

LevelOne

WAP-6110  
300Mbps Wireless PoE Access Point

User's Manual

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# 1 Introduction

Congratulations on becoming the owner of the Wireless Gateway. You will now be able to access the Internet using your high-speed xDSL/Cable modem connection.

This User Guide will show you how to connect your Wireless Gateway, and how to customize its configuration to get the most out of your new product.

## Features

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The list below contains the main features of the device and may be useful to users with knowledge of networking protocols. If you are not an experienced user, the chapters throughout this guide will provide you with enough information to get the most out of your device.

Features include:

- 10/100Base-T Ethernet Wireless AP to provide Internet connectivity to all computers on your LAN
- Network address translation (NAT) functions to provide security for your LAN
- Network configuration through DHCP Server and DHCP Client
- Services including IP route and DNS configuration, RIP, and IP
- Supports remote software upgrades
- User-friendly configuration program accessed via a web browser
- User-friendly configuration program accessed via EasySetup program

The Wireless Gateway has the internal Ethernet switch allows for a direct connection to a 10/100BASE-T Ethernet network via an RJ-45 interface, with LAN connectivity for both the Wireless Gateway and a co-located PC or other Ethernet-based device.

## Device Requirements

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In order to use the Wireless Gateway, you must have the following:

- One RJ-45 Broadband Internet connection via cable modem or xDSL modem
- Instructions from your ISP on what type of Internet access you will be using, and the addresses needed to set up access
- One or more computers each containing an Ethernet card (10Base-T/100Base-T network interface card (NIC))
- TCP/IP protocol for each PC

- For system configuration using the supplied
  - a. web-based program: a web browser such as Internet Explorer v4 or later, or Netscape v4 or later. Note that version 4 of each browser is the minimum version requirement – for optimum display quality, use Internet Explorer v5, or Netscape v6.1
  - b. EasySetup program: Graphical User Interface



### Note

*You do not need to use a hub or switch in order to connect more than one Ethernet PC to your device. Instead, you can connect up to four Ethernet PCs directly to your device using the ports labeled Ethernet on the rear panel.*

## Using this Document

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### Notational conventions

- Acronyms are defined the first time they appear in the text and also in the glossary.
- For brevity, the Wireless Gateway is referred to as “the device”.
- The term *LAN* refers to a group of Ethernet-connected computers at one site.

### Typographical conventions

- *Italic* text is used for items you select from menus and drop-down lists and the names of displayed web pages.
- **Bold** text is used for text strings that you type when prompted by the program, and to emphasize important points.

### Special messages

This document uses the following icons to draw your attention to specific instructions or explanations.



### Note

*Provides clarifying or non-essential information on the current topic.*



### Definition

*Explains terms or acronyms that may be unfamiliar to many readers. These terms are also included in the Glossary.*



### WARNING

*Provides messages of high importance, including messages relating to personal safety or system integrity.*

# 2 Getting to know the device

## **Computer / System requirements**

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- 1. Pentium 200MHZ processor or above
- 2. Windows 98SE, Windows Me, Windows 2000, Windows XP, Windows Vista, Windows 7 and Windows 8
- 3. 64MB of RAM or above
- 4. 25MB free disk space

## **Package Contents**

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1. WAP-6110
2. CD-ROM With User Manual
3. Quick Installation Guide
4. Ethernet Cable (RJ-45)
5. Power Adapter
6. Detachable Antenna

## LED meanings & activations

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### Front Panel

The front panel contains lights called Light Emitting Diodes (LEDs) that indicate the status of the unit.



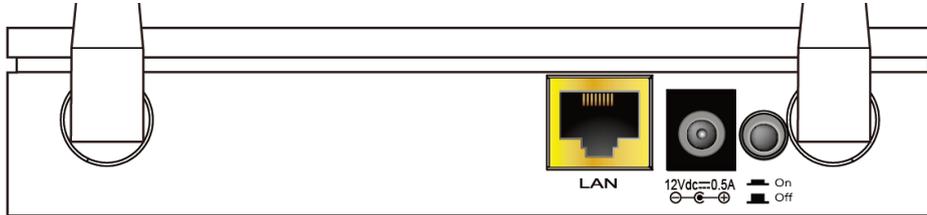
*\* Actual Front Panel and ANTENNA may vary depending on model.*

Figure 1: Front Panel and LEDs

Label	Color	Function
POWER	green	On: device is powered on Off: device is powered off
WLAN	green	On: WLAN link established and active Blink: Valid Wireless packet being transferred
WPS	green	Off: WPS link isn't established and active Blink: Valid WPS packet being transferred
LAN	green	On: LAN link established and active Off: No LAN link Blink: Valid Ethernet packet being transferred

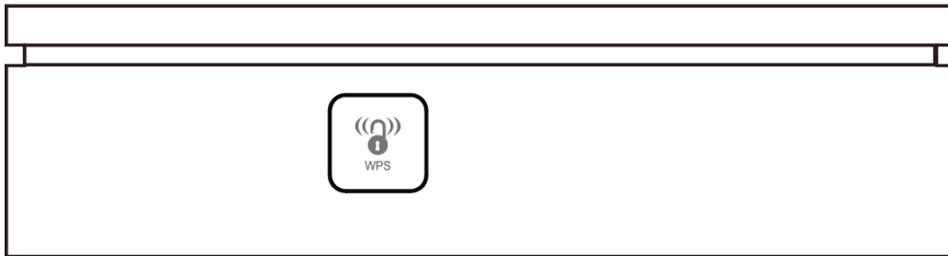
### Rear and Right Panel and bottom Side

The rear and right panel and bottom side contains a *Restore Defaults* button, the ports for the unit's data and power connections.



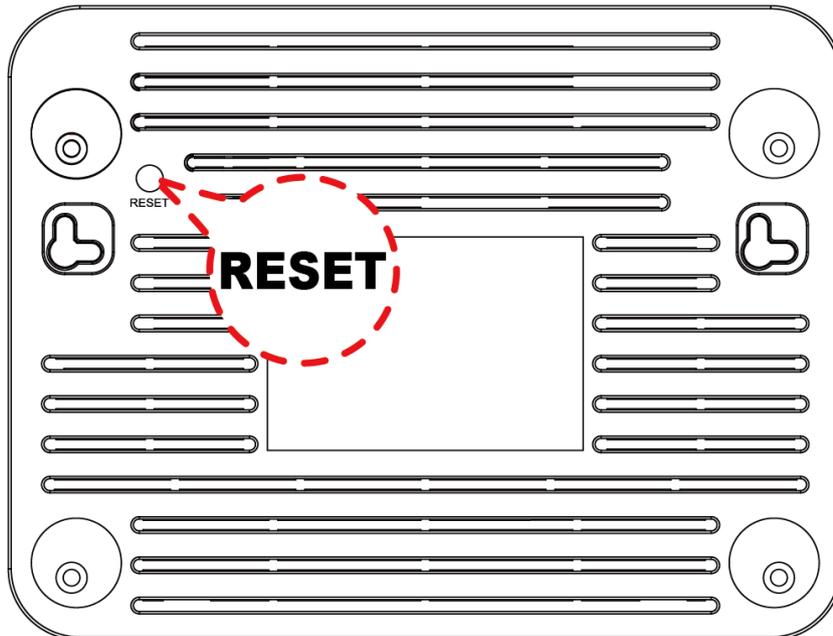
*\* Actual Rear Panel and ANTENNA may vary depending on model.*

Figure 2: Rear Panel Connections



*\* Actual button may vary depending on model.*

Figure 3: Right Panel Connections



*\* Actual button may vary depending on model.*

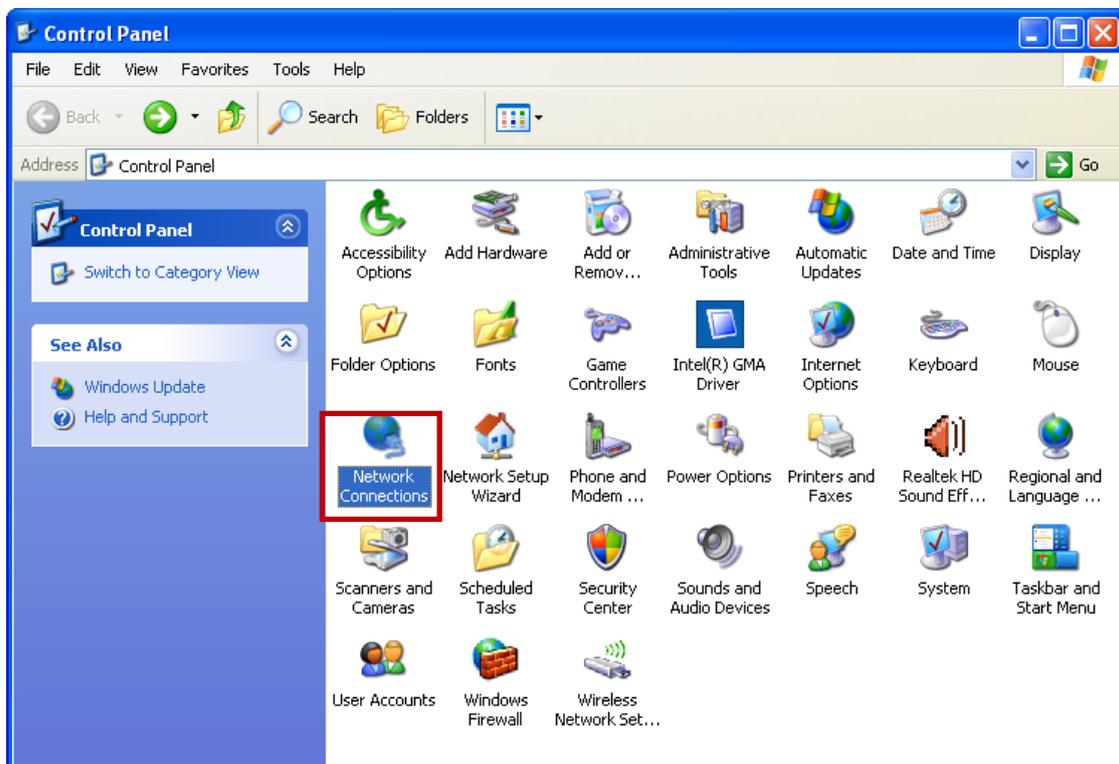
Label	Function
ANTENNA	2 detachable ANTENNA
ON/OFF SWITCH	Power on/off the device
POWER	Connects to the supplied power adaptor
LAN	Connects the device via LAN Ethernet
WPS	Press this button for at least 3 full seconds and the WPS LED will flash to start WPS. Now go to the wireless adapter or device and press its WPS button. Make sure to press the button within 120 seconds (2 minutes) after pressing the AP's WPS button.
RESET	Reset button. <b>RESET</b> the 802.11n WLAN AP to its default settings. Press this button for at least 6 full seconds to <b>RESET</b> device to its default settings.

### 3 Computer configurations under different OS, to obtain IP address automatically

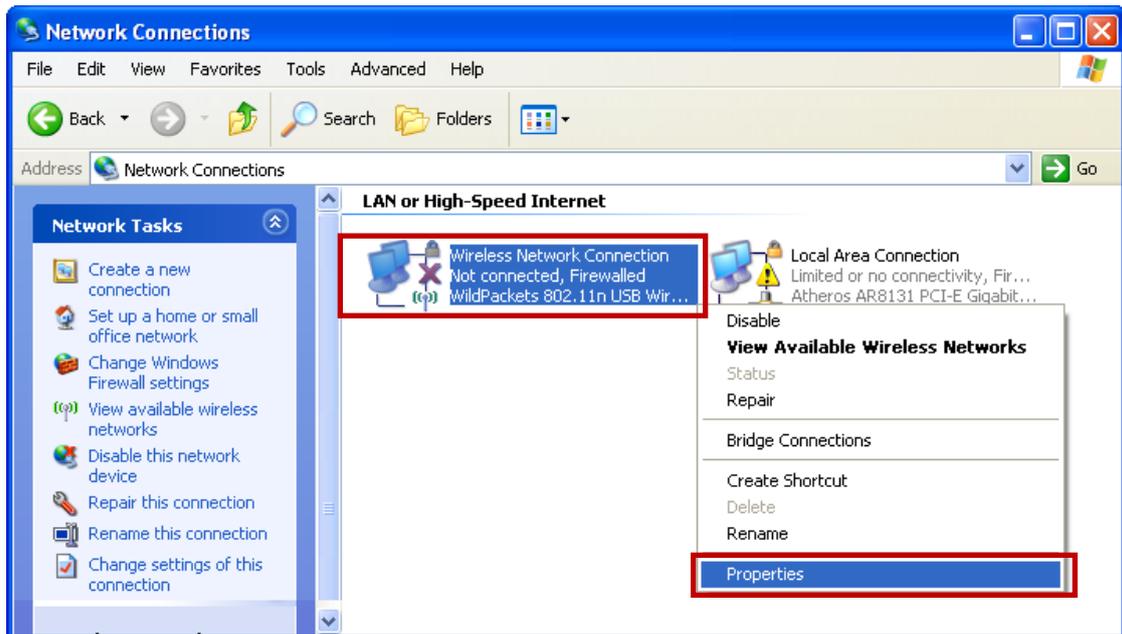
Before starting the 802.11n WLAN AP configuration, please kindly configure the PC computer as below, to have automatic IP address / DNS Server.

#### **For Windows 98SE / ME / 2000 / XP**

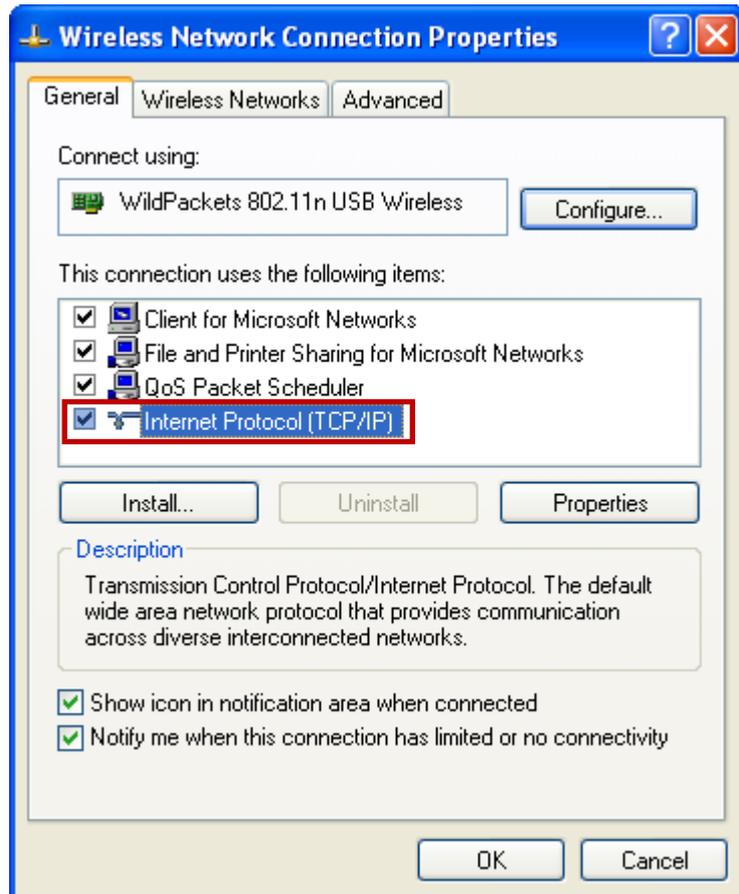
1. Click on "**Start**" -> "**Control Panel**" (in Classic View). In the Control Panel, double click on "**Network Connections**" to continue.



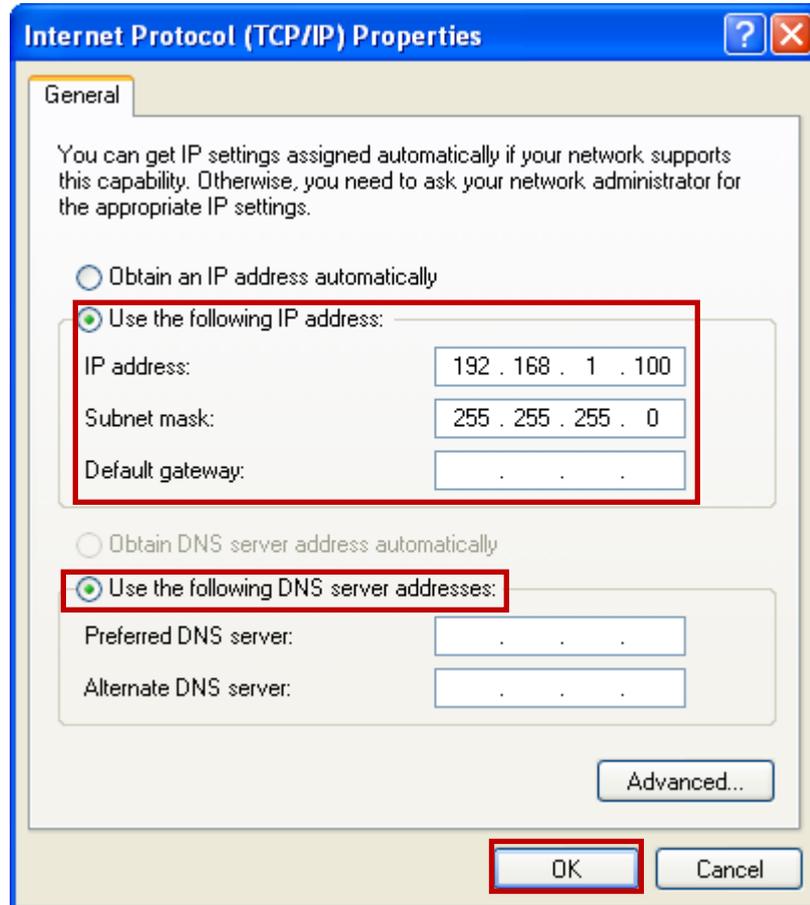
2. Single RIGHT click on "Local Area connection", then click "Properties".



3. Double click on "Internet Protocol (TCP/IP)".



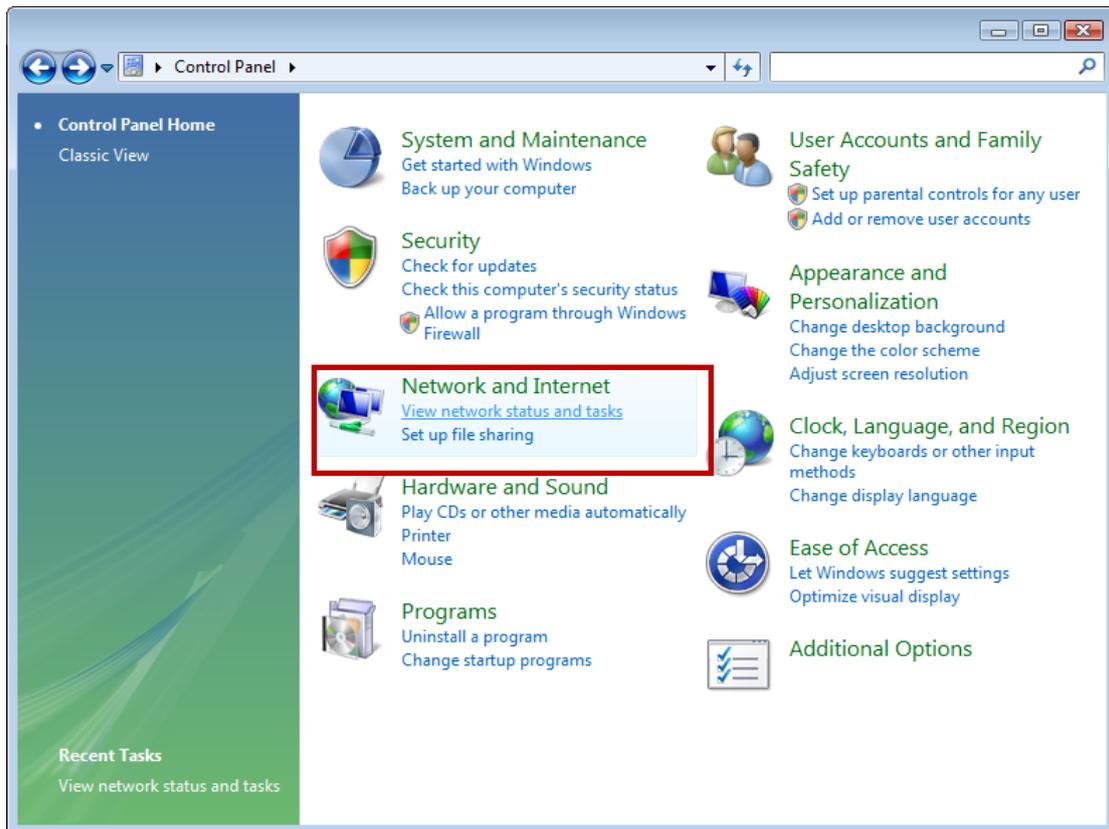
4. Check **"Use the following IP address"**, configure IP address to **"192.168.1.100"**, Subnet mask to **"255.255.255.0"** and check **"Use the following DNS server addresses"** then click on **"OK"** to continue.



