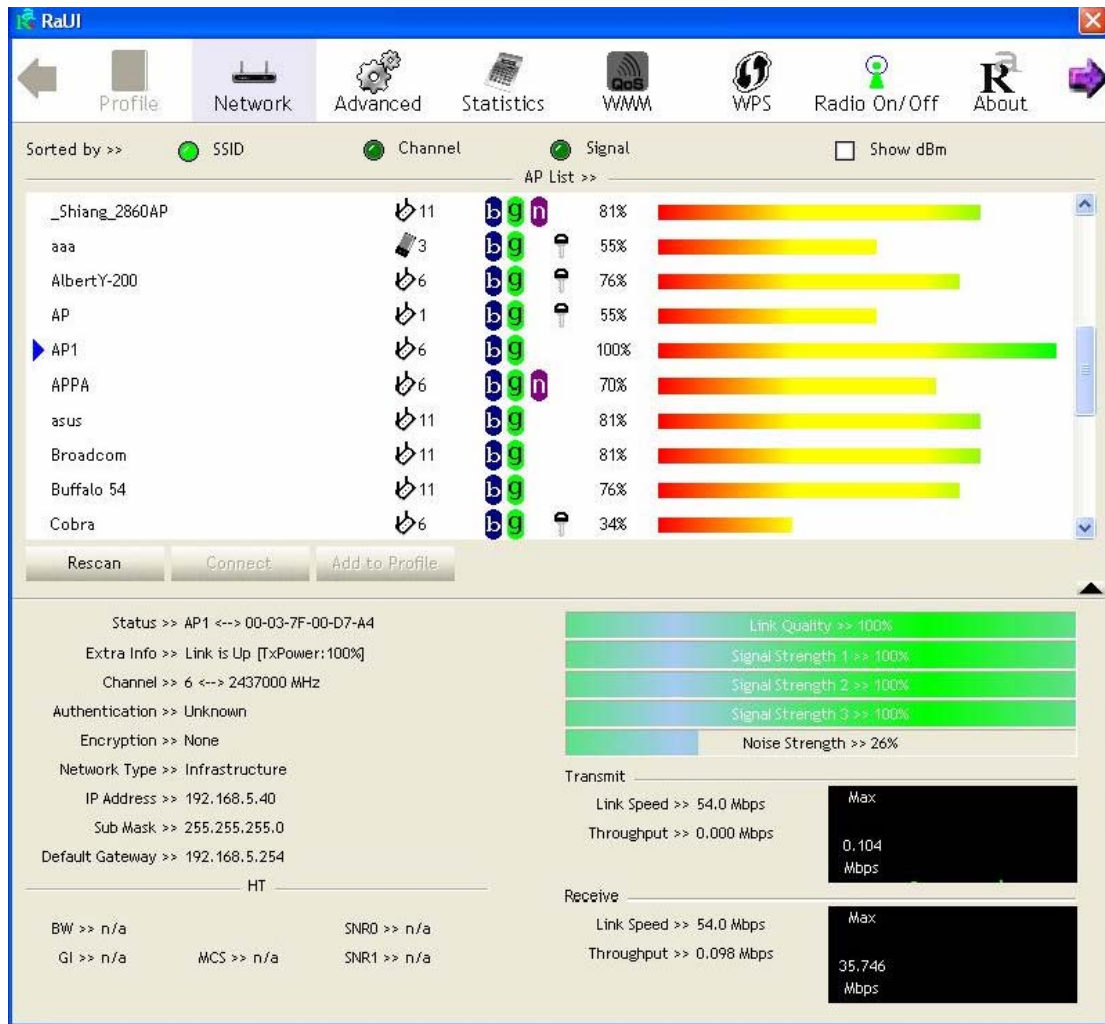
When the adapter is installed, the configuration utility will be displayed automatically. This adapter will auto connect to wireless device which has better signal strength and no wireless security setting.

In Windows XP, it provides wireless configuration utility named "Windows Zero configuration" which provides basic configuration function for Ralink Wireless NIC, Ralink's Utility (RaUI) provides WPA supplicant functionality. To make it easier for user to select the correct utility, RaUI will let user make the selection when it first runs after windows XP boots.

RaUI can co-exist with **WZC** (**Windows Zero Configuration**). When coexisting with WZC, RaUI only provides monitoring function, such as link status, network status, statistic counters, advance feature status, WMM status and WPS status. It won't interfere with WZC's configuration or profile functions. Please see below picture: To select WZC or RaUI

If "**Use Zero Configurations as Configuration utility**" is selected, please continue on the section. Below picture shows that the RaUI status when WZC is active as main control utility.
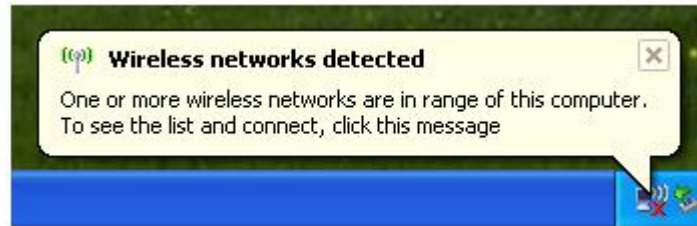
When activating WZC, there are couple different on RaUI status compare to the without WZC running:

(1) **Profile** button will be gray, profile function is removed since the NIC is controlled by WZC.

(2) The **connect** and **add profile** function will be gray. The reason is same as the first difference.

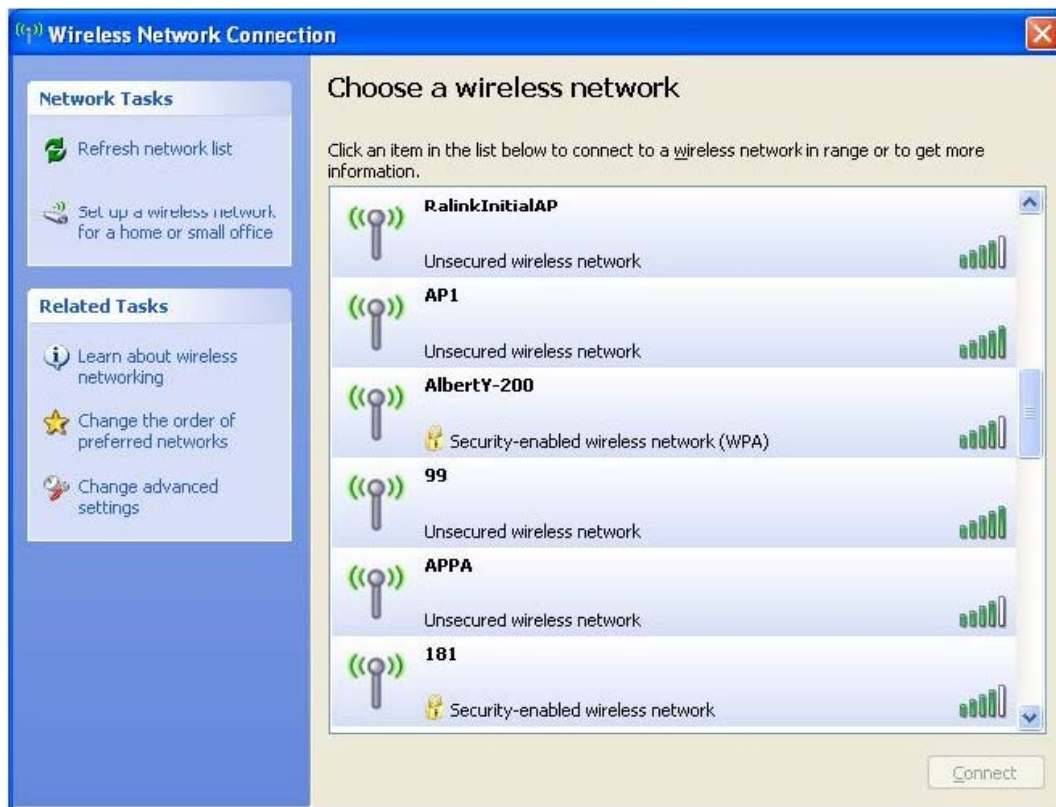
[Use WZC to configure wireless NIC]

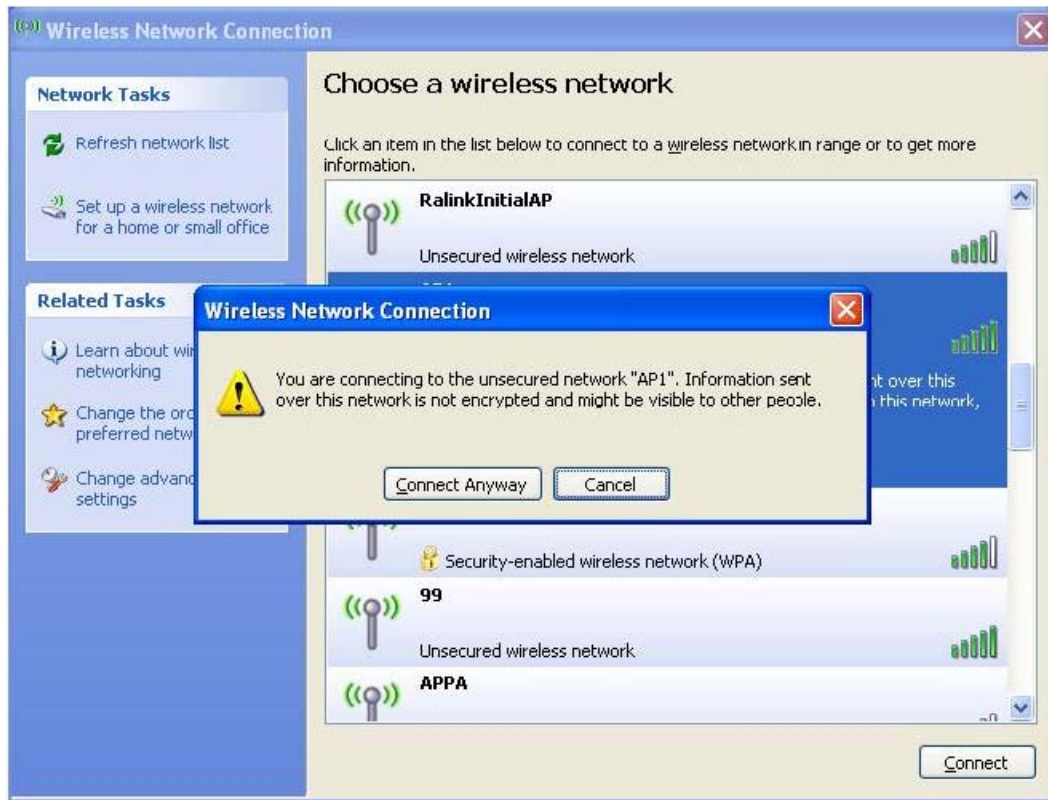**STEP1:** If connection is lost or not connected, the status prompt as below will pop up.