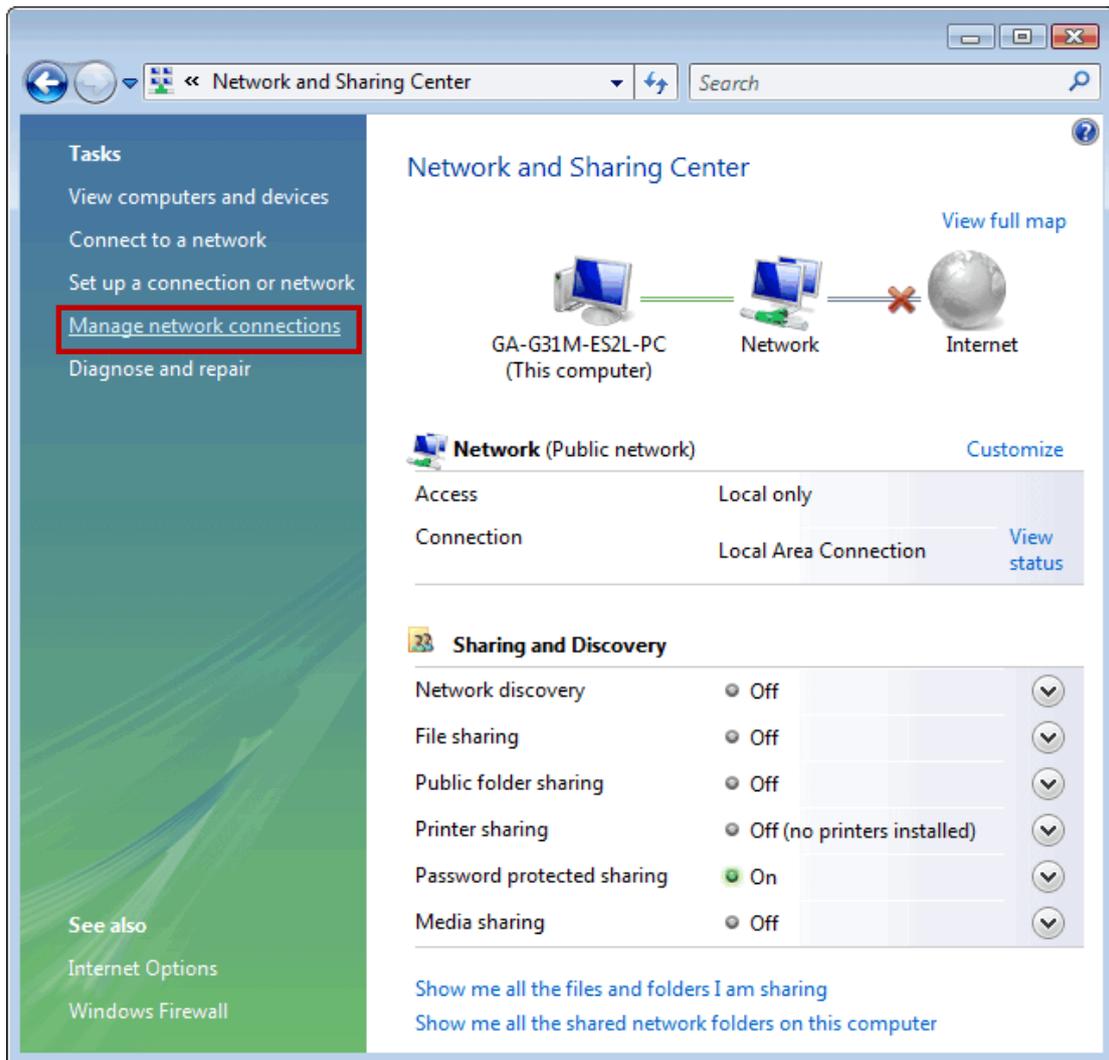
5. Click **"Show icon in notification area when connected"** (see screen image in 3. above) then Click on **"OK"** to complete the setup procedures.

## For Windows Vista-32/64

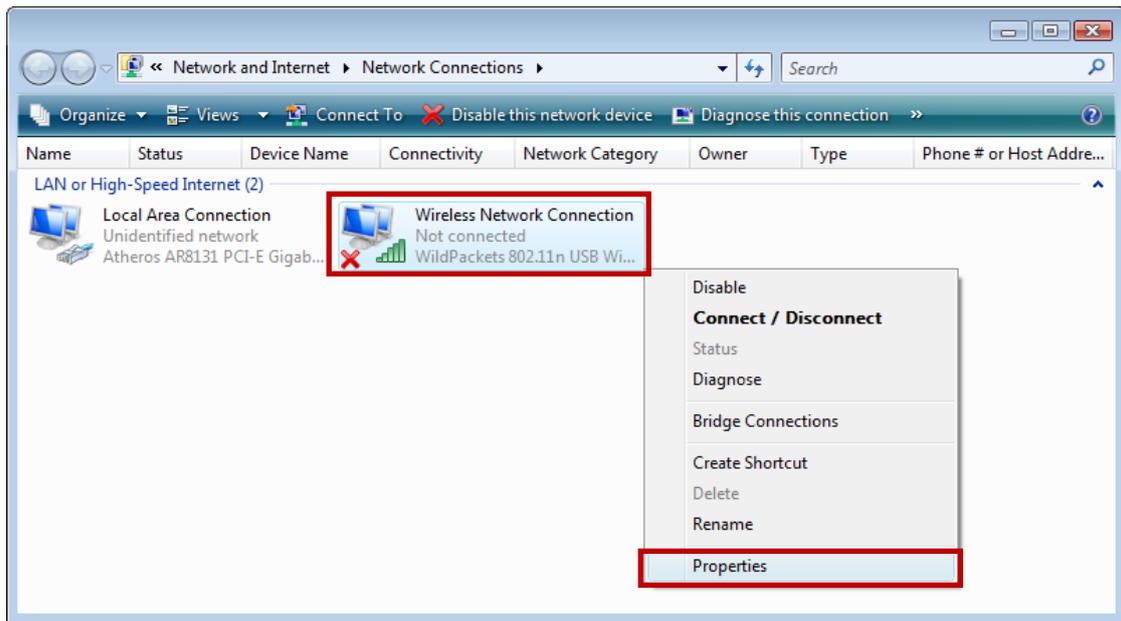
1. Click on “Start” -> “Control Panel” -> “View network status and tasks”.



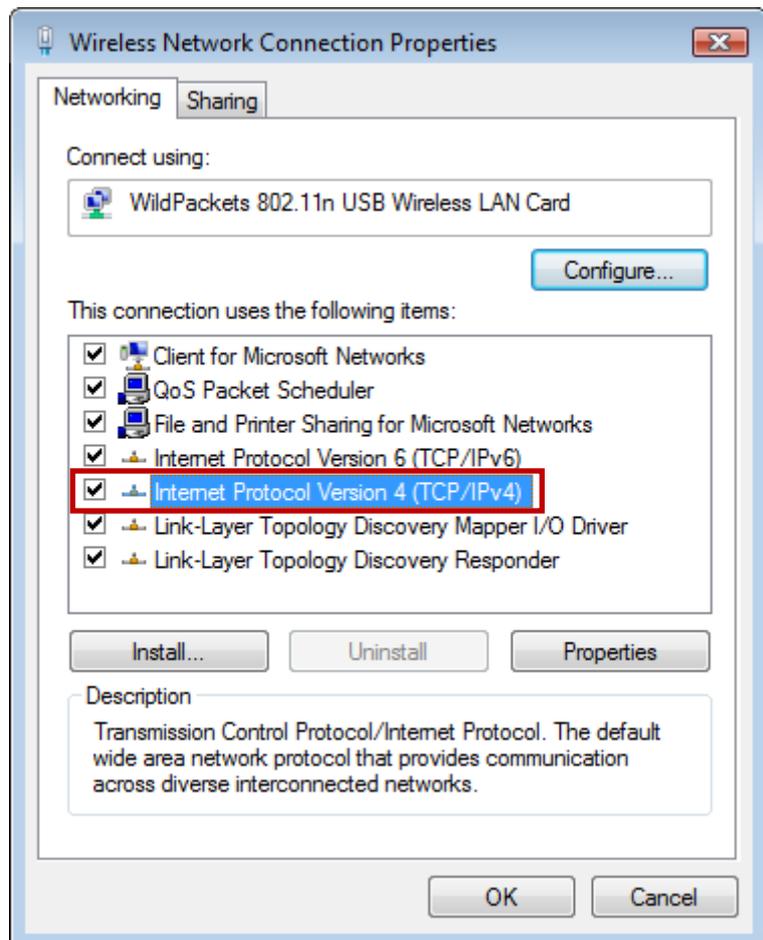
2. In the Manage network connections, click on **“Manage network connections”** to continue.



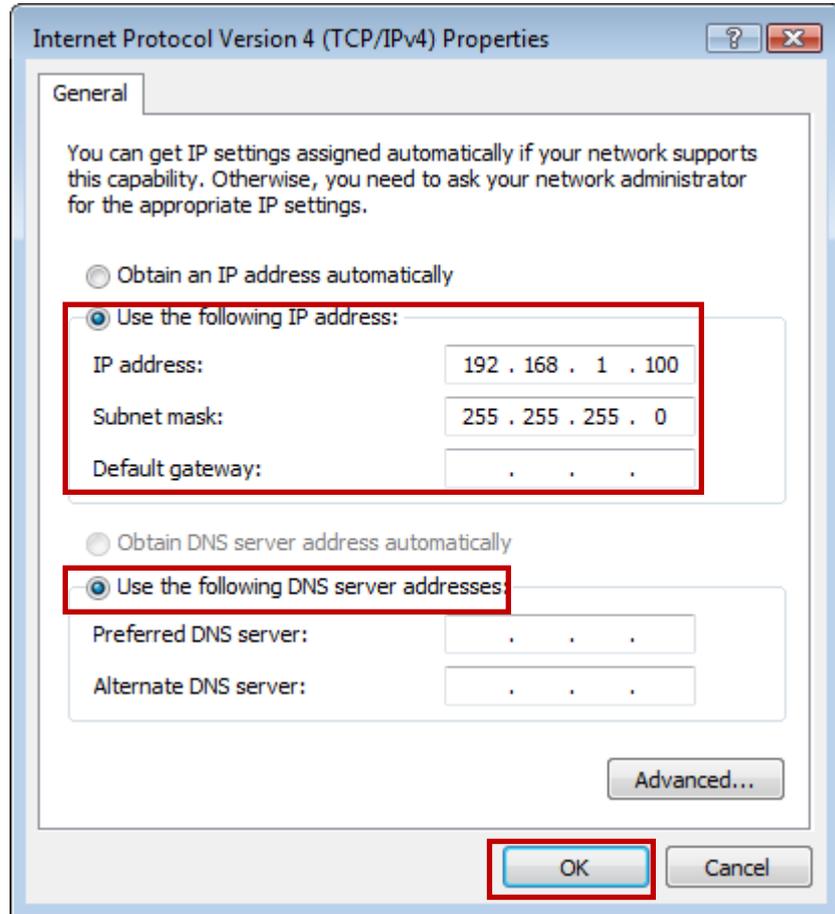
3. Single RIGHT click on "**Wireless Network Connection**", then click "**Properties**".



4. The screen will display the information "**User Account Control**" and click "**Continue**" to continue.
5. Double click on "**Internet Protocol Version 4 (TCP/IPv4)**".

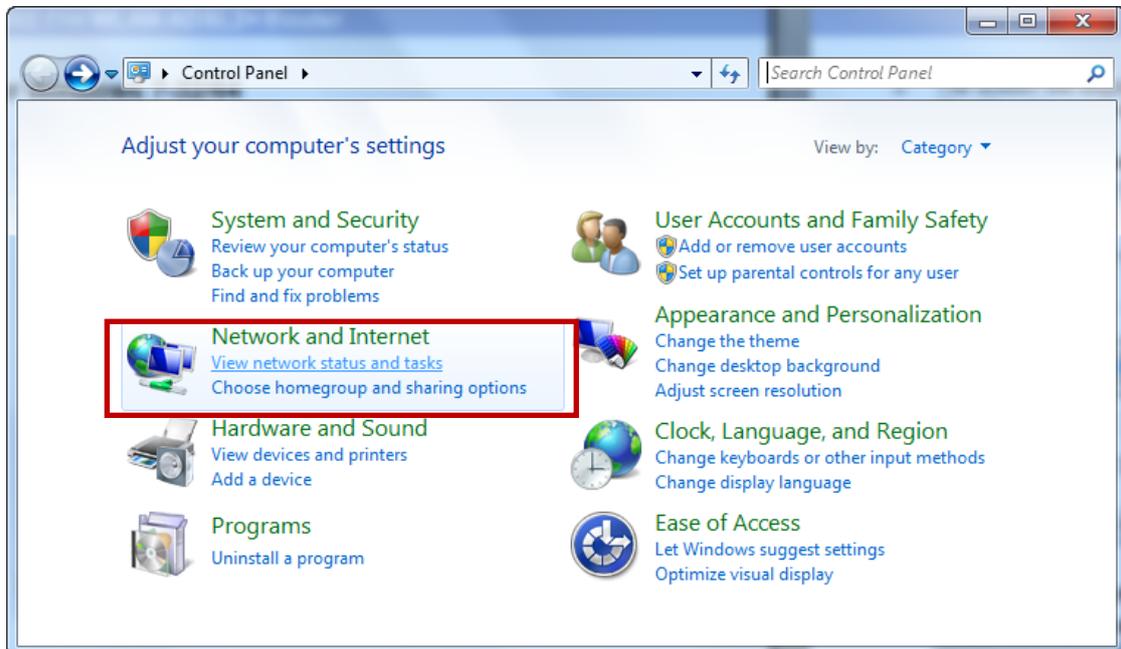


6. Check **"Use the following IP address"**, configure IP address to **"192.168.1.100"**, Subnet mask to **"255.255.255.0"** and check **"Use the following DNS server addresses"** then click on **"OK"** to continue.

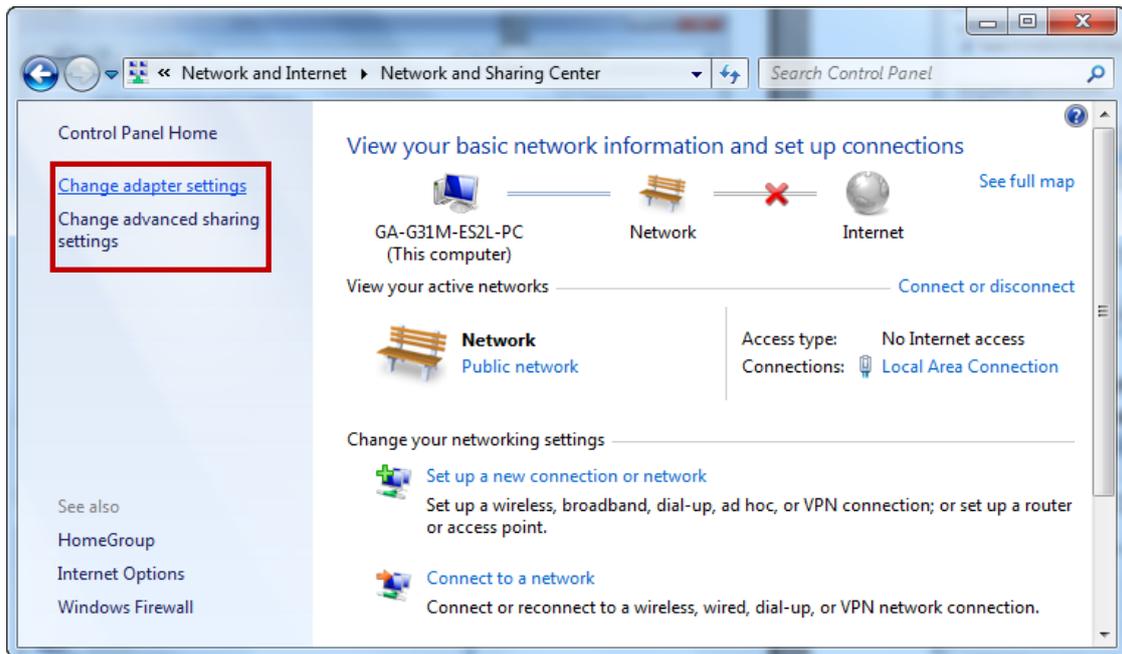


## For Windows 7-32/64

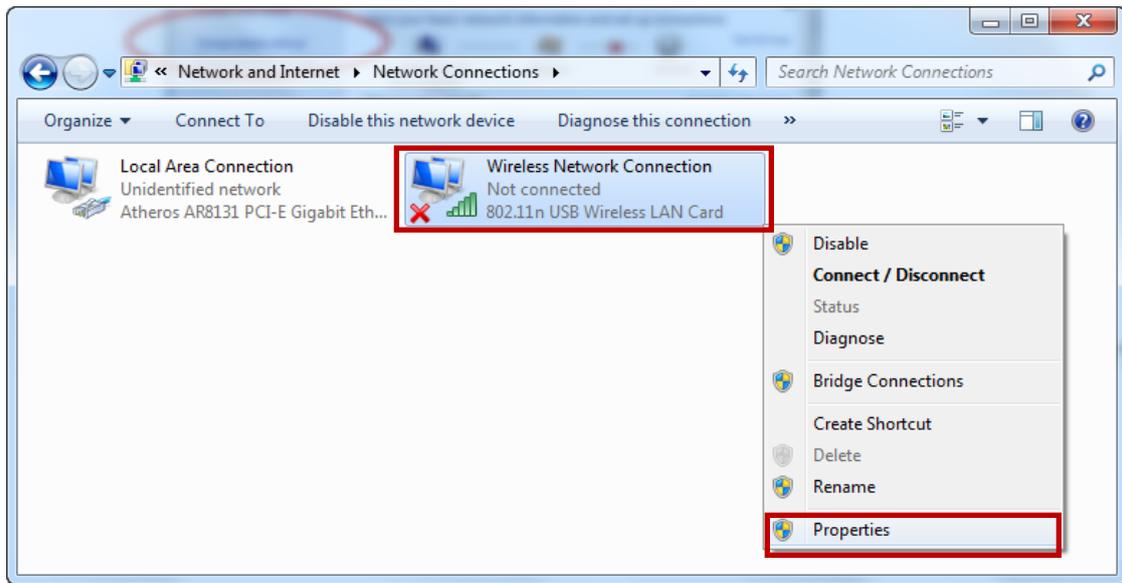
1. Click on “Start” -> “Control Panel” (in Category View) -> “View network status and tasks”.



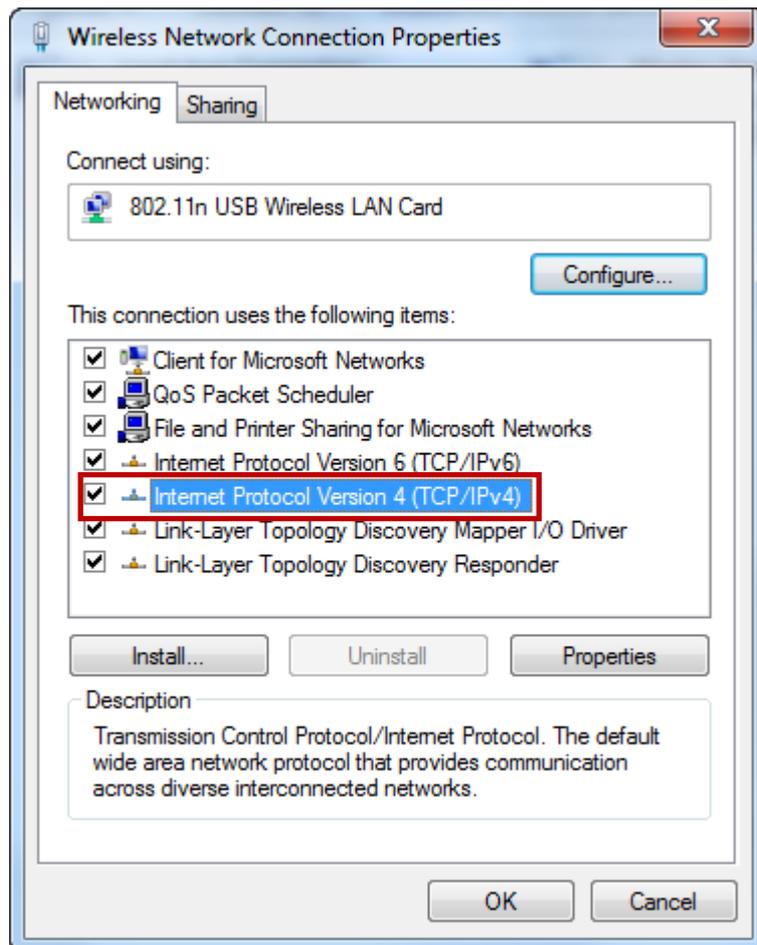
2. In the Control Panel Home, click on **“Change adapter settings”** to continue.



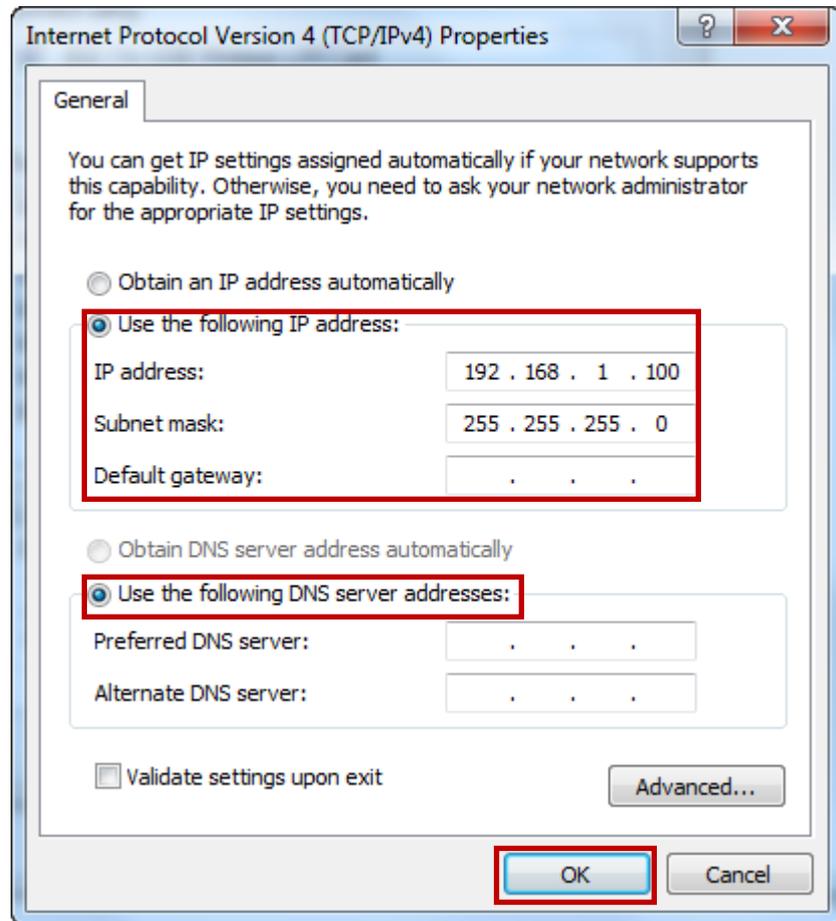
3. Single RIGHT click on “Local Area Connection”, then click “Properties”.



4. Double click on "Internet Protocol Version 4 (TCP/IPv4)".



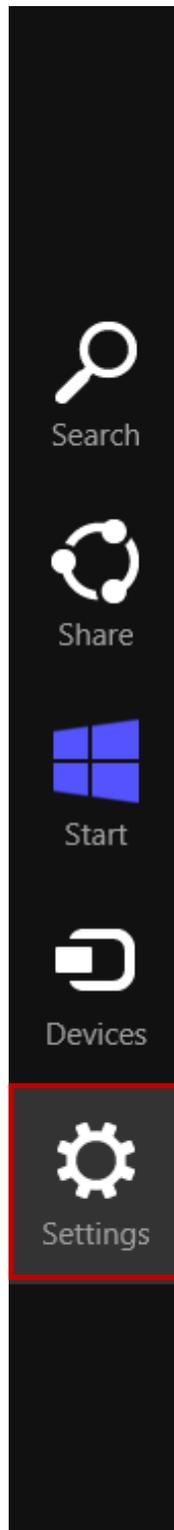
5. Check **"Use the following IP address"**, configure IP address to **"192.168.1.100"**, Subnet mask to **"255.255.255.0"** and check **"Use the following DNS server addresses"** then click on **"OK"** to continue.



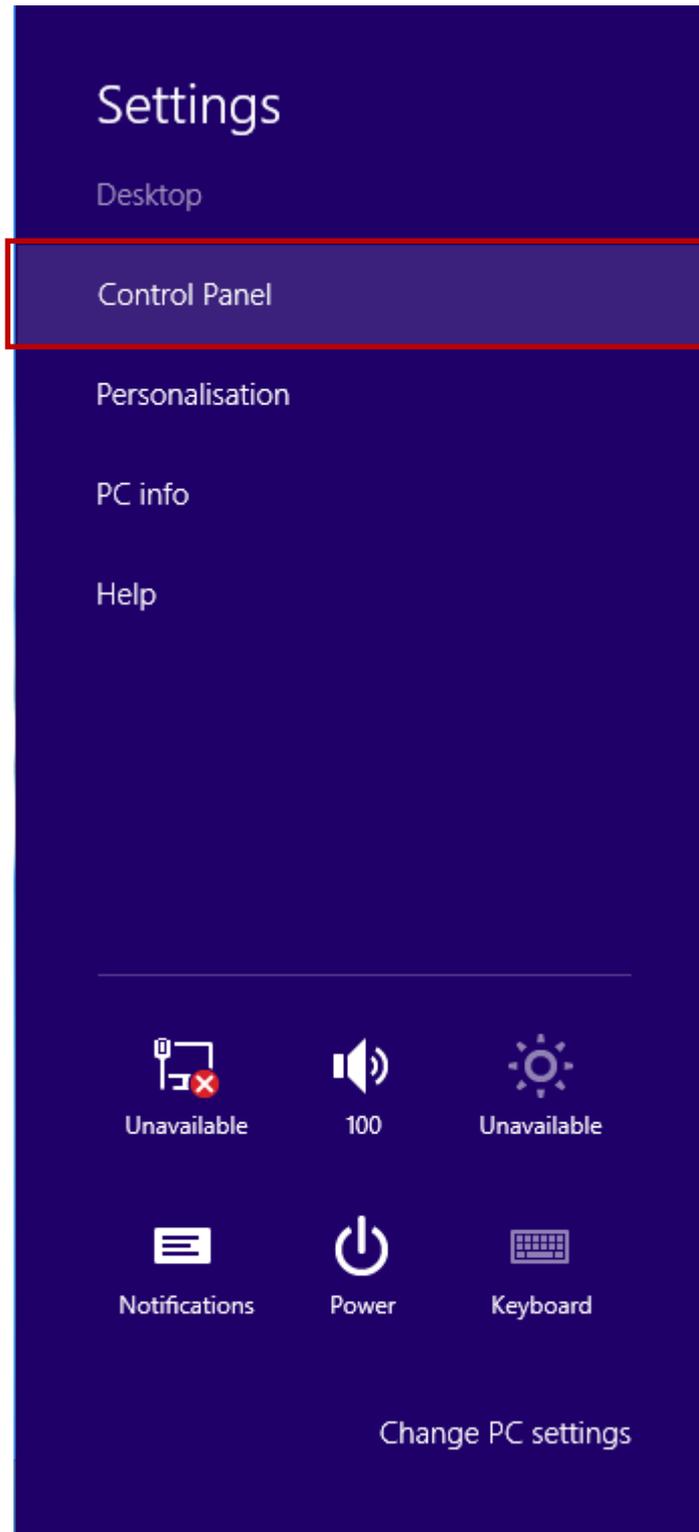
## For Windows 8-32/64

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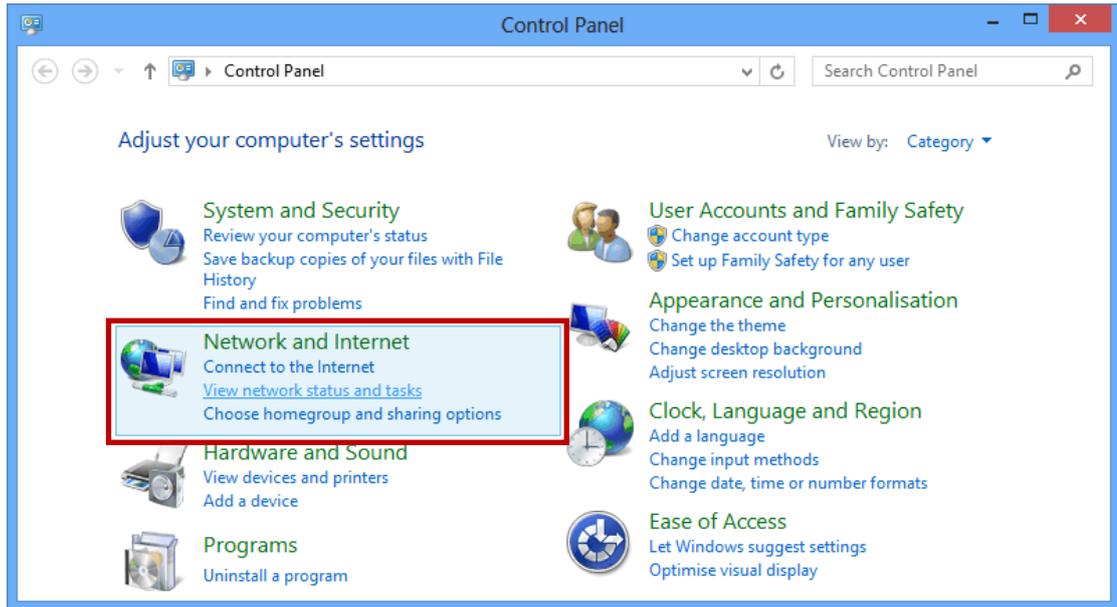
1. Move the mouse or tap to the upper right corner and click on **Settings**.



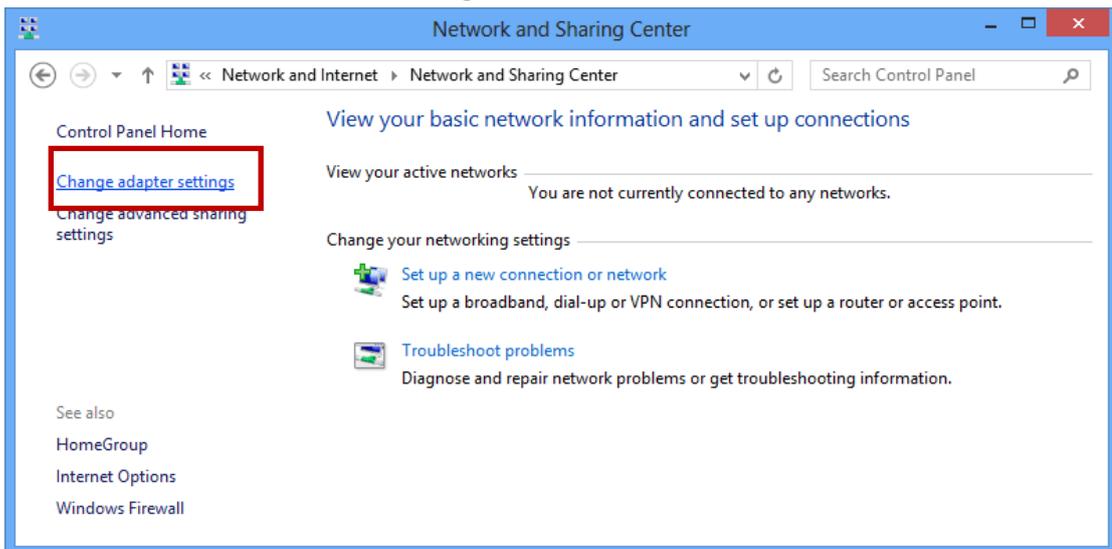
2. Click on **“Control Panel”**.



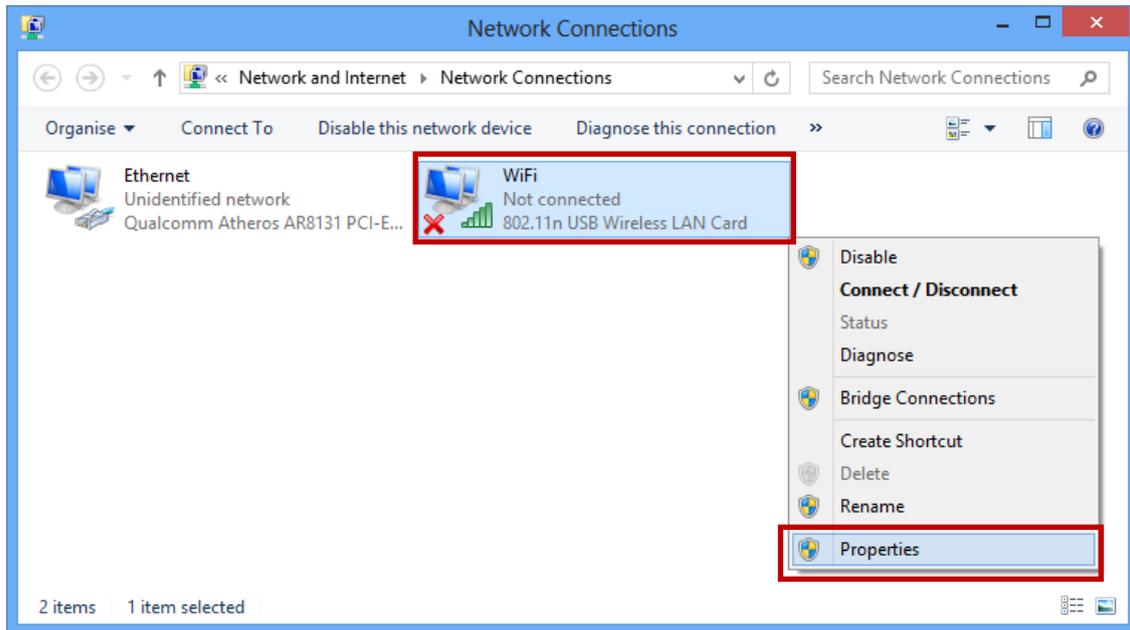
3. Click on “View network status and tasks”.



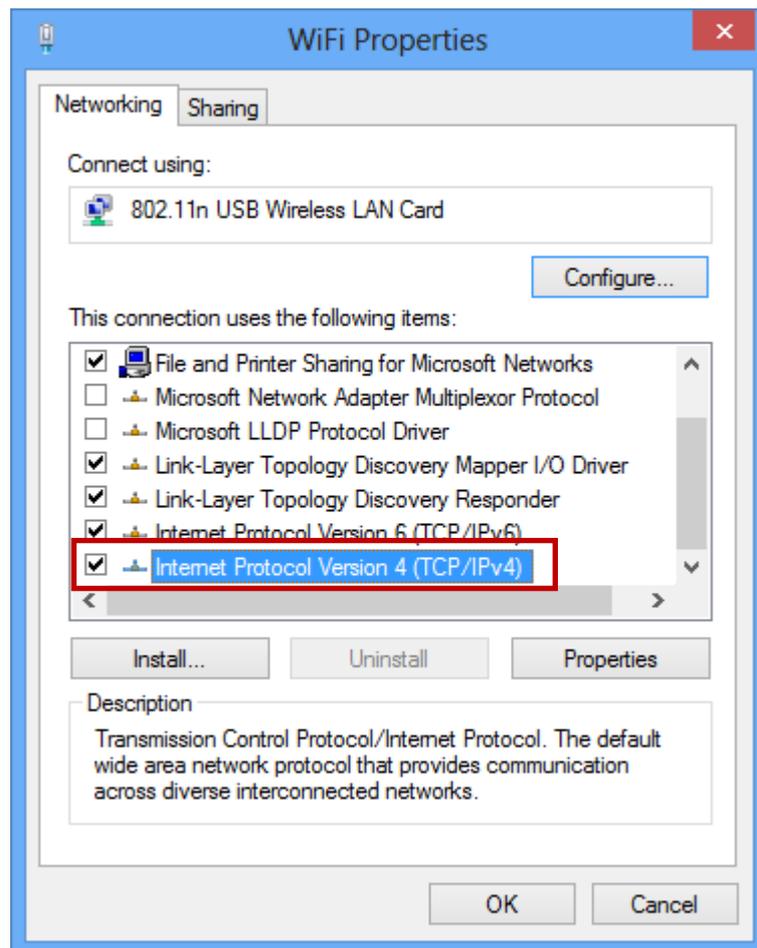
4. In the Control Panel Home, click on “Change adapter settings” to continue.



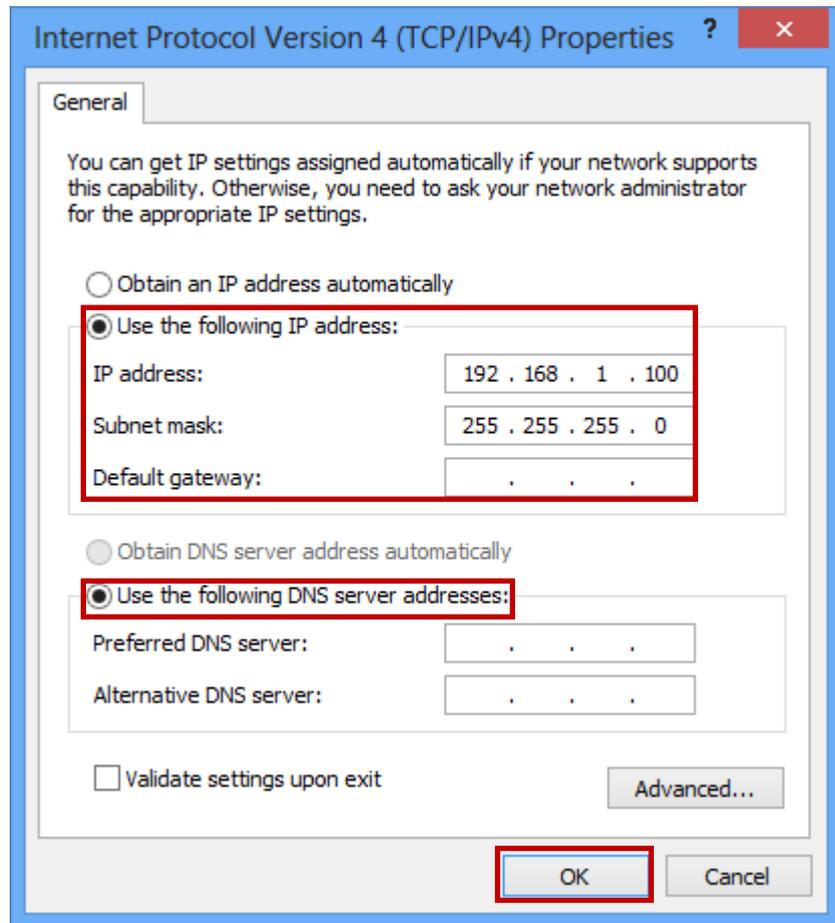
5. Single RIGHT click on "Ethernet", then click "Properties".