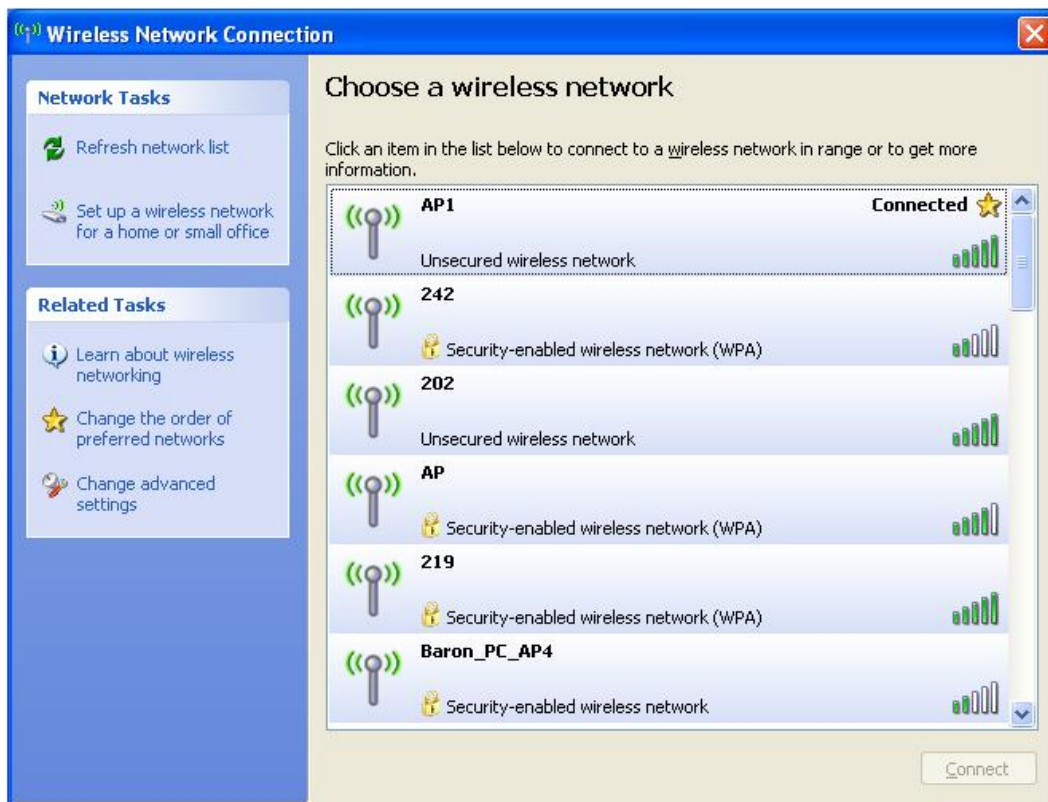**STEP2:** Right-click the network connection icon in the task bar.

STEP3: Select "**View Available Wireless Networks**" will pop up the dialog shown as below.
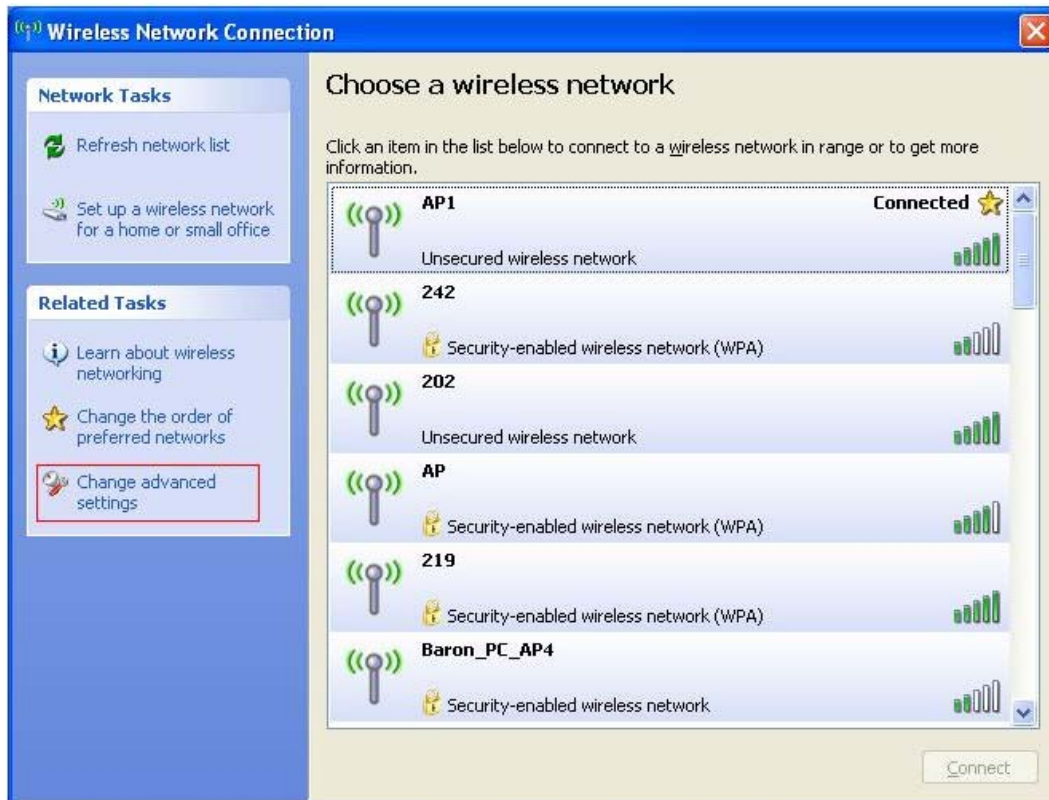
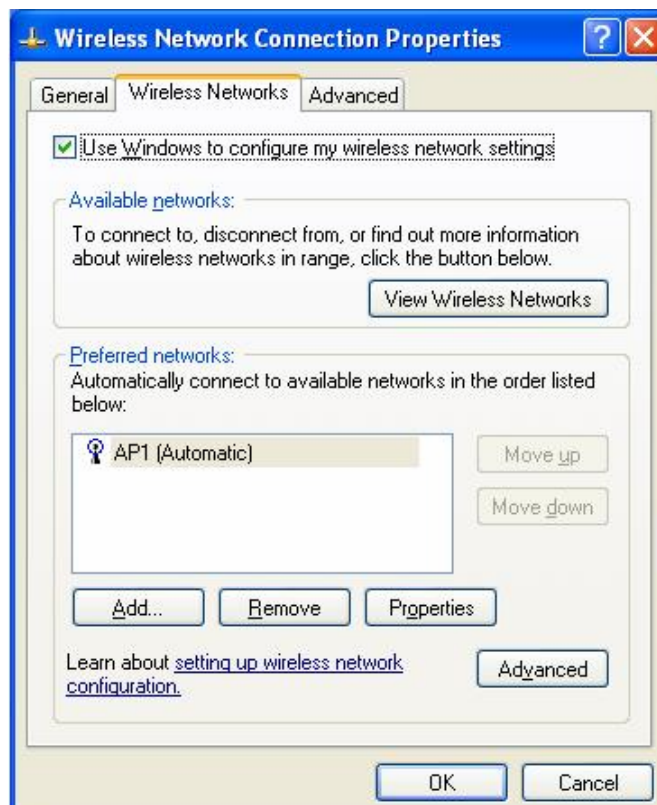**STEP4:** Select intended AP and click "**Connect**" shown as below, then click "**Connect Anyway**".

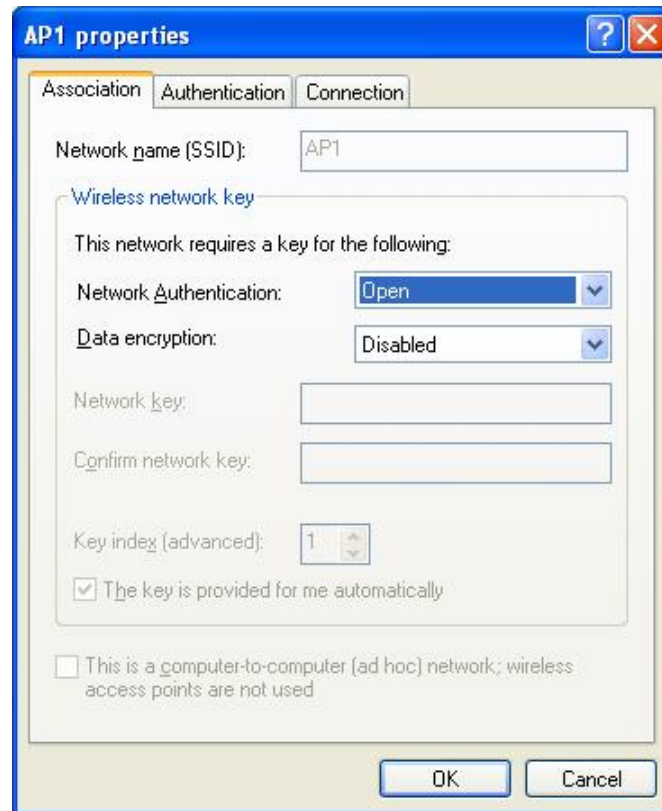**STEP5:** AP1 is successful connected.