6. Double click on "Internet Protocol Version 4 (TCP/IPv4)".



7. Check **"Use the following IP address"**, configure IP address to **"192.168.1.100"**, Subnet mask to **"255.255.255.0"** and check **"Use the following DNS server addresses"** then click on **"OK"** to continue.



# 4 Connecting your device

This chapter provides basic instructions for connecting the Wireless Gateway to a computer or LAN and to the Internet.

In addition to configuring the device, you need to configure the Internet properties of your computer(s). For more details, see the following sections:

- *Configuring Ethernet PCs*

This chapter assumes that you have already established a DSL/Cable service with your Internet service provider (ISP). These instructions provide a basic configuration that should be compatible with your home or small office network setup. Refer to the subsequent chapters for additional configuration instructions.

## Connecting the Hardware

---

This section describes how to connect the device to the wall phone port, the power outlet and your computer(s) or network.



**WARNING**

***Before you begin, turn the power off for all devices. These include your computer(s), your LAN hub/switch (if applicable), and the Wireless Gateway.***

The diagram below illustrates the hardware connections. The layout of the ports on your device may vary from the layout shown. Refer to the steps that follow for specific instructions.

## Using WISP (Wireless ISP)

The Wireless Access Point supports WISP (Wireless ISP). To use WISP:

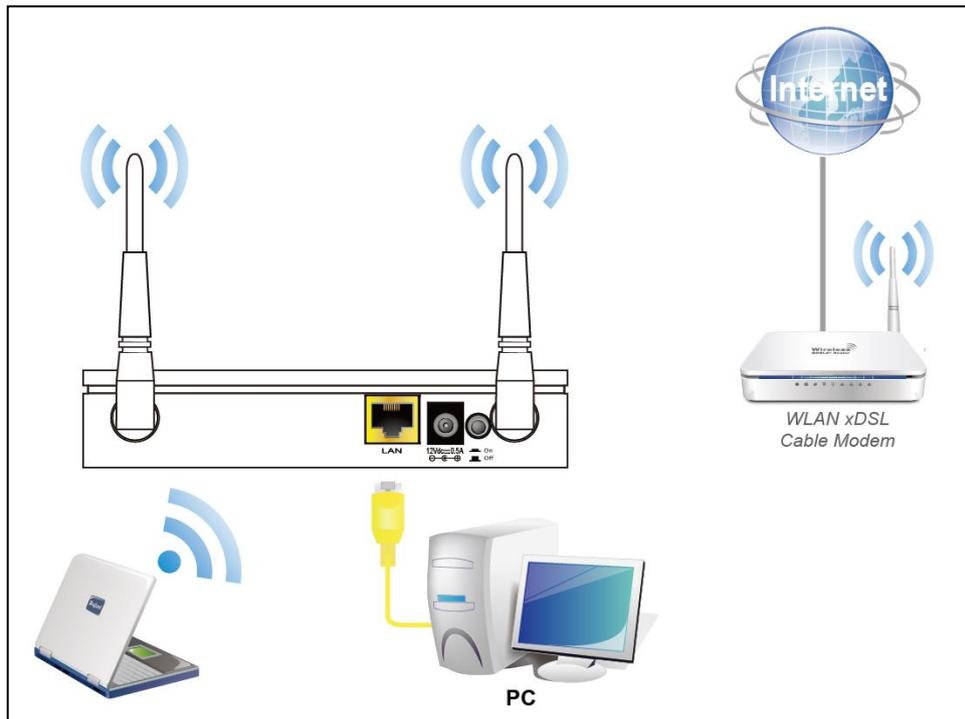


Figure 4: Overview of Hardware Connections

### Step 1. Connect the Ethernet cable to LAN Port

Connect the supplied RJ45 Ethernet cable from your PC's Ethernet port to the 802.11n WLAN AP's LAN Port.

### Step 2. Attach the power connector

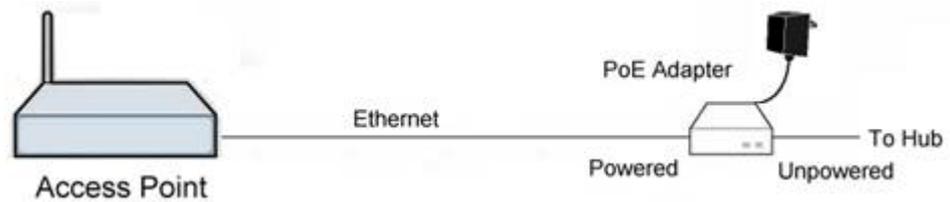
Connect the power adapter to the power inlet "POWER" of the 802.11n WLAN AP and turn the power switch "ON/OFF SWITCH" of your 802.11n WLAN AP on.

\* Actual ANTENNA may vary depending on model

## Using PoE (Power over Ethernet)

---

The Wireless Access Point supports PoE (Power over Ethernet).  
To use PoE:



**Step 1. Do not connect the supplied power adapter to the Wireless Access Point.**

**Step 2. Connect one end of a standard (category 5) LAN cable to the Ethernet port on the Wireless Access Point.**

**Step 3. Connect the other end of the LAN cable to the powered Ethernet port on a suitable PoE Adapter.**

**Step 4. Connect the unpowered Ethernet port on the PoE adapter to your Hub or switch.**

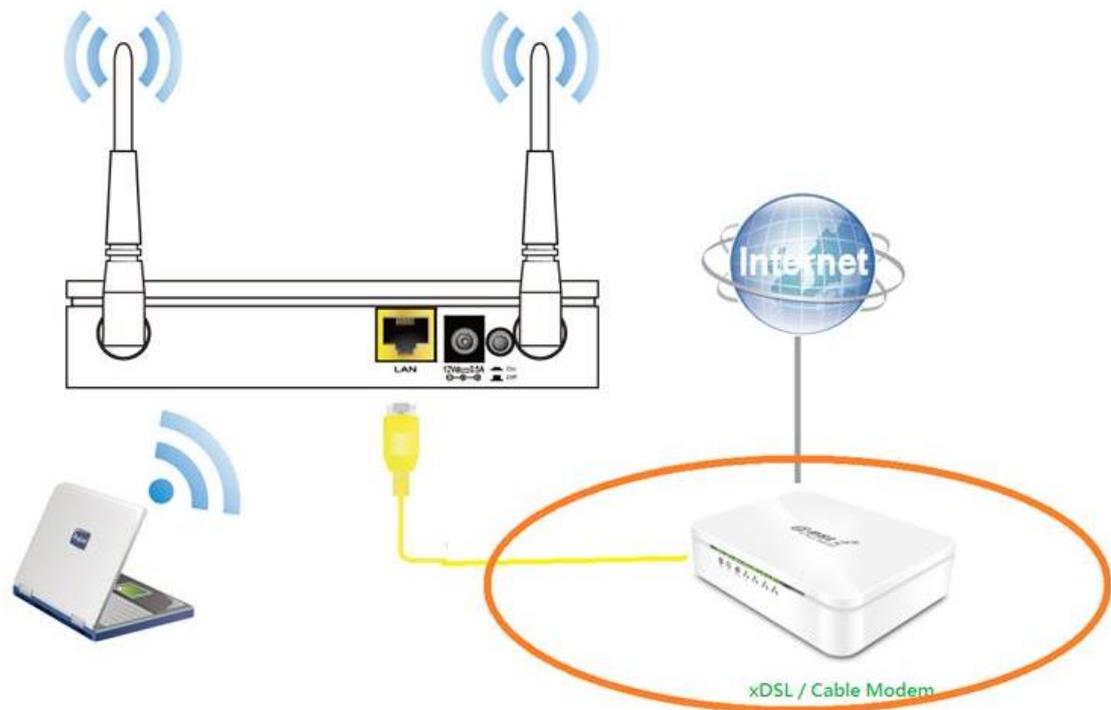
**Step 5. Connect the power supply to the PoE adapter and power up.**

**Step 6. Check the LEDs on the Wireless Access Point to see it is drawing power via the Ethernet connection.**

## Using AP (Access Point)

---

The Wireless Access Point supports AP (Access Point). To use AP:



### Step 1. Connect the Ethernet cable to LAN Port

Connect the supplied RJ45 Ethernet cable from xDSL/Cable Modem's LAN port to the 802.11n WLAN AP's LAN Port.

### Step 2. Attach the power connector

Connect the power adapter to the power inlet "POWER" of the 802.11n WLAN AP and turn the power switch "ON/OFF SWITCH" of your 802.11n WLAN AP on.

\* Actual ANTENNA may vary depending on model

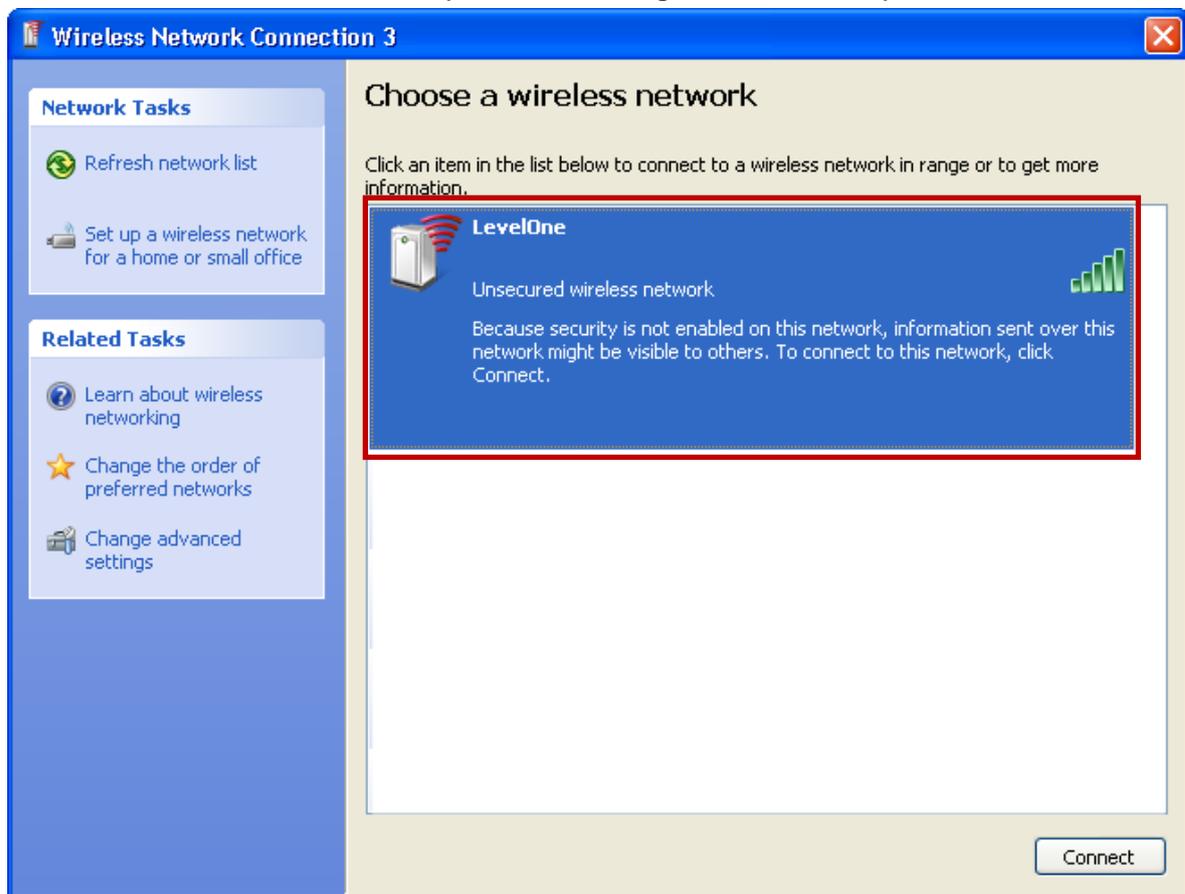
## Wireless Connection

For easy installation it is saved to keep the settings. You can later change the wireless settings via the wireless configuration menu. (see user manual on the CD – Chapter 8).

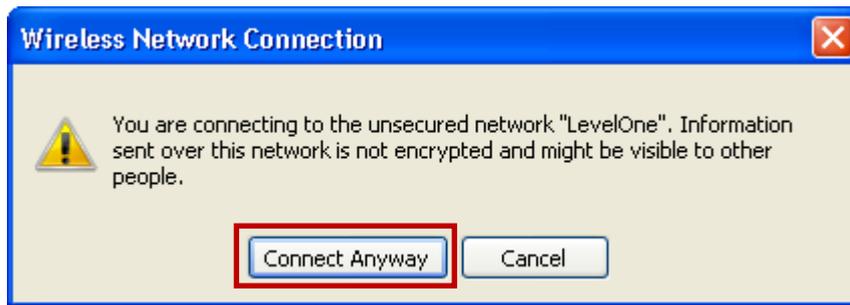
1. Double click on the wireless icon on your computer and search for the wireless network that you enter **SSID** name.



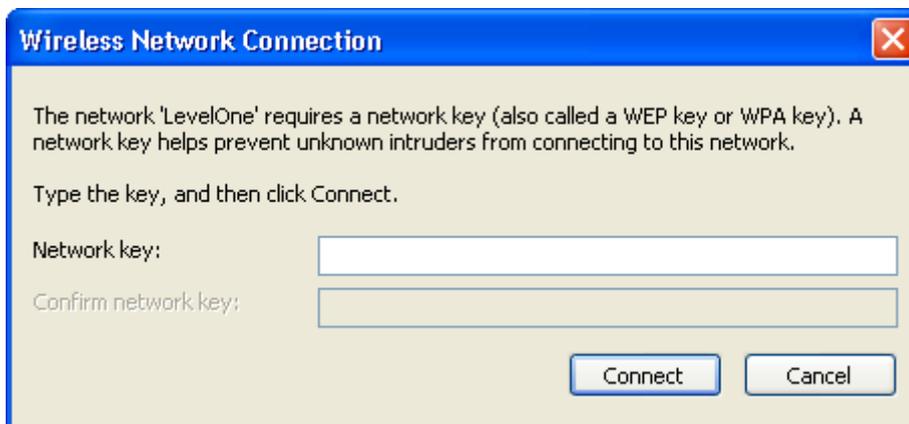
2. Click on the wireless network that you enter **SSID** name (the default setting **SSID = LevelOne**) to connect.



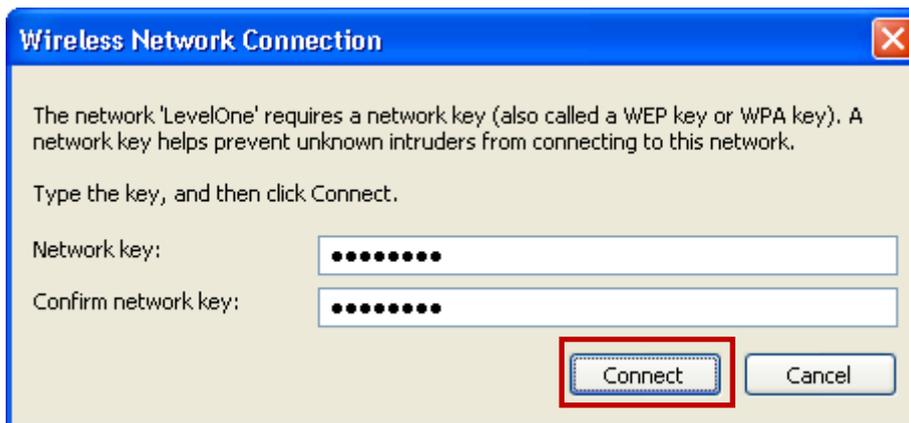
3. If the wireless network isn't encrypted, click on "**Connect Anyway**" to connect.



4. If the wireless network is encrypted, enter the network key that belongs to your authentication type and key. You can later change this network key via the wireless configuration menu. (see user manual on the CD – Chapter 8).



5. Click on "Connect" or "Apply".



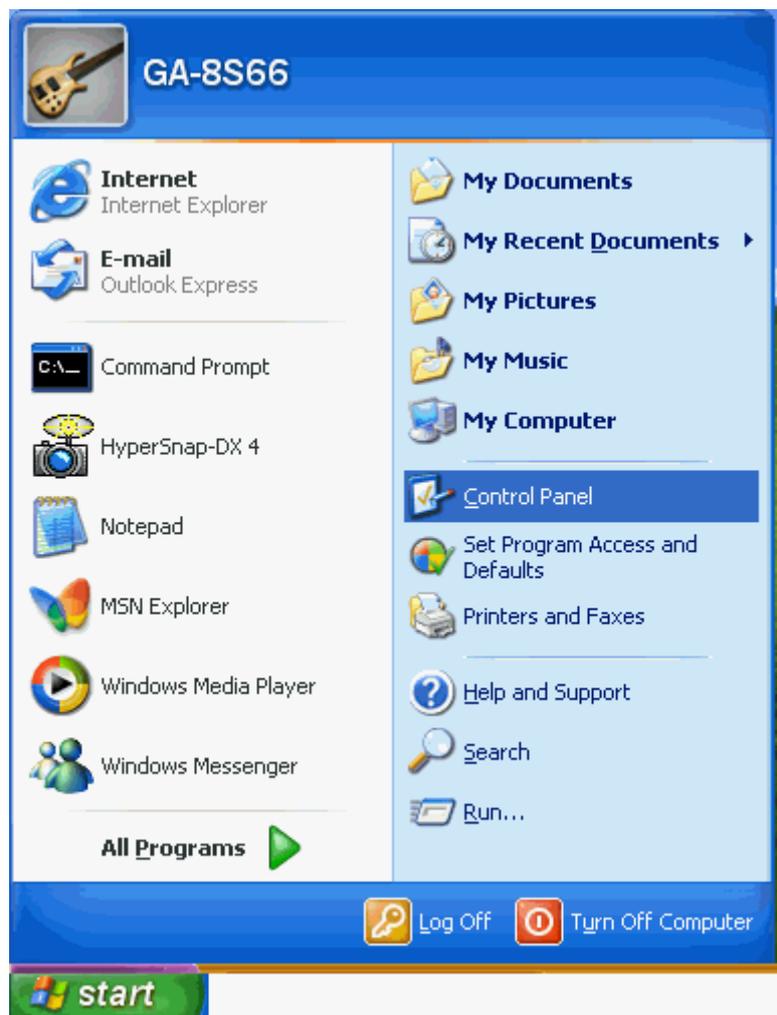
6. Now, the 802.11n WLAN AP has been connected, and able to be configured.

# 5 What the Internet/WAN access of your own Network now is

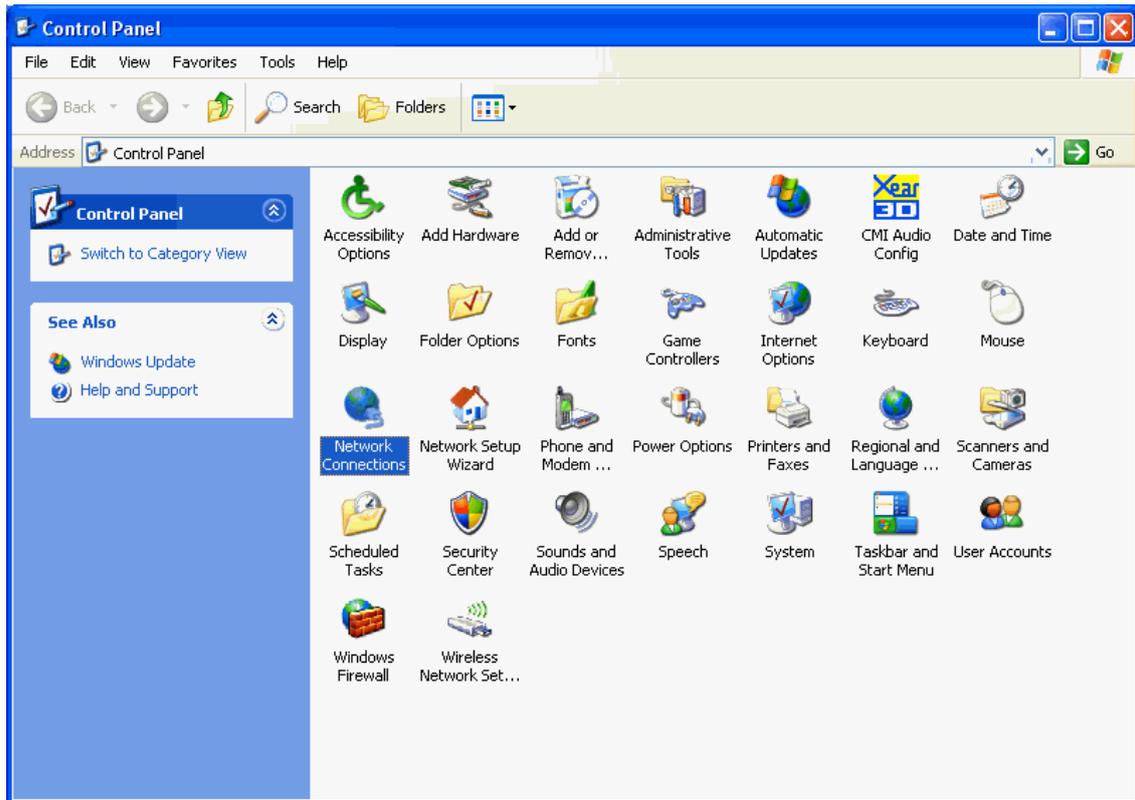
Now you could check what the Internet/WAN access of your network is to know how to configure the WAN port of Wireless Gateway.