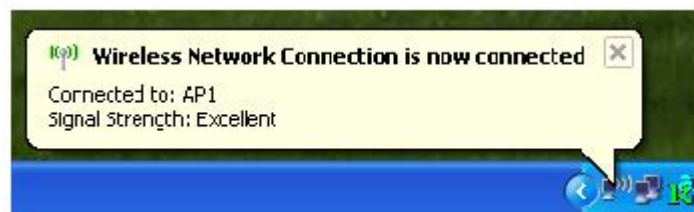**STEP6:** If you want to modify information about AP, click "**Change advanced settings**"
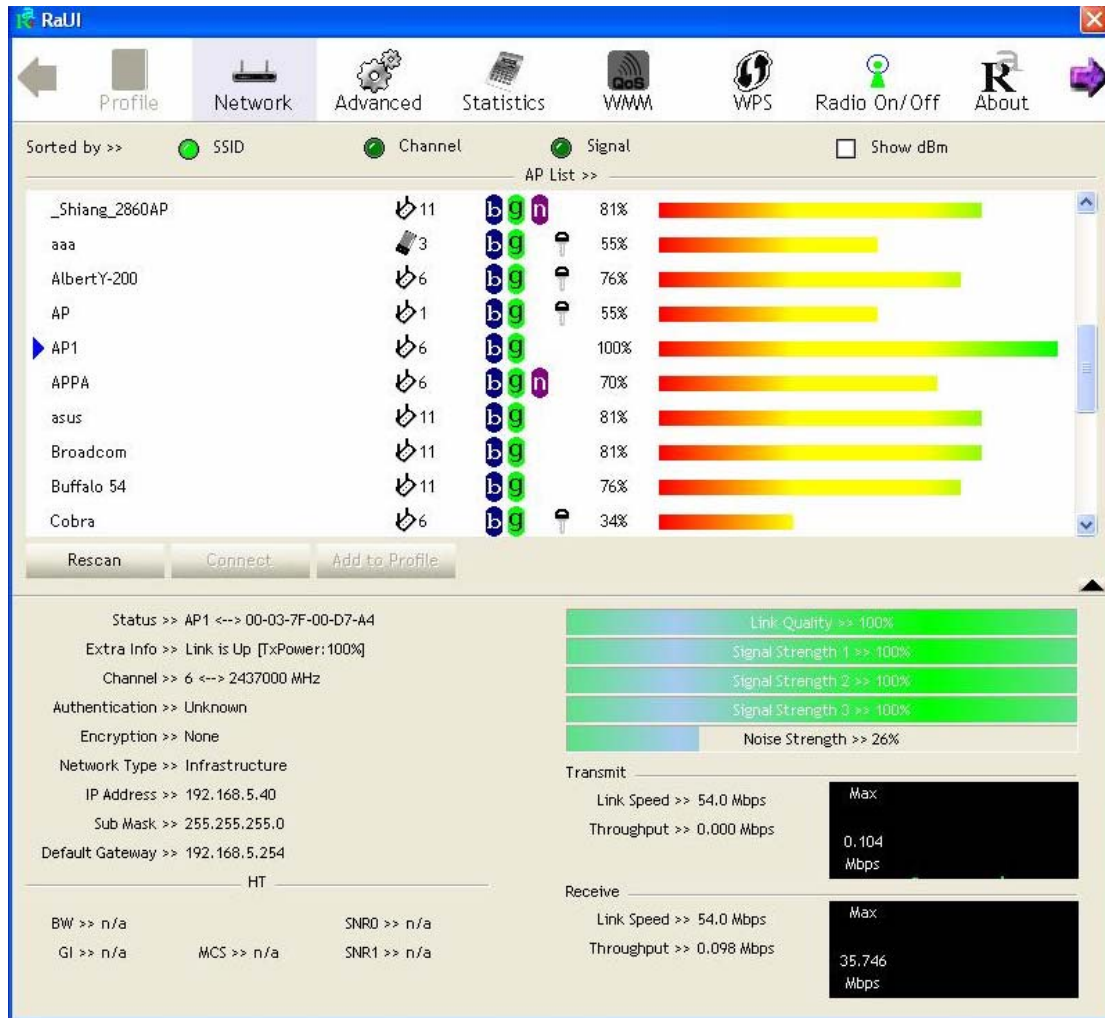

STEP7: Choose "**Wireless Networks**" tab.

STEP8: Click "**Properties**" and then click "**OK**" button.