Please follow steps below to check what the Internet/WAN access if your own Network is DHCP Client, Static IP or PPPoE Client.

1. Click Start -> Control Panel



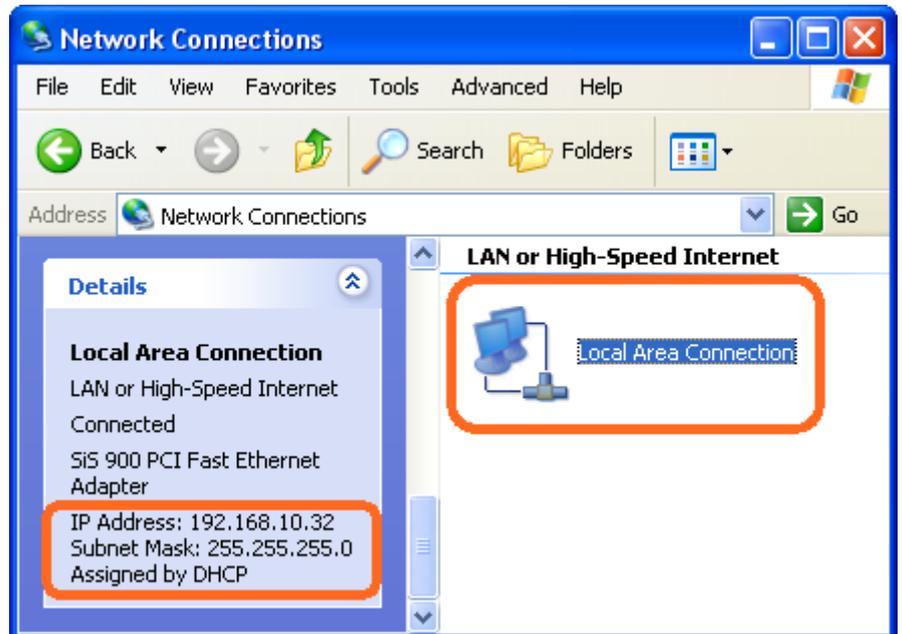
## 2. Double click *Network Connections*



## Internet/WAN access is the DHCP client

If you cannot see any **Broadband Adapter** in the **Network Connections**, your Internet/WAN access is **DHCP Client** or **Static IP**.

3. Click **Local Area Connection** in **LAN or High-Speed Internet** and you could see string **Assigned by DHCP** in Details.

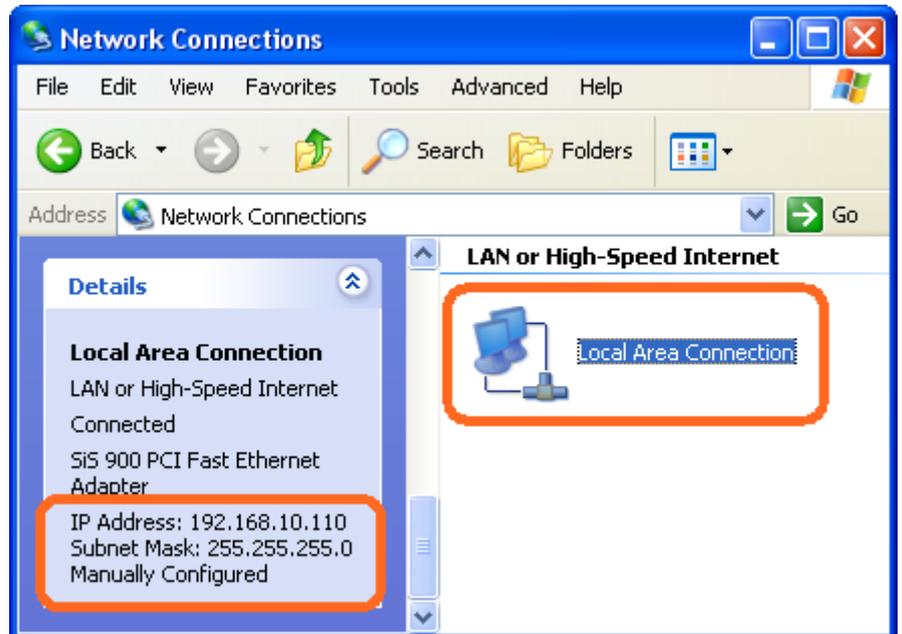


## Internet/WAN access is the Static IP

---

If you cannot see any **Broadband Adapter** in the **Network Connections**, your Internet/WAN access is **DHCP Client** or **Static IP**.

4. Click **Local Area Connection** in **LAN or High-Speed Internet** and you could see string **Manually Configured** in Details.



5. Right click **Local Area Connection** and click **Properties** and then you could get the IP settings in detail and write down the IP settings as follow:

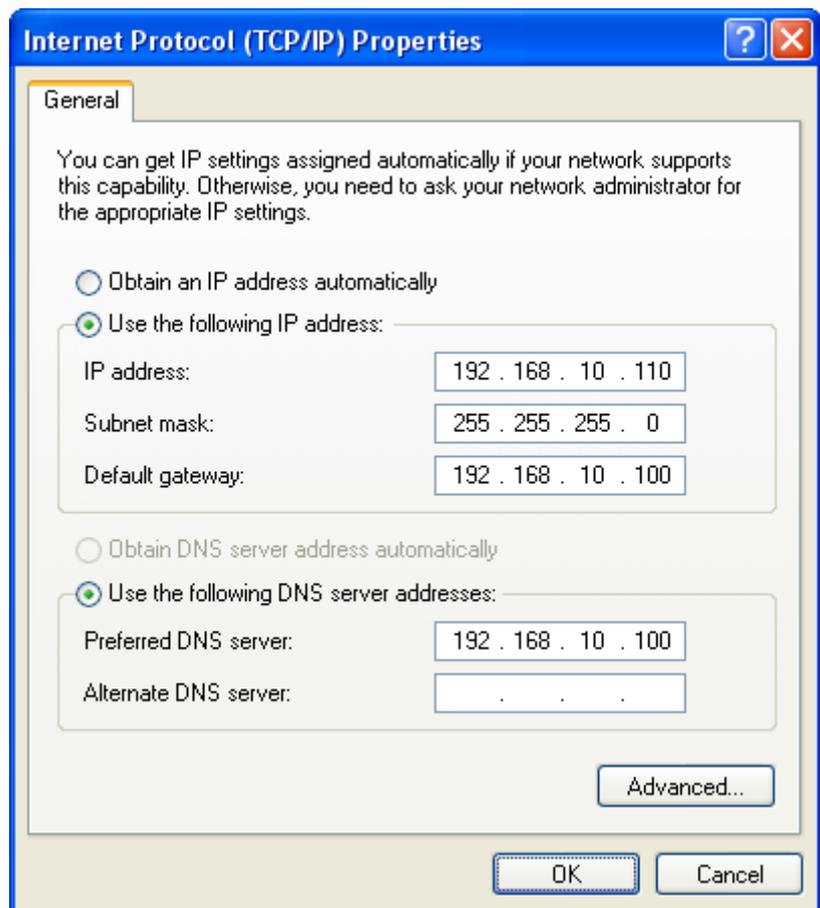
**IP Address: 192.168.10.110**

**Subnet mask: 255.255.255.0**

**Default gateway: 192.168.10.100**

**Preferred DNS server: 192.168.10.100**

**Alternate DNS Server: If you have it, please also write it down.**



## Internet/WAN access is the PPPoE client

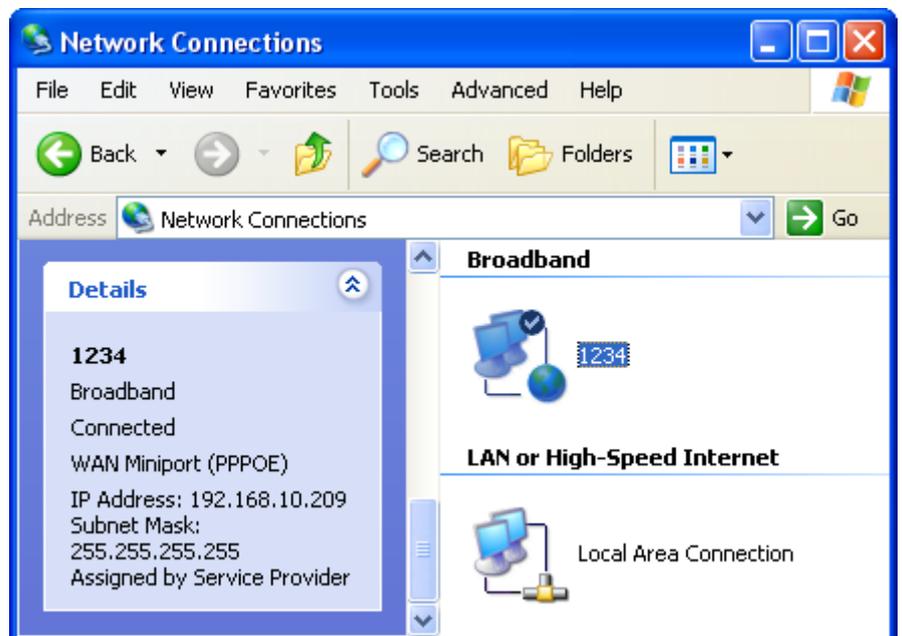
If you can see any **Broadband Adapter** in the **Network Connections**, your Internet/WAN access is **PPPoE Client**.

1. Click **Broadband Adapter** in **Broadband** and you could see string **Assigned by Service Provider** in Details.

For PPPoE configuration on Wireless Gateway, you'll need following information that you could get from your Telecom, or by your Internet Service Provider.

**Username of PPPoE: 1234 for example**

**Password of PPPoE: 1234 for example**



# 6 Getting Started with the Web pages

The Wireless Gateway includes a series of Web pages that provide an interface to the software installed on the device. It enables you to configure the device settings to meet the needs of your network. You can access it through your web browser from any PC connected to the device via the LAN ports.

## Accessing the Web pages

---

To access the Web pages, you need the following:

- A PC or laptop connected to the LAN port on the device.
- A web browser installed on the PC. The minimum browser version requirement is Internet Explorer v4 or Netscape v4. For the best display quality, use latest version of Internet Explorer, Netscape or Mozilla Fire fox. From any of the LAN computers, launch your web browser, type the following URL in the web address (or location) box, and press [Enter] on your keyboard:

**http://192.168.1.1**

The Status homepage for the web pages is displayed:

## Status

This page shows the current status and some basic settings of the device.

---

<b>System</b>	
<b>Uptime</b>	0day:0h:0m:49s
<b>Firmware Version</b>	v3.2.5
<b>Customer Version</b>	RE1P_E_v325_2T2R_LEV_03_130613
<b>Build Time</b>	Thu Jun 13 04:25:31 EDT 2013
<b>Wireless Configuration</b>	
<b>Mode</b>	AP
<b>Band</b>	2.4 GHz (B+G+N)
<b>SSID</b>	LevelOne
<b>Channel Number</b>	1
<b>Encryption</b>	Disabled
<b>BSSID</b>	00:13:33:5a:04:25
<b>Associated Clients</b>	0
<b>TCP/IP Configuration</b>	
<b>Attain IP Protocol</b>	Fixed IP
<b>IP Address</b>	192.168.1.1
<b>Subnet Mask</b>	255.255.255.0
<b>Default Gateway</b>	0.0.0.0
<b>DHCP Server</b>	Disabled
<b>MAC Address</b>	00:13:33:5a:04:23

Figure 5: Homepage

The first time that you click on an entry from the left-hand menu, a login box is displayed. You must enter your username and password to access the pages.

A login screen is displayed:



Figure 6: Login screen

1. Enter your user name and password. The first time you log into the program, use these defaults:

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



**Note**

You can change the password at any time or you can configure your device so that you do not need to enter a password. See Password.

2. Click on OK. You are now ready to configure your device.

This is the first page displayed each time you log in to the Web pages.



**Note**

If you receive an error message or the Welcome page is not displayed, see Troubleshooting Suggestions.

## Testing your Setup

---

Once you have connected your hardware and configured your PCs, any computer on your LAN should be able to use the DSL /Cable connection to access the Internet.

To test the connection, turn on the device, wait for 30 seconds and then verify that the LEDs are illuminated as follows:

**Table 1. LED Indicators**

Label	Color	Function
POWER	green	On: device is powered on Off: device is powered off
WLAN	green	On: WLAN link established and active Blink: Valid Wireless packet being transferred
WPS	green	Off: WPS link isn't established and active Blink: Valid WPS packet being transferred
WAN	green	On: WAN link established and active Off: No LAN link Blink: Valid Ethernet packet being transferred
LAN 1/2/3/4	green	On: LAN link established and active Off: No LAN link Blink: Valid Ethernet packet being transferred

If the LEDs illuminate as expected, test your Internet connection from a LAN computer. To do this, open your web browser, and type the URL of any external website (such as <http://www.yahoo.com>). The LED labeled *WAN* should blink rapidly and then appear solid as the device connects to the site.

If the LEDs do not illuminate as expected, you may need to configure your Internet access settings using the information provided by your ISP. For details, see *Internet Access*. If the LEDs still do not illuminate as expected or the web page is not displayed, see *Troubleshooting Suggestions* or contact your ISP for assistance.

## Default device settings

---

In addition to handling the xDSL / Cable modem connection to your ISP, the Wireless Gateway can provide a variety of services to your network. The device is preconfigured with default settings for use with a typical home or small office network.

The table below lists some of the most important default settings; these and other features are described fully in the subsequent chapters. If you are familiar with network configuration, review these settings to verify that they meet the needs of your network. Follow the instructions to change them if necessary. If you are unfamiliar with these settings, try using the device without modification, or contact your ISP for assistance.



**WARNING**

*We strongly recommend that you contact your ISP prior to changing the default configuration.*

Option	Default Setting	Explanation/Instructions
<i>WAN Port IP Address</i>	DHCP Client	This is the temporary public IP address of the WAN port on the device. It is an unnumbered interface that is replaced as soon as your ISP assigns a 'real' IP address. See <i>Network Settings -&gt; WAN Interface</i> .
<i>LAN Port IP Address</i>	Assigned static IP address: 192.168.1.1  Subnet mask: 255.255.255.0	This is the IP address of the LAN port on the device. The LAN port connects the device to your Ethernet network. Typically, you will not need to change this address. See <i>Network Settings -&gt; LAN Interface</i> .
<i>DHCP (Dynamic Host Configuration Protocol)</i>	DHCP server disabled	The Wireless Gateway maintains a pool of private IP addresses for dynamic assignment to your LAN computers. To use this service, you must have set up your computers to accept IP information dynamically, as described in <i>Configuring Ethernet PCs</i> .

# 7 Wireless Network

This chapter assumes that you have already set up your Wireless PCs and installed a compatible Wireless card on your device. See *Configuring Wireless PCs*.

## Basic Settings

---

The *Wireless Network* page allows you to configure the Wireless features of your device. To access the *Wireless Network Basic Settings* page:

From the left-hand *Wireless* menu, click on *Basic Settings*. The following page is displayed:

## Wireless Basic Settings

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters.

---

**Disable Wireless LAN Interface**

**Band:** 2.4 GHz (B+G+N) ▼

**Mode:** AP ▼

**Network Type:** Infrastructure ▼

**SSID:** LevelOne

**Channel Width:** 40MHz ▼

**Control Sideband:** Upper ▼

**Channel Number:** Auto ▼

**Broadcast SSID:** Enabled ▼

**WMM:** Enabled ▼

**Data Rate:** Auto ▼

**TX restrict:** 0 Mbps (0:no restrict)

**RX restrict:** 0 Mbps (0:no restrict)

**Associated Clients:**

**Enable Mac Clone (Single Ethernet Client)**

**Enable Universal Repeater Mode (Acting as AP and client simultaneously)**

**SSID of Extended Interface:**

Figure 7: Wireless Network page

Field	Description
<b>Disable Wireless LAN Interface</b>	Enable/Disable the Wireless LAN Interface. Default: Disable
<b>Band</b>	Specify the WLAN Mode to 802.11b/g Mixed mode, 802.11b mode or 802.11g mode
<b>Mode</b>	Configure the Wireless LAN Interface to AP, Client, WDS, AP + WDS or WISP mode
<b>Network Type</b>	Configure the Network Type to Infrastructure or Ad hoc.
<b>SSID</b>	Specify the network name.  Each Wireless LAN network uses a unique Network Name to identify the network. This name is called the Service Set Identifier (SSID). When you set up your wireless adapter, you specify the SSID. If you want to connect to an existing network, you must use the name for that network. If you are setting up your own network you can make up your own name and use it on each computer. The name can be up to 20 characters long and contain letters and numbers.
<b>Channel Width</b>	Choose a Channel Width from the pull-down menu.
<b>Control Sideband</b>	Choose a Control Sideband from the pull-down menu.
<b>Channel Number</b>	Choose a Channel Number from the pull-down menu.
<b>Broadcast SSID</b>	Broadcast or Hide SSID to your Network. Default: Enabled
<b>WMM</b>	Enable/disable the Wi-Fi Multimedia (WMM) support.
<b>Data Rate</b>	Select the Data Rate from the drop-down list
<b>TX restrict / RX restrict</b>	Configure the TX restrict / RX restrict
<b>Associated Clients</b>	Show Active Wireless Client Table  This table shows the MAC address, transmission, reception packet counters and encrypted status for each associated wireless client.
<b>Enable Mac Clone (Single Ethernet Client)</b>	Enable Mac Clone (Single Ethernet Client)
<b>Enable Universal Repeater Mode</b>	Acting as AP and client simultaneously
<b>SSID of Extended Interface</b>	When mode is set to "AP" and URM (Universal Repeater Mode ) is enabled, user should input SSID of another AP in the field of "SSID of Extended Interface". Please note, the channel number should be set to the one, used by another AP because 8186 will share the same channel between AP and URM interface (called as extended interface hereafter).

## Advanced Settings

These settings are only for more technically advanced users who have a sufficient knowledge about wireless LAN. These settings should not be changed unless you know what effect the changes will have on your Access Point. To access the *Wireless Network Advanced Settings* page:

From the left-hand *Wireless* menu, click on *Advanced Settings*. The following page is displayed:

## Wireless Advanced Settings

These settings are only for more technically advanced users who have a sufficient knowledge about wireless LAN. These settings should not be changed unless you know what effect the changes will have on your Access Point.