STEP9: After filling appropriate value, click "**OK**" button. And the status will prompt up as below.
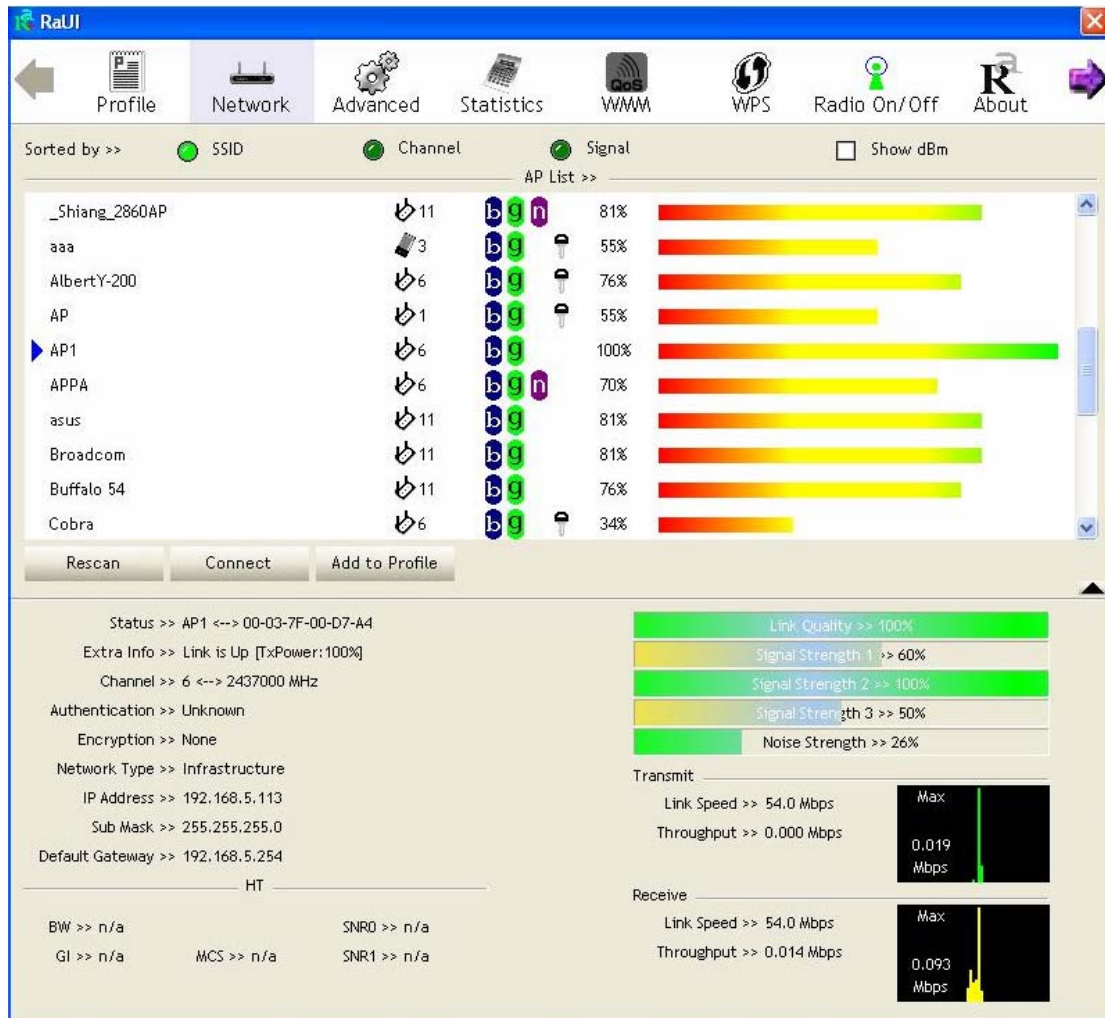

STEP10: Click the Ralink's icon will bring up RaUI main window. User can find the surrounding APs in the list. The current connected AP will also shown with the green icon indicated as below screen. User may user the available tab to configure more advanced features provided by Ralink's wireless NIC.

3.1.1 Start

When starting RaUI, system will connect to the AP with best signal strength without setting profile or matching profile setting. It will issue a scan command to wireless NIC. After two seconds, the AP list will updated with the result of BSS list scan. The AP list include most used fields, such as SSID, network type, channel used, wireless mode, security status and signal percentage. The arrow icon indicates the connected BSS or IBSS network.

There are three sections in RaUI. These sections are briefly described as below.

- **Button Section:** include Profile page, Network page, Advanced page, Statistics page, WMM page, WPS page, About button, Radio On/Off button and Help button.

→ Button Section

→ Move to the Left

→ Move to the Right

■ **Function Section:** Corresponding button

➔ Profile Page

➔ Network Page

➔ Advanced Page

➔ Statistics Page

Transmit	Receive		
Frames Transmitted Successfully		=	1432
Frames Retransmitted Successfully		=	4
Frames Fail To Receive ACK After All Retries		=	0
RTS Frames Successfully Receive CTS		=	0
RTS Frames Fail To Receive CTS		=	0

Reset Counter

➔ WMM Page

WMM Setup Status

WMM >> Enabled   Power Save >> Disabled   Direct Link >> Disabled

☑ WMM Enable

    ☐ WMM - Power Save Enable

        ☐ AC_BK   ☐ AC_BE   ☐ AC_VI   ☐ AC_VO

    ☐ Direct Link Setup Enable

        MAC Address >> ☐☐☐☐☐☐   Timeout Value >> 60 sec   Apply   Tear Down

➔ WPS Page

WPS AP List

ID : Unknown	hsinchu1	00-11-26-71-27-68	6	

Rescan

Information

Pin Code

64893945 Renew

WPS Profile List

Config Mode

Enrollee

Detail

Connect

Rotate

Disconnect

Export Profile

Delete

PIN   ☑ WPS Associate IE   Progress >> 0%

PBC   ☑ WPS Probe IE

➔ About Page

RaConfig Version >> 2.0.3.0   Date >> 08-02-2007

Driver Version >> 1.0.4.0   Date >> 07-28-2007

EEPROM Version >> 1.1

Firmware Version >> 0.7

Phy_Address >> 00-06-4F-12-34-56

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■ **Status Section:** Include Link Status, Authentication Status, AP's information, Configuration and retrying the connection when authentication is failed.

➔ Link Status

Status >> WLAN_SW <--> 00-07-40-F1-99-42
Extra Info >> Link is Up [TxPower:100%]
Channel >> 9 <--> 2452 MHz
Authentication >> WPA-PSK
Encryption >> TKIP
Network Type >> Infrastructure
IP Address >> 192.168.10.45
Sub Mask >> 255.255.255.0
Default Gateway >> 192.168.10.1
——— HT ———

BW >> n/a   SNR0 >> n/a
GI >> n/a   MCS >> n/a   SNR1 >> n/a

Link Quality >> 100%
Signal Strength 1 >> 75%
Signal Strength 2 >> 100%
Signal Strength 3 >> 100%
Noise Strength >> 26%

Transmit
Link Speed >> 54.0 Mbps
Throughput >> 4.156 Kbps
Max
7.240 Kbps

Receive
Link Speed >> 54.0 Mbps
Throughput >> 14.896 Kbps
Max
57.064 Kbps

➔ Authentication Status

Authentication Status

Card Name >> Ralink 802.11n Wireless LAN Card   Connected by manual...