<b>Fragment Threshold:</b>	<input type="text" value="2346"/>	(256-2346)
<b>RTS Threshold:</b>	<input type="text" value="2347"/>	(0-2347)
<b>Beacon Interval:</b>	<input type="text" value="100"/>	(20-1024 ms)
<b>Preamble Type:</b>	<input checked="" type="radio"/> Long Preamble <input type="radio"/> Short Preamble	
<b>IAPP:</b>	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled	
<b>Protection:</b>	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled	
<b>Aggregation:</b>	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled	
<b>Short GI:</b>	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled	
<b>WLAN Partition:</b>	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled	
<b>STBC:</b>	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled	
<b>LDPC:</b>	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled	
<b>20/40MHz Coexist:</b>	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled	
<b>RF Output Power:</b>	<input checked="" type="radio"/> 100% <input type="radio"/> 70% <input type="radio"/> 50% <input type="radio"/> 35% <input type="radio"/> 15%	

Apply Changes

Reset

Field	Description
<b>Fragment Threshold</b>	<b>When transmitting a packet over a network medium, sometimes the packet is broken into several segments, if the size of packet exceeds that allowed by the network medium.</b> <b>The Fragmentation Threshold defines the number of bytes used for the fragmentation boundary for directed messages.</b>
<b>RTS Threshold</b>	<b>RTS stands for “Request to Send”. This parameter controls what size data packet the low level RF protocol issues to an RTS packet. The default is 2347.</b>
<b>Beacon Interval</b>	<b>Choosing beacon period for improved response time for wireless http clients.</b>
<b>Preamble Type</b>	<b>Specify the Preamble type is short preamble or long preamble</b>

<b>IAPP</b>	<b>Disable or Enable IAPP</b>
<b>Protection</b>	<b>A protection mechanism prevents collisions among 802.11g nodes.</b>
<b>Aggregation</b>	<b>Disable or Enable Aggregation</b>
<b>Short GI</b>	<b>Disable or Enable Short GI</b>
<b>WLAN Partition</b>	<b>Disable or Enable WLAN Partition</b>
<b>STBC</b>	<b>Disable or Enable STBC</b>
<b>20/40MHz Coexist</b>	<b>Disable or Enable 20/40MHz Coexist</b>
<b>RF Output Power</b>	<b>TX Power measurement.</b>

## **Security**

---

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network. To access the *Wireless Network Security* page:

From the left-hand *Wireless* menu, click on *Security*. The following page is displayed:

## Wireless Security Setup

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Select SSID:

Encryption:

802.1x Authentication:

Field	Description
Select SSID	Select the SSID
Encryption	Configure the Encryption to Disable, WEP, WPA , WPA2 or WPA-Mixed
Use 802.1x Authentication	Use 802.1x Authentication by WEP 64bits or WEP 128bits
Authentication	Configure the Authentication Mode to Open System, Shared Key or Auto
Key Length	Select the Key Length 64-bit or 128-bit
Key Format	Select the Key Format ASCII (5 characters), Hex (10 characters), ASCII (13 characters) or Hex (26 characters)
Encryption Key	Enter the Encryption Key
WPA Authentication Mode	Configure the WPA Authentication Mode to Enterprise (RADIUS) or Personal (Pre-Shared Key)
WPA Cipher Suite	Configure the WPA Cipher Suite to AES

Field	Description
WPA2 Cipher Suite	Configure the WPA2 Cipher Suite to AES
Pre-Shared Key Format	Configure the Pre-Shared Key Format to Passphrase or HEX (64 characters)
Pre-Shared Key	Type the Pre-Shared Key
Enable Pre-Authentication	According to some of the preferred embodiments, a method for proactively establishing a security association between a mobile node in a visiting network and an authentication agent in another network to which the mobile node can move includes: negotiating pre-

	<p>authentication using a flag in a message header that indicates whether the communication is for establishing a pre-authentication security association; and one of the mobile node and the authentication agent initiating pre-authentication by transmitting a message with the flag set in its message header, and the other of the mobile node and the authentication agent responding with the flag set in its message header only if it supports the pre-authentication. Enable/disable pre-authentication support. Default: disable.</p>
<p><b>Authentication RADIUS Server</b></p>	<p><b>Port:</b> Type the port number of RADIUS Server  <b>IP address:</b> Type the IP address of RADIUS Server  <b>Password:</b> Type the Password of RADIUS Server</p>

## WEP + Encryption Key

WEP aims to provide security by encrypting data over radio waves so that it is protected as it is transmitted from one end point to another. However, it has been found that WEP is not as secure as once believed.

1. From the *Encryption* drop-down list, select *WEP* setting.
2. From the *Key Length* drop-down list, select *64-bit* or *128-bit* setting.
3. From the *Key Format* drop-down list, select *ASCII (5 characters)*, *Hex (10 characters)*, *ASCII (13 characters)* or *Hex (26 characters)* setting.
4. Enter the *Encryption Key* value depending on selected ASCII or Hexadecimal.
5. Click *Apply Changes* button.

## Wireless Security Setup

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Select SSID:

**Encryption:**

**802.1x Authentication:**

**Authentication:**

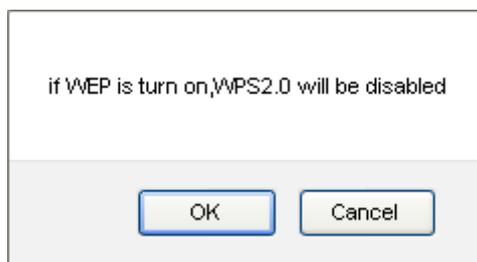
Open System  Shared Key  Auto

**Key Length:**

**Key Format:**

**Encryption Key:**

6. Click *OK* button.



7. Change setting successfully! Click on *Reboot Now* button to confirm.

## **Change setting successfully!**

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

Reboot Now

Reboot Later

### WEP + Use 802.1x Authentication

WEP aims to provide security by encrypting data over radio waves so that it is protected as it is transmitted from one end point to another. However, it has been found that WEP is not as secure as once believed.

1. From the *Encryption* drop-down list, select *WEP* setting.
2. Check the option of *Use 802.1x Authentication*.
3. Click on the ratio of *WEP 64bits* or *WEP 128bits*.
4. Enter the *Port*, *IP Address* and *Password* of RADIUS Server:
5. Click *Apply Changes* button.

## Wireless Security Setup

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Select SSID:

**Encryption:**

**802.1x Authentication:**

**Authentication:**  Open System  Shared Key  Auto

**Key Length:**  64 Bits  128 Bits

**RADIUS Server IP Address:**

**RADIUS Server Port:**

**RADIUS Server Password:**

6. Click *OK* button.

if WEP is turn on,WPS2.0 will be disabled

7. Change setting successfully! Click on *Reboot Now* button to confirm.

### **Change setting successfully!**

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

Reboot Now

Reboot Later

### WPA/WPA2/WPA2 Mixed + Personal (Pre-Shared Key)

Wi-Fi Protected Access (WPA and WPA2) is a class of systems to secure wireless (Wi-Fi)

computer networks. WPA is designed to work with all wireless network interface cards, but not necessarily with first generation wireless access points. WPA2 implements the full standard, but will not work with some older network cards. Both provide good security, with two significant issues:

- Either WPA or WPA2 must be enabled and chosen in preference to WEP. WEP is usually presented as the first security choice in most installation instructions.
- In the "Personal" mode, the most likely choice for homes and small offices, a pass phrase is required that, for full security, must be longer than the typical 6 to 8 character passwords users are taught to employ.

1. From the *Encryption* drop-down list, select *WPA*, *WPA2* or *WPA2 Mixed* setting.

**Encryption:**

**Encryption:**

**Encryption:**

2. Click on the radio of *Personal (Pre-Shared Key)*.

**WPA Authentication Mode:**  Enterprise (RADIUS)  Personal (Pre-Shared Key)

3. Check the option of *TKIP* and/or *AES* in *WPA Cipher Suite* if your Encryption is *WPA*:

**WPA Cipher Suite:**  TKIP  AES

4. Check the option of *TKIP* and/or *AES* in *WPA2 Cipher Suite* if your Encryption is *WPA2*:

**WPA2 Cipher Suite:**  TKIP  AES

5. Check the option of *TKIP* and/or *AES* in *WPA/WPA2 Cipher Suite* if your Encryption is *WPA2 Mixed*:

**WPA Cipher Suite:**  TKIP  AES

**WPA2 Cipher Suite:**  TKIP  AES

6. From the *Pre-Shared Key Format* drop-down list, select *Passphrase* or *Hex (64 characters)* setting.

**Pre-Shared Key Format:**

**Pre-Shared Key Format:**

7. Enter the *Pre-Shared Key* depending on selected *Passphrase* or *Hex (64 characters)*.

**Pre-Shared Key:**

0123456789

8. Click on *Apply Changes* button to confirm and return.

Apply Changes

9. Change setting successfully! Click on *Reboot Now* button to confirm.

## Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

Reboot Now

Reboot Later

### WPA/WPA2/WPA2 Mixed + Enterprise (RADIUS)

Wi-Fi Protected Access (WPA and WPA2) is a class of systems to secure wireless (Wi-Fi) computer networks. WPA is designed to work with all wireless network interface cards, but not necessarily with first generation wireless access points. WPA2 implements the full standard, but will not work with some older network cards. Both provide good security, with two significant issues:

- Either WPA or WPA2 must be enabled and chosen in preference to WEP. WEP is usually presented as the first security choice in most installation instructions.
- In the "Personal" mode, the most likely choice for homes and small offices, a pass phrase is required that, for full security, must be longer than the typical 6 to 8 character passwords users are taught to employ.

1. From the *Encryption* drop-down list, select *WPA*, *WPA2* or *WPA2 Mixed* setting.

Encryption: WPA

Encryption: WPA2

Encryption: WPA2 Mixed

2. Click on the radio of *Enterprise (RADIUS)*.

**WPA Authentication Mode:**  Enterprise (RADIUS)  Personal (Pre-Shared Key)

3. Check the option of *TKIP* and/or *AES* in *WPA Cipher Suite* if your Encryption is *WPA*:

**WPA Cipher Suite:**  TKIP  AES

4. Check the option of *TKIP* and/or *AES* in *WPA2 Cipher Suite* if your Encryption is *WPA2*:

**WPA2 Cipher Suite:**  TKIP  AES

5. Check the option of *TKIP* and/or *AES* in *WPA/WPA2 Cipher Suite* if your Encryption is *WPA2 Mixed*:

**WPA Cipher Suite:**  TKIP  AES

**WPA2 Cipher Suite:**  TKIP  AES

6. Enter the *Port*, *IP Address* and *Password* of RADIUS Server:

**RADIUS Server IP Address:**

**RADIUS Server Port:**

**RADIUS Server Password:**

7. Change setting successfully! Click on *Reboot Now* button to confirm.

### Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

## Access Control

---

For security reason, using MAC ACL's (MAC Address Access List) creates another level of difficulty to hacking a network. A MAC ACL is created and distributed to AP so that only authorized NIC's can connect to the network. While MAC address spoofing is a proven means to hacking a network this can be used in conjunction with additional security measures to increase the level of complexity of the network security decreasing the chance of a breach.

MAC addresses can be add/delete/edit from the ACL list depending on the MAC Access Policy.

If you choose 'Allowed Listed', only those clients whose wireless MAC addresses are in the access control list will be able to connect to your Access Point. When 'Deny Listed' is selected, these wireless clients on the list will not be able to connect the Access Point. To access the *Wireless Network Access Control* page:

From the left-hand *Wireless* menu, click on *Access Control*. The following page is displayed:

## Wireless Access Control

If you choose 'Allowed Listed', only those clients whose wireless MAC addresses are in the access control list will be able to connect to your Access Point. When 'Deny Listed' is selected, these wireless clients on the list will not be able to connect the Access Point.

---

**Wireless Access Control Mode:**  

**MAC Address:**

**Comment:**

### Current Access Control List:

MAC Address	Comment	Select
<input type="button" value="Delete Selected"/> <input type="button" value="Delete All"/> <input type="button" value="Reset"/>		

### Allow Listed

If you choose 'Allowed Listed', only those clients whose wireless MAC addresses are in the access control list will be able to connect to your Access Point.

1. From the Wireless Access Control Mode drop-down list, select Allowed Listed setting.
2. Enter the *MAC Address*.
3. Enter the *Comment*.
4. Click *Apply Changes* button.

**Wireless Access Control Mode:**  

**MAC Address:**  **Comment:**

5. Change setting successfully! Click on *Reboot Now* button to confirm.

### Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

6. The MAC Address that you created has been added in the *Current Access Control List*.

#### Current Access Control List:

MAC Address	Comment	Select
00:11:22:33:44:55	Test1	<input type="checkbox"/>

### Deny Listed

When 'Deny Listed' is selected, these wireless clients on the list will not be able to connect the Access Point.

1. From the Wireless Access Control Mode drop-down list, select *Deny Listed* setting.
2. Enter the *MAC Address*.
3. Enter the *Comment*.
4. Click *Apply Changes* button.

**Wireless Access Control Mode:**  

**MAC Address:**  **Comment:**

5. Change setting successfully! Click on *Reboot Now* button to confirm.

### Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

6. The MAC Address that you created has been added in the *Current Access Control List*.

#### Current Access Control List:

MAC Address	Comment	Select
00:11:22:33:44:55	Test1	<input type="checkbox"/>

## WDS settings

---

Wireless Distribution System uses wireless media to communicate with other APs, like the Ethernet does. To do this, you must set these APs in the same channel and set MAC address of other APs which you want to communicate with in the table and then enable the WDS. To access the *Wireless Network WDS settings* page:

From the left-hand *Wireless* menu, click on *WDS settings*. The following page is displayed:

## WDS Settings

Wireless Distribution System uses wireless media to communicate with other APs, like the Ethernet does.

To do this, you must set these APs in the same channel and set MAC address of other APs which you want to communicate with in the table and then enable the WDS. After "enable WDS", you must select "set security" as first step.

**Enable WDS**

Set Security

**MAC Address:**

**Data Rate:**

 ▾

**Comment:**

Apply Changes

Reset

Show Statistics

**Current WDS AP List:**

MAC Address	Tx Rate (Mbps)	Comment	Select
-------------	----------------	---------	--------

Delete Selected

Delete All

Reset

### Configure WDS (Wireless Distribution System) only

1. From the left-hand *Wireless* menu, click on *Basic Settings*.
2. From the *Mode* drop-down list, select *WDS*.
3. From the *Channel Number* drop-down list, select a Channel.
4. Click *Apply Changes* button.

## Wireless Basic Settings

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters.

---

**Disable Wireless LAN Interface**

**Band:**

**Mode:**

**Network Type:**

**SSID:**

**Channel Width:**

**Control Sideband:**

**Channel Number:**

**Broadcast SSID:**

**WMM:**

**Data Rate:**

**TX restrict:**  Mbps (0:no restrict)

**RX restrict:**  Mbps (0:no restrict)

**Associated Clients:**

**Enable Mac Clone (Single Ethernet Client)**

**Enable Universal Repeater Mode (Acting as AP and client simultaneously)**

**SSID of Extended Interface:**

5. Change setting successfully! Click on *Reboot Now* button to confirm.

### Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

6. From the left-hand *Wireless* menu, click on *WDS settings*.
7. Check on the option *Enable WDS*.
8. Enter the *MAC Address*.
9. Enter the *Comment*.
10. Click the *Set Security*.

## WDS Settings

Wireless Distribution System uses wireless media to communicate with other APs, like the Ethernet does.

To do this, you must set these APs in the same channel and set MAC address of other APs which you want to communicate with in the table and then enable the WDS. After "enable WDS", you must select "set security" as first step.

**Enable WDS**

Set Security

**MAC Address:**

**Data Rate:**  ▼

**Comment:**

Apply Changes

Reset

Show Statistics

**Current WDS AP List:**

MAC Address	Tx Rate (Mbps)	Comment	Select
-------------	----------------	---------	--------

Delete Selected

Delete All

Reset

11. This page allows you setup the wireless security for WDS. When enabled, you must make sure each WDS device has adopted the same encryption algorithm and Key.
12. Configure each field with the *Encryption* that you selected.
13. Click *Apply Changes* button.

## WDS Security Setup

This page allows you setup the wireless security for WDS. When enabled, you must make sure each WDS device has adopted the same encryption algorithm and Key.

---

**Encryption:**    
**WEP Key Format:**    
**WEP Key:**   
**Pre-Shared Key Format:**    
**Pre-Shared Key:**

14. Change setting successfully! Click on *Reboot Now* button to confirm.

### Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

15. Click *Close* button to close and exit the *WDS Security Setup*.

## WDS Security Setup

This page allows you setup the wireless security for WDS. When enabled, you must make sure each WDS device has adopted the same encryption algorithm and Key.

---

<b>Encryption:</b>	<input type="text" value="None"/>
<b>WEP Key Format:</b>	<input type="text" value="ASCII (5 characters)"/>
<b>WEP Key:</b>	<input type="text"/>
<b>Pre-Shared Key Format:</b>	<input type="text" value="Passphrase"/>
<b>Pre-Shared Key:</b>	<input type="text"/>

16. Change setting successfully! Click on *Reboot Now* button to confirm.

### Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

17. Click *Apply Changes* button.

## WDS Settings

Wireless Distribution System uses wireless media to communicate with other APs, like the Ethernet does.

To do this, you must set these APs in the same channel and set MAC address of other APs which you want to communicate with in the table and then enable the WDS. After "enable WDS", you must select "set security" as first step.

**Enable WDS**

Set Security

MAC Address:

Data Rate:

Comment:

Apply Changes

Reset

Show Statistics

**Current WDS AP List:**

MAC Address	Tx Rate (Mbps)	Comment	Select
-------------	----------------	---------	--------

Delete Selected

Delete All

Reset

18. Change setting successfully! Click on *Reboot Now* button to confirm.

### Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

Reboot Now

Reboot Later

19. The MAC Address that you created has been added in the *Current Access Control List*.

**Current WDS AP List:**

MAC Address	Tx Rate (Mbps)	Comment	Select
00:11:22:33:44:55	Auto	Test1	<input type="checkbox"/>

Delete Selected

Delete All

Reset

### Configure AP (Access Point) + WDS (Wireless Distribution System)

1. From the left-hand *Wireless* menu, click on *Basic Settings*.
2. From the *Mode* drop-down list, select *AP+WDS*.
3. Enter *SSID* for example *LevelOne*.
4. From the *Channel Number* drop-down list, select a Channel.
5. Click *Apply Changes* button.

## Wireless Basic Settings

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters.

**Disable Wireless LAN Interface**

**Band:** 2.4 GHz (B+G+N) ▼

**Mode:** AP+WDS ▼

Multiple AP

**Network Type:** Infrastructure ▼

**SSID:** LevelOne

Add to Profile

**Channel Width:** 40MHz ▼

**Control Sideband:** Upper ▼

**Channel Number:** 5 ▼

**Broadcast SSID:** Enabled ▼

**WMM:** Enabled ▼

**Data Rate:** Auto ▼

**TX restrict:** 0 Mbps (0:no restrict)

**RX restrict:** 0 Mbps (0:no restrict)

**Associated Clients:** Show Active Clients

**Enable Mac Clone (Single Ethernet Client)**

**Enable Universal Repeater Mode (Acting as AP and client simultaneously)**

**SSID of Extended Interface:**

Add to Profile

Apply Changes

Reset

6. Change setting successfully! Click on *Reboot Now* button to confirm.

## Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

Reboot Now

Reboot Later

7. From the left-hand *Wireless* menu, click on *WDS settings*.
8. Check on the option *Enable WDS*.
9. Enter the *MAC Address*.
10. Enter the *Comment*.
11. Click the *Set Security*.

## WDS Settings

Wireless Distribution System uses wireless media to communicate with other APs, like the Ethernet does.

To do this, you must set these APs in the same channel and set MAC address of other APs which you want to communicate with in the table and then enable the WDS. After "enable WDS", you must select "set security" as first step.

**Enable WDS**

Set Security

**MAC Address:**

**Data Rate:**

**Comment:**

Apply Changes

Reset

Show Statistics

**Current WDS AP List:**

MAC Address	Tx Rate (Mbps)	Comment	Select
-------------	----------------	---------	--------

Delete Selected

Delete All

Reset

12. This page allows you setup the wireless security for WDS. When enabled, you must make sure each WDS device has adopted the same encryption algorithm and Key.
13. Configure each field with the *Encryption* that you selected.
14. Click *Apply Changes* button.

## WDS Security Setup

This page allows you setup the wireless security for WDS. When enabled, you must make sure each WDS device has adopted the same encryption algorithm and Key.