16:37:25.062	Starting network connection...
16:37:25.171	Network is connecting...
16:37:25.281	PEAP Authenticating...
16:37:28.375	Wireless client is authenticated.

Cancel

➜ AP's Information

➜ Retry the Connection

➜ Configuration

■ At the mean time of starting RaUI, there is also a small Ralink icon appears within windows taskbar as below. You may double click it to bring up the main menu if you selected to close RaUI menu earlier. You may also use mouse;s right button to close RaUI utility.
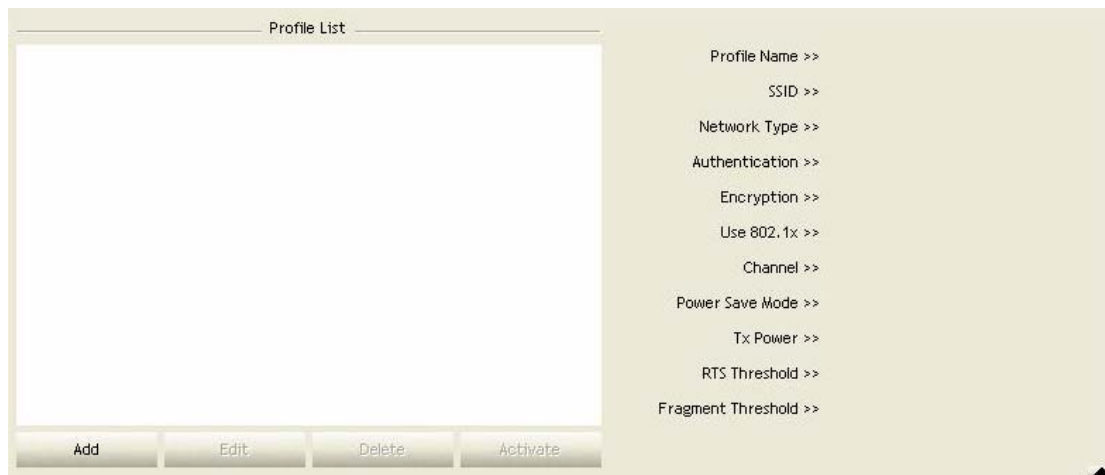
 ➔➔ Ralink icon in system tray.

■ Besides, the small icon will change color to reflect current wireless network connection status. The status indicates as follow:

➔ -- indicate Connected and Signal Strength is Good.

➔ -- indicate Connected and Signal Strength is Normal

➔ -- indicate Wireless NIC is not connected yet

➔ -- indicate Wireless NIC is not detected

➔ -- indicate Connected and Signal Strength is Weak

3.1.2 Profile

Profile can book keeping your favorite wireless setting among your home, office, and other public hot-spot. You may save multiple profiles, and activate the correct one at your preference.

[Definition of each field]

Profile Name: Name of profile, preset to PROF✳ （✳ indicate 1,2,3,…）

SSID: AP or Ad-Hoc name

Network Type: Network's type, including infrastructure and Ad-Hoc.

Authentication: Authentication mode

Encryption: Encryption Type

Use 802.1x: Whether or not use 802.1x feature

Channel: channel in use for Ad-Hoc mode

Power Save Mode: Choose from CAM (Constantly Awake Mode) or Power Saving Mode.

Tx Power: Transmit power, the amount of power used by a radio transceiver to send the signal out.

RTS Threshold: User can adjust the RTS threshold number by sliding the bar or key in the value directly.

Fragment Threshold: User can adjust the Fragment threshold number by sliding the bar or

key in the value directly.

[Icons and buttons]

➤ ➜ indicate connection is successful on currently activated profile

➤ ➜ indicate connection is failed on currently activate profile

➤ ➜ indicate network type is infrastructure mode

➤ ➜ indicate network type is Ad-Hoc

➤ ➜ indicate security-enabled wireless network

Add ➜ Add a new profile

Edit ➜ Edit an existing profile

Delete ➜ Delete an existing profile
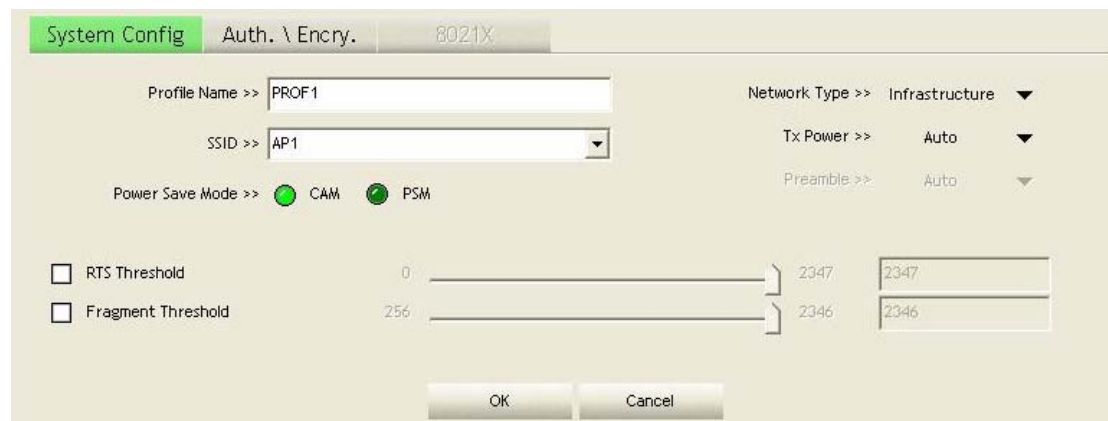
Activate ➜ Activate selected profile