---

**Encryption:**

**WEP Key Format:**   (characters)

**WEP Key:**

**Pre-Shared Key Format:**

**Pre-Shared Key:**

15. Change setting successfully! Click on *Reboot Now* button to confirm.

### Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

- Click *Close* button to close and exit the *WDS Security Setup*.

## WDS Security Setup

This page allows you setup the wireless security for WDS. When enabled, you must make sure each WDS device has adopted the same encryption algorithm and Key.

---

<b>Encryption:</b>	<input type="text" value="None"/>
<b>WEP Key Format:</b>	<input type="text" value="ASCII (5 characters)"/>
<b>WEP Key:</b>	<input type="text"/>
<b>Pre-Shared Key Format:</b>	<input type="text" value="Passphrase"/>
<b>Pre-Shared Key:</b>	<input type="text"/>

- Click *Apply Changes* button.

## WDS Settings

Wireless Distribution System uses wireless media to communicate with other APs, like the Ethernet does.

To do this, you must set these APs in the same channel and set MAC address of other APs which you want to communicate with in the table and then enable the WDS. After "enable WDS", you must select "set security" as first step.

---

**Enable WDS**

<b>MAC Address:</b>	<input type="text" value="001122334455"/>
<b>Data Rate:</b>	<input type="text" value="Auto"/>
<b>Comment:</b>	<input type="text" value="001122334455"/>

### Current WDS AP List:

MAC Address	Tx Rate (Mbps)	Comment	Select
-------------	----------------	---------	--------

18. Change setting successfully! Click on *Reboot Now* button to confirm.

### Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

19. The MAC Address that you created has been added in the *Current Access Control List*.

#### Current WDS AP List:

MAC Address	Tx Rate (Mbps)	Comment	Select
00:11:22:33:44:55	Auto	Test1	<input type="checkbox"/>

## Site Survey

---

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled. To access the *Wireless Network WDS settings* page:

From the left-hand *Wireless* menu, click on *Site Survey*. The following page is displayed:

## Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

---

Site Survey

SSID	BSSID	Channel	Type	Encrypt	Signal
None					

### Configure Wireless client + Site Survey

1. From the left-hand *Wireless* menu, click on *Basic Settings*.
2. From the *Mode* drop-down list, select *Client*.
3. Enter *SSID* of the AP that you want to connect to for example *LevelOne*. If you don't know what the *SSID* of the AP that you want to connect to, please skip this step.
4. Click *Apply Changes* button.

## Wireless Basic Settings

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters.

**Disable Wireless LAN Interface**

**Band:** 2.4 GHz (B+G+N) ▾

**Mode:** Client ▾ Multiple AP

**Network Type:** Infrastructure ▾

**SSID:** LevelOne Add to Profile

**Channel Width:** 40MHz ▾

**Control Sideband:** Upper ▾

**Channel Number:** Auto ▾

**Broadcast SSID:** Enabled ▾

**WMM:** Enabled ▾

**Data Rate:** Auto ▾

**TX restrict:** 0 Mbps (0:no restrict)

**RX restrict:** 0 Mbps (0:no restrict)

**Associated Clients:** Show Active Clients

**Enable Mac Clone (Single Ethernet Client)**

**Enable Universal Repeater Mode (Acting as AP and client simultaneously)**

**SSID of Extended Interface:**

Add to Profile

**Enable Wireless Profile**

**Wireless Profile List:**

SSID	Encrypt	Select
------	---------	--------

Delete Selected DeleteAll

Apply Changes Reset

5. Change setting successfully! Click on *Reboot Now* button to confirm.

### Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

6. Please wait 20 seconds ...

### Change setting successfully!

Do not turn off or reboot the Device during this time.

Please wait 9 seconds ...

7. From the left-hand *Wireless* menu, click on *Site Survey*.
8. Click *Site Survey* button.

## Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

---

SSID	BSSID	Channel	Type	Encrypt	Signal	Select
None						

9. Now you could see the APs that scanned by the Wireless Gateway were listed below.
10. Click on the ratio of AP's SSID under the item *Select* that you want the Wireless Gateway to connect to.
11. Click *Next* button.

## Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

---

Site Survey

SSID	BSSID	Channel	Type	Encrypt	Signal	Select
WRT120N	68:7f:74:fb:fc:16	9 (B+G+N)	AP	WPA2-PSK	50	<input type="radio"/>

Next>>

12. Click *Next* button.

## Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

---

Encryption:

None

<<Back

Connect

13. Please wait...

## Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

---

Please wait...

14. Check on *Add to Wireless Profile*.
15. Click *Reboot Now* button.

## Connect successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

**Add to Wireless Profile**

Reboot Now

Reboot Later

16. Change setting successfully! Please wait 20 seconds....

## Change setting successfully!

**Do not turn off or reboot the Device during this time.**

**Please wait 17 seconds ...**

### Configure Wireless ISP + Site Survey

1. From the left-hand *Wireless* menu, click on *Basic Settings*.
2. From the *Mode* drop-down list, select *WISP*.
3. Enter *SSID* for example *LevelOne*.
4. Click *Apply Changes* button.

## Wireless Basic Settings

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters.

**Disable Wireless LAN Interface**

**Band:** 2.4 GHz (B+G+N) ▼

**Mode:** WISP ▼ Multiple AP

**Network Type:** Infrastructure ▼

**SSID:** LevelOne Add to Profile

**Channel Width:** 40MHz ▼

**Control Sideband:** Upper ▼

**Channel Number:** Auto ▼

**Broadcast SSID:** Enabled ▼

**WMM:** Enabled ▼

**Data Rate:** Auto ▼

**TX restrict:** 0 Mbps (0:no restrict)

**RX restrict:** 0 Mbps (0:no restrict)

**Associated Clients:** Show Active Clients

**Enable Mac Clone (Single Ethernet Client)**

**Enable Universal Repeater Mode (Acting as AP and client simultaneously)**

**SSID of Extended Interface:**

Add to Profile

**Enable Wireless Profile**

**Wireless Profile List:**

SSID	Encrypt	Select
------	---------	--------

Delete Selected

DeleteAll

Apply Changes

Reset

5. Change setting successfully! Please wait 20 seconds....

## Change setting successfully!

**Do not turn off or reboot the Device during this time.**

**Please wait 17 seconds ...**

6. From the left-hand *Wireless* menu, click on *Site Survey*.

7. Click *Site Survey* button.

## Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

---

Site Survey

SSID	BSSID	Channel	Type	Encrypt	Signal	Select
None						

Next>>

8. Now you could see the APs that scanned by the Wireless Gateway were listed below.
9. Click on the ratio of AP's SSID under the item *Select* that you want the Wireless Gateway to connect to.
10. Click *Next* button.

## Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

---

Site Survey

SSID	BSSID	Channel	Type	Encrypt	Signal	Select
WRT120N	68:7f:74:fb:fc:16	9 (B+G+N)	AP	WPA2-PSK	50	

Next>>

11. Click *Next* button.

## Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

---

Encryption:

None

<<Back

Connect

12. Please wait...

## Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

---

Please wait...

13. Check on *Add to Wireless Profile*.
14. Click *Reboot Now* button.

## **Connect successfully!**

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

**Add to Wireless Profile**

Reboot Now

Reboot Later

15. Change setting successfully! Please wait 20 seconds....

## **Change setting successfully!**

**Do not turn off or reboot the Device during this time.**

**Please wait 17 seconds ...**

## WPS

---

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). Using this feature could let your wireless client automatically synchronize its setting and connect to the Access Point in a minute without any hassle. To access the *Wireless Network WPS* page:

From the left-hand *Wireless* menu, click on *WPS*. The following page is displayed:

## Wi-Fi Protected Setup

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). Using this feature could let your wireless client automatically synchronize its setting and connect to the Access Point in a minute without any hassle.

---

**Disable WPS**

Apply Changes

Reset

---

**WPS Status:**

Configured  UnConfigured

Reset to UnConfigured

**Auto-lock-down state: unlocked**

Unlock

**Self-PIN Number:**

80856542

**Push Button Configuration:**

Start PBC

**STOP WSC**

Stop WSC

**Client PIN Number:**

Start PIN

---

Field	Description
<b>Disable WPS</b>	Checking this box and clicking “Apply Changes” will disable Wi-Fi Protected Setup. WPS is turned on by default.
<b>WPS Status</b>	When AP’s settings are factory default (out of box), it is set to open security and un-configured state. It will be displayed by “WPS Status”. If it already shows “Configured”, some registrars such as Vista WCN will not configure AP. Users will need to go to the “Save/Reload Settings” page and click “Reset” to reload factory default settings.
<b>Self-PIN Number</b>	“Self-PIN Number” is AP’s PIN. Whenever users want to change AP’s PIN, they could click “Regenerate PIN” and then click “ Apply Changes”. Moreover, if users want to make their own PIN, they could enter four digit PIN without checksum and then click “ Apply Changes”. However, this would not be recommended since the registrar side needs to be supported with four digit PIN.

Field	Description
<b>Push Button Configuration</b>	<b>Clicking this button will invoke the PBC method of WPS. It is only used when AP acts as a registrar.</b>
<b>Apply Changes</b>	<b>Whenever users want to enable/disable WPS or change AP's PIN, they need to apply this button to commit changes.</b>
<b>Reset</b>	<b>It restores the original values of "Self-PIN Number" and "Client PIN Number".</b>
<b>Client PIN Number</b>	<b>It is only used when users want their station to join AP's network. The length of PIN is limited to four or eight numeric digits. If users enter eight digit PIN with checksum error, there will be a warning message popping up.  If users insist on this PIN, AP will take it.</b>

### **Introduction of WPS**

Although home Wi-Fi networks have become more and more popular, users still have trouble with the initial set up of network. This obstacle forces users to use the open security and increases the risk of eavesdropping. Therefore, WPS is designed to ease set up of security-enabled Wi-Fi networks and subsequently network management (Wi-Fi Protected Setup Specification 1.0h.pdf, p. 8).

The largest difference between WPS-enabled devices and legacy devices is that users do not need the knowledge about SSID, channel and security settings, but they could still surf in a security-enabled Wi-Fi network. For examples, in the initial network set up, if users want to use the PIN configuration, the only thing they need to do is entering the device PIN into registrar, starting the PIN method on that device and simply wait until the device joins the network. After the PIN method is started on both sides, a registration protocol will be initiated between the registrar and the enrollee. Typically, a registrar could be an access point or other device that is capable of managing the network. An enrollee could be an access point or a station that will join the network. After the registration protocol has been done, the enrollee will receive SSID and security settings from the registrar and then join the network. In other words; if a station attempts to join a network managed by an access point with built-in internal registrar, users will need to enter station's PIN into the web page of that access point. If the device PIN is correct and valid and users start PIN on station, the access point and the station will automatically exchange the encrypted information of the network settings under the management of AP's internal registrar. The station then uses this information to perform authentication algorithm, join the secure network, and transmit data with the encryption algorithm. More details will be demonstrated in the following sections.

## Supported WPS features

Currently, Wireless Gateway supports WPS features for **AP mode**, **AP+WDS mode**, **Infrastructure-Client mode**, and the **wireless root interface of Universal Repeater mode**.

Other modes such as **WDS mode**, **Infrastructure-Adhoc mode**, and the **wireless virtual interface of Universal Repeater mode** are not implemented with WPS features.

**If those unsupported modes are enforced by users, WPS will be disabled.** Under the configuration of every WPS-supported mode, Wireless Gateway has *Push Button method* and *PIN method*. For each method, Wireless Gateway offers different security levels included in network credential, such as open security, WEP 64 bits, WEP 128 bits, WPA-Personal TKIP, WPA-Personal AES, WPA2-Personal TKIP, and WPA2-Personal AES. Users could choose either one of the methods at their convenience.

## AP mode

For AP mode, Wireless Gateway supports three roles, registrar, proxy, and enrollee in registration protocol. At different scenarios, Wireless Gateway will automatically switch to an appropriate role depending on the other device's role or a specific configuration.

### AP as Enrollee

If users know AP's PIN and enter it into external registrar, the external registrar will configure AP with a new wireless profile such as new SSID and new security settings. The external registrar does this job either utilizing the in-band EAP (wireless) or out-of-band UPnP (Ethernet). During the WPS handshake, a wireless profile is encrypted and transmitted to AP. If the handshake is successfully done, AP will be re-initialized with the new wireless profile and wait for legacy stations or WPS stations to join its network.

### AP as Registrar

Wireless Gateway also has a built-in internal registrar. Whenever users enter station's PIN into AP's webpage, click "Start PBC", or push the physical button, AP will switch to registrar automatically. If users apply the same method on station side and the WPS handshake is successfully done, SSID and security settings will be transmitted to that station without the risk of eavesdropping. And then the station will associate with AP in a security-enabled network.

### AP as Proxy

At this state, AP is transparent to users. If users want to configure a station or any device that is capable of being an enrollee, they have to enter device's PIN into an external registrar and choose an appropriate wireless profile. After the PIN is entered, the external registrar will inform AP this event. AP then conveys the encrypted wireless profile between the

device and the external registrar. Finally, the device will use the wireless profile and associate with AP. However, the device may connect to other APs if the wireless profile does not belong to the proxy AP. Users must carefully choose the wireless profile or create a wireless profile on an external registrar.

### **Infrastructure-Client mode**

In Infrastructure-Client mode, Wireless Gateway only supports enrollee's role. If users click "Start PIN", click "Start PBC", or press the physical button on Wireless Gateway, it will start to seek WPS AP. Once users apply the same method on registrar side, Wireless Gateway will receive the wireless profile upon successfully doing the registration protocol. Then Wireless Gateway will associate with an AP.

### **Instructions of AP's and Client's operations**

At this state, AP is transparent to users. If users want to configure a station or any device that is capable of being an enrollee, they have to enter device's PIN into an external registrar and choose an appropriate wireless profile. After the PIN is entered, the external registrar will inform AP this event. AP then conveys the encrypted wireless profile between the device and the external registrar. Finally, the device will use the wireless profile and associate with AP. However, the device may connect to other APs if the wireless profile does not belong to the proxy AP. Users must carefully choose the wireless profile or create a wireless profile on an external registrar.

### Wireless Basic Settings page

Users need to make sure the “Broadcast SSID” file is set to “Enabled”. Otherwise, it might prevent WPS from working properly.

## Wireless Basic Settings

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters.

**Disable Wireless LAN Interface**

**Band:** 2.4 GHz (B+G+N) ▼

**Mode:** AP ▼ Multiple AP

**Network Type:** Infrastructure ▼

**SSID:** LevelOne Add to Profile

**Channel Width:** 40MHz ▼

**Control Sideband:** Upper ▼

**Channel Number:** Auto ▼

**Broadcast SSID:** Enabled ▼

**WMM:** Enabled ▼

**Data Rate:** Auto ▼

**TX restrict:** 0 Mbps (0:no restrict)

**RX restrict:** 0 Mbps (0:no restrict)

**Associated Clients:** Show Active Clients

**Enable Mac Clone (Single Ethernet Client)**

**Enable Universal Repeater Mode (Acting as AP and client simultaneously)**

**SSID of Extended Interface:** Add to Profile

Apply Changes

Reset

## Operations of AP - AP being an enrollee

---

In this case, AP will be configured by any registrar either through in-band EAP or UPnP. Here, users do not need to do any action on AP side. They just need AP's device PIN and enter it into registrar. An example from Vista WCN will be given.

1. From the left-hand *Wireless* -> *WPS* menu. The following page is displayed:
2. Make sure AP is in un-configured state.

## Wi-Fi Protected Setup

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). Using this feature could let your wireless client automatically synchronize its setting and connect to the Access Point in a minute without any hassle.