▼ ➜ Show the information of Status Section

▲ ➜ Hide the information of Status Section

3.1.2.1 Add/Edit Profile

There are 3 methods to open Profile Editor form:

➜ You can open it from "Add to Profile" button in Site Survey function

➜ You can open it form "Add" button in Profile function

➜ You can open it from "Edit" button in Profile function

Profile Name: User can chose name for this profile, or use default name defined by system.

SSID: User can key in the intended SSID name or use pull down menu to select from available APs.

Power Save Mode: Choose from CAM [Constantly Awake Mode] or Power Saving Mode.

Network Type: There are two types, infrastructure and 802.11 Ad-Hoc mode. Under Ad-Hoc mode, user can also choose the preamble type, the available preamble type includes auto and long. In addition to that the channel field will be available for setup in Ad-Hoc mode.

RTS Threshold: User can adjust the RTS threshold number by sliding the bar or key in the value directly. The default value is 2347.

Fragment Threshold: User can adjust the Fragment threshold number by sliding the bar or key in the value directly. The default value is 2346.

Channel: Only available for setting under Ad-Hoc mode. User can choose the channel frequency to start their Ad-Hoc network.

Authentication Type: There are 7 type of authentication modes supported by RaUI. They are Open, Shared, LEAP, WPA, WPA-PSK, WPA2, WPA2-PSK.

Encryption Type: For open and shared authentication mode, the selection of encryption type are None and WEP. For WPA, WPA2, WPA-PSK and WPA2-PSK authentication mode, the encryption type supports both TKIP and AES.

802.1x Setting: It is an authentication for WPA and WPA2 certificate to server.

WPA Pre-Shared Key: This is the shared secret between AP and STA. For WPA-PSK and WPA2-PSK authentication mode, this field must be filled with character longer than 8 and less than 32 lengths.

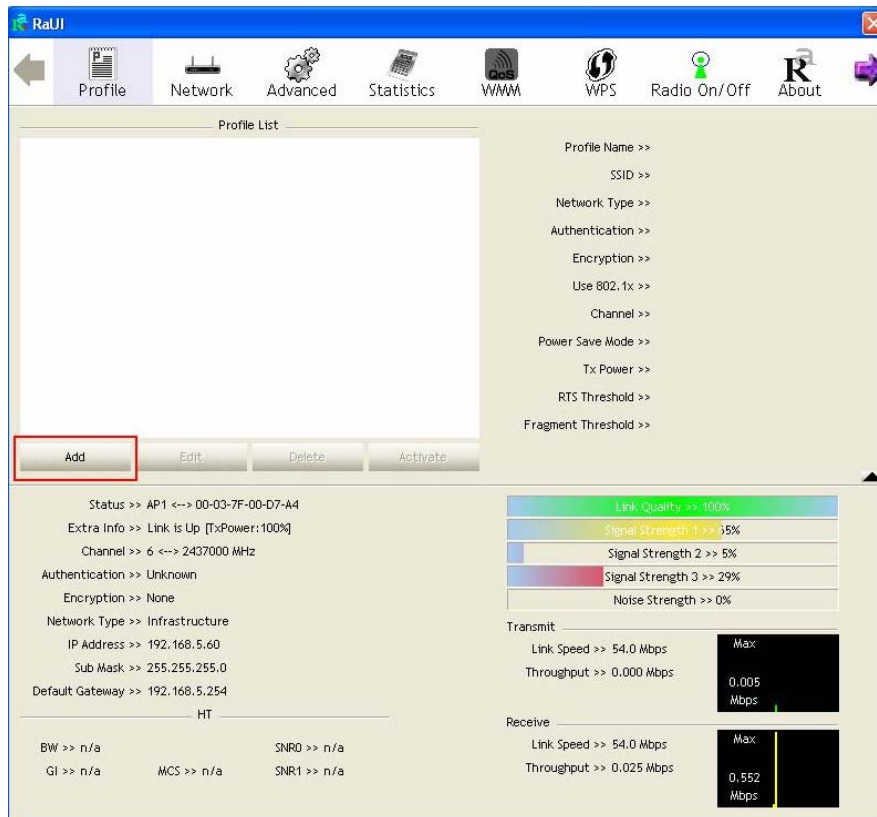**WEP Key:** Only valid when using WEP encryption algorithm. The key must matched AP's key. There are several formats to enter the keys:

➡ Hexadecimal – 40bits: 10 Hex characters

➡ Hexadecimal – 128bits: 26 Hex characters.

➡ ASCII – 40bits: 5 ASCII characters

➡ ASCII – 128bits: 13 ASCII characters

3.1.2.2 Example to Add Profile in Profile

Step 1: Click **Add** in Profile function

Step 2: Add Profile page will pop up.