---

**Disable WPS**

Apply Changes

Reset

---

**WPS Status:**

Configured  UnConfigured

Reset to UnConfigured

**Auto-lock-down state: unlocked**

Unlock

**Self-PIN Number:**

80856542

**Push Button Configuration:**

Start PBC

**STOP WSC**

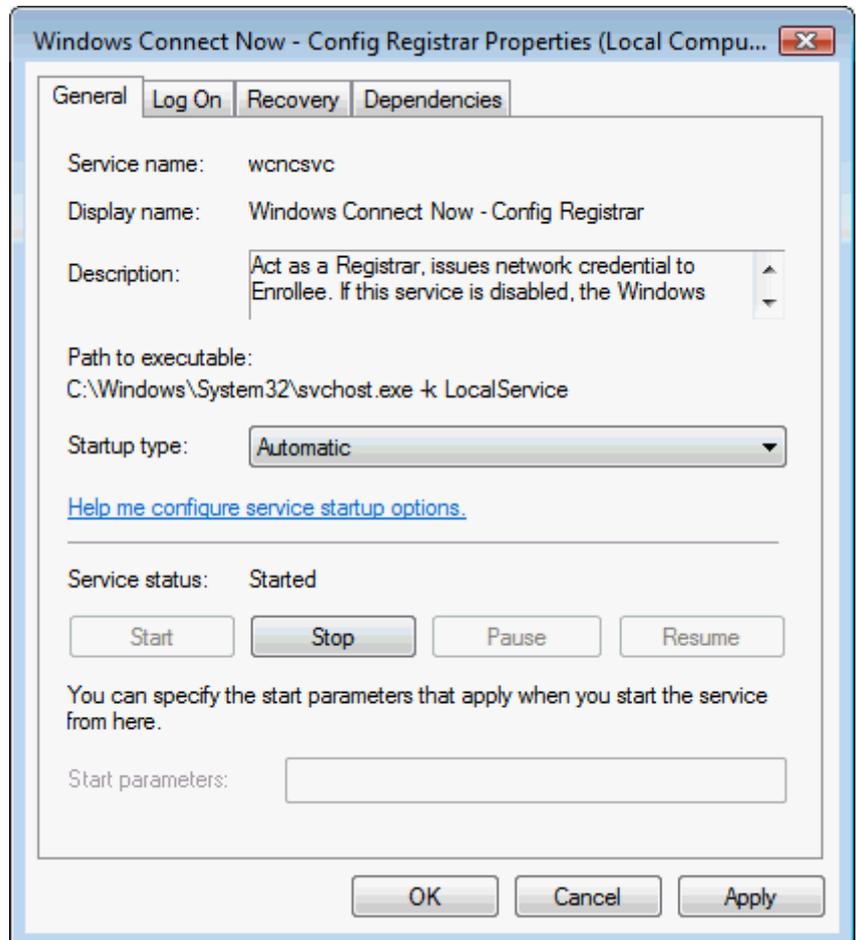
Stop WSC

**Client PIN Number:**

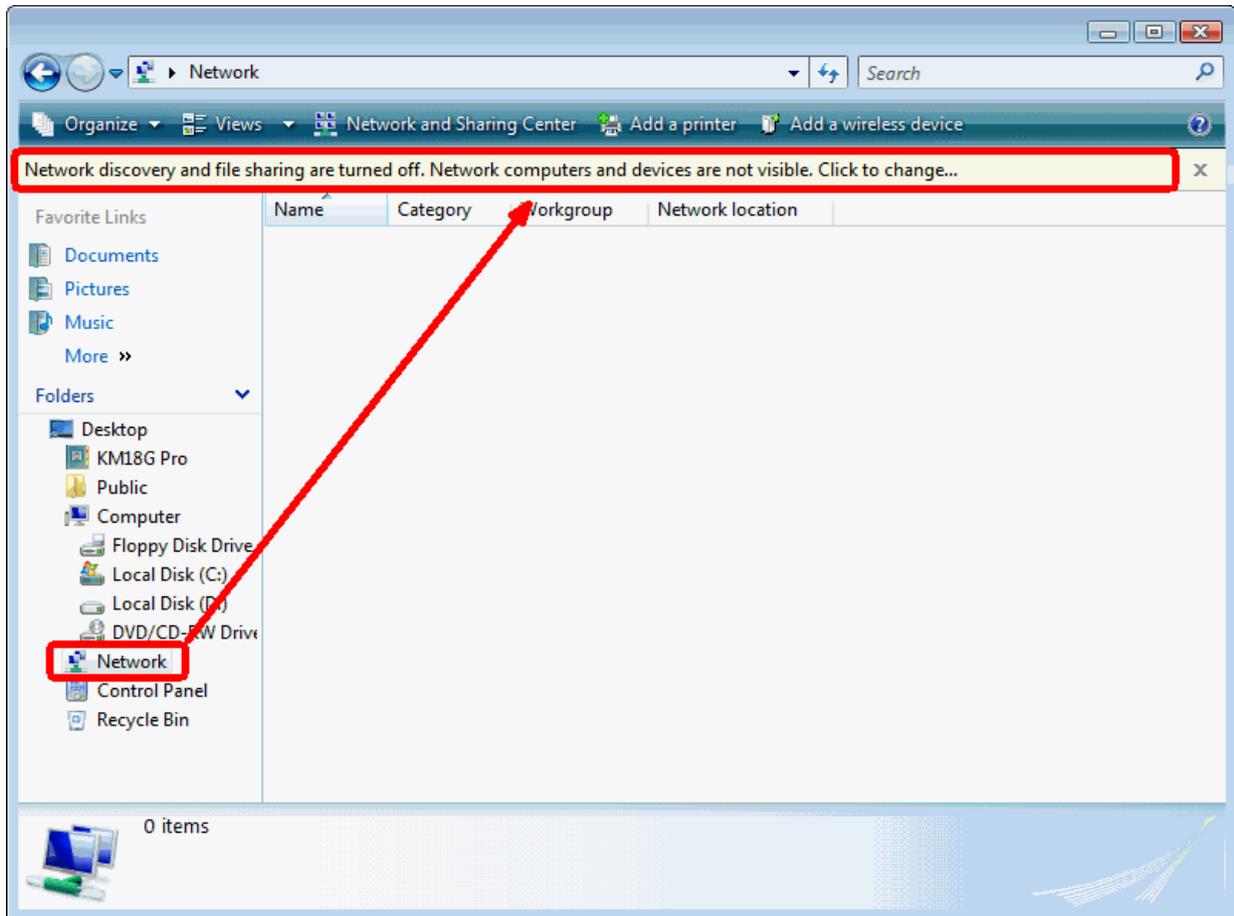
Start PIN

---

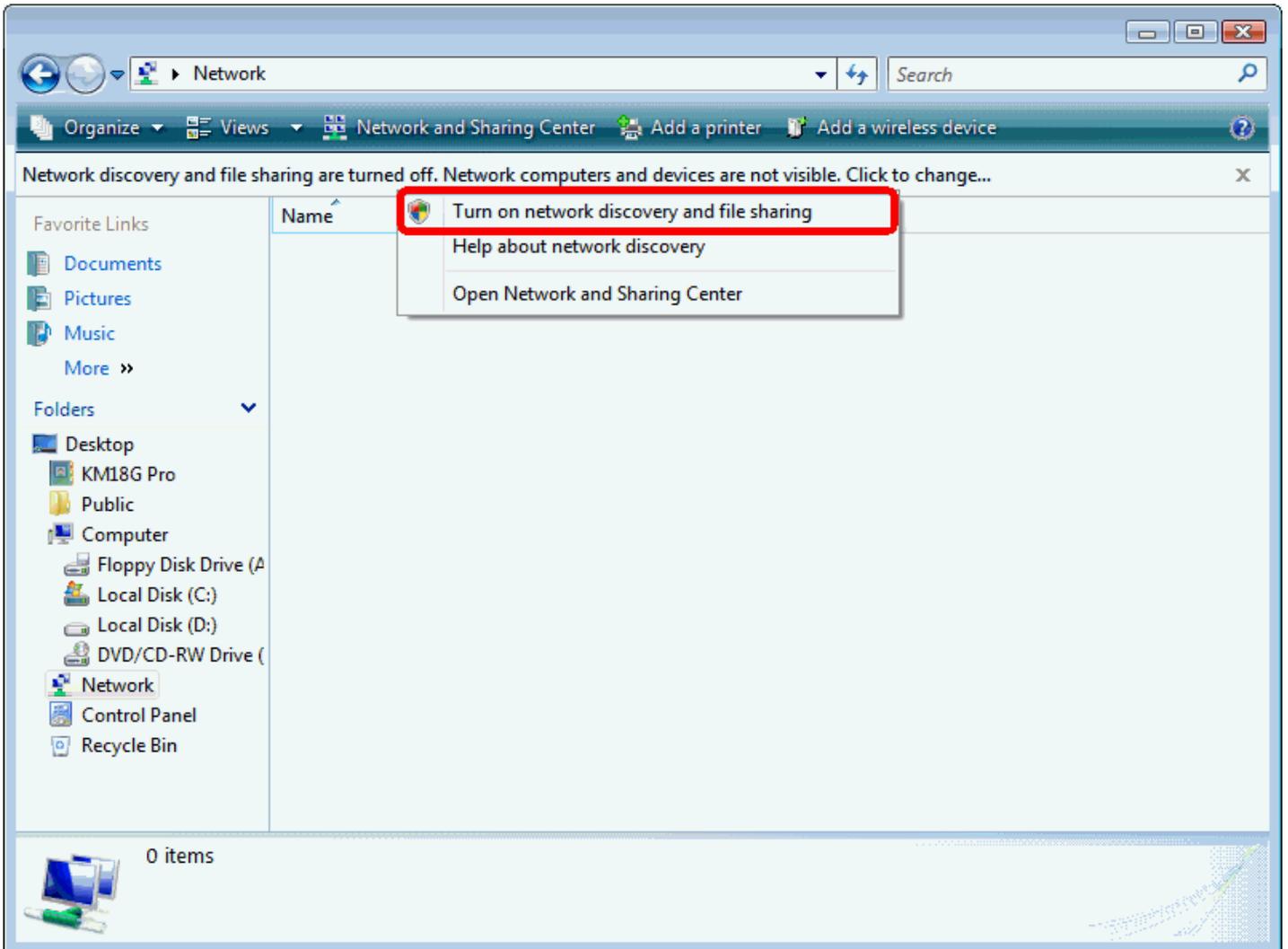
3. Plug the Ethernet cable into AP's LAN port and make sure the IP connection is valid with Vista.
4. Make sure WCN is enabled. Users may need to enable it at the first time. They could open the "Control Panel", click "Classic View", open "Administrative Tools", double click "Services", , a User Account Control pop up and click "Continue", edit properties of "Windows Connect Now", choose the "Startup type" with "Automatic" and click "Start".



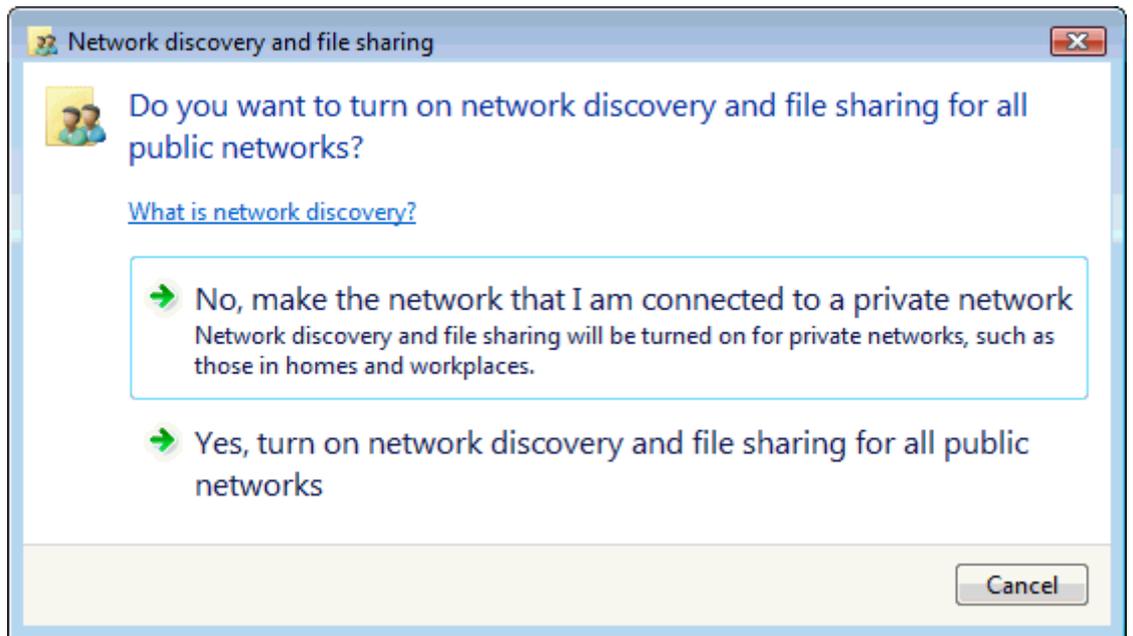
5. If the previous steps are done, open Windows Explorer. Go to the Network section.
6. Click on “Network discovery and file sharing are turned off. Network computers and devices are not visible. Click to change...”



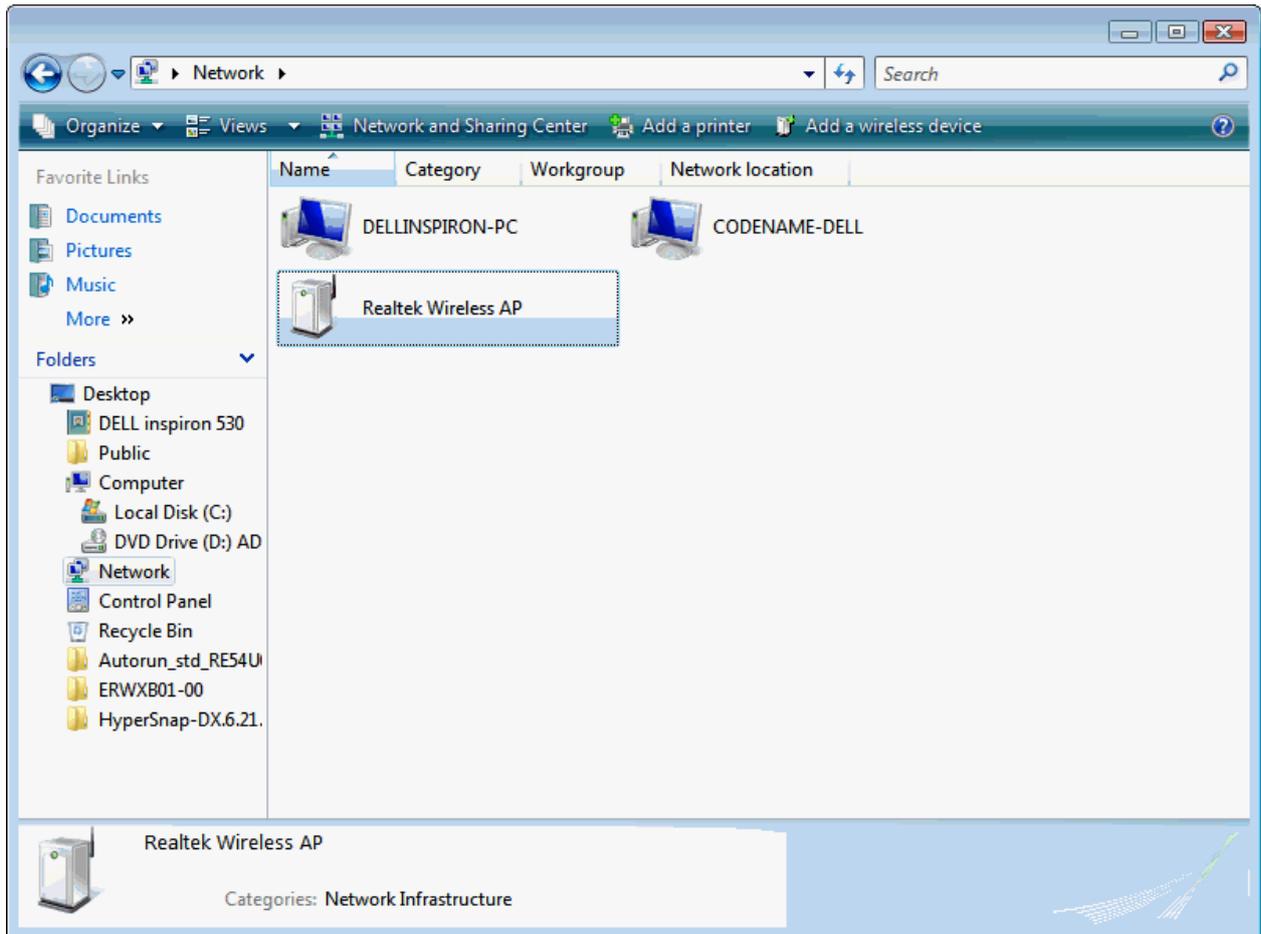
7. Click on "Turn on network discovery and file sharing"



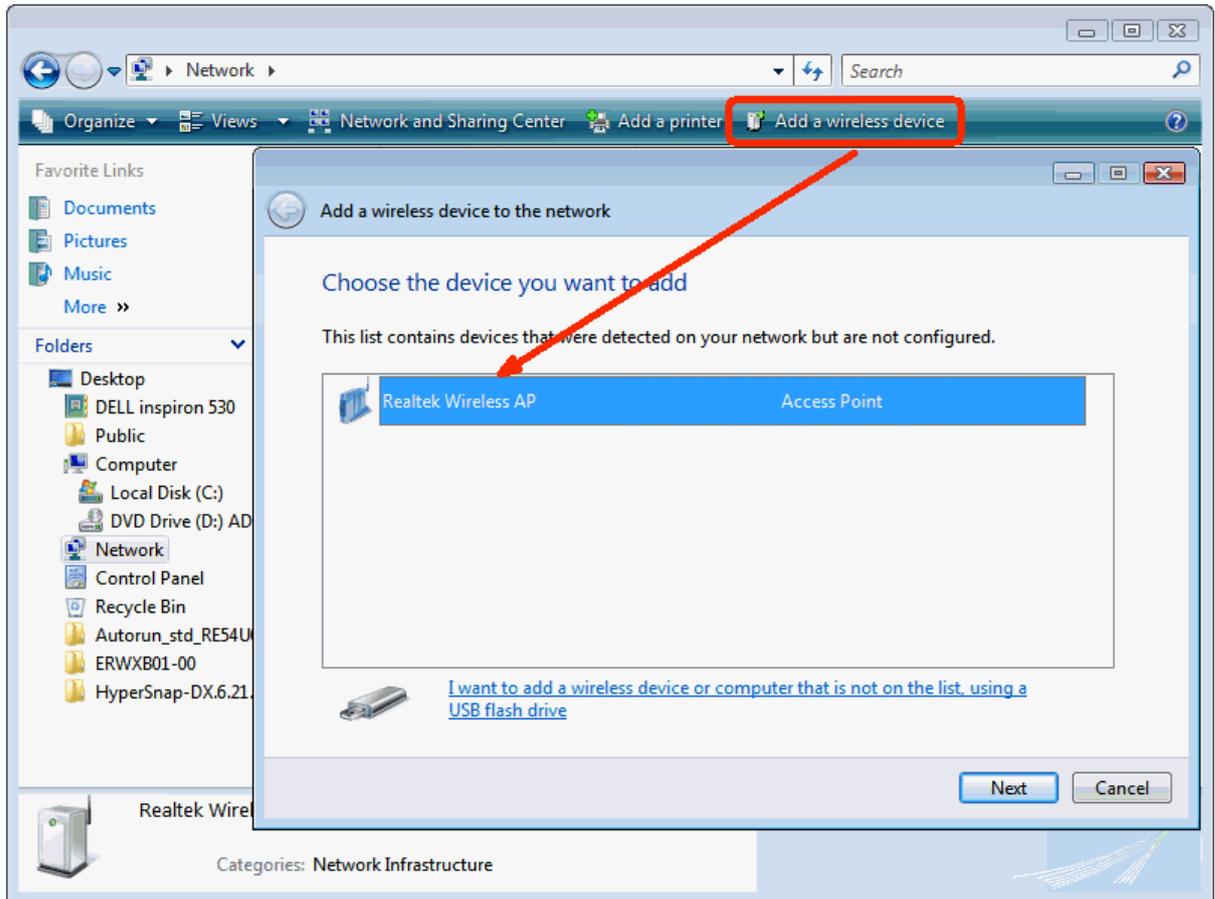
8. Click on “No, make the network that I am connected to a private network”



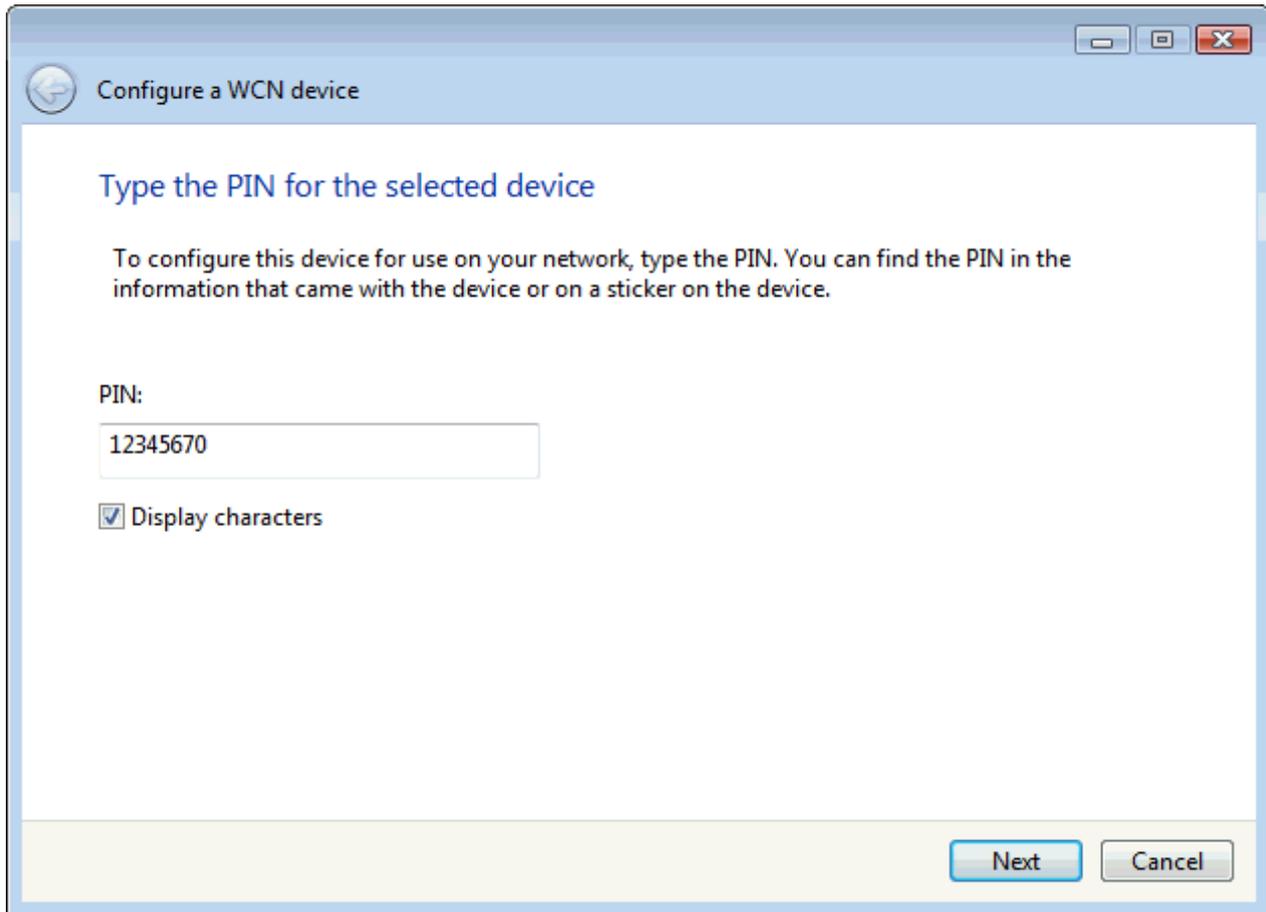
9. AP's icon will show up. Double click on it.



10. Users could also Click “Add a wireless device” if the icon is not there. Click “next”.



11. Enter AP's Self-PIN Number and click "next".



The screenshot shows a Windows-style dialog box with a title bar that says "Configure a WCN device". The main content area has a heading "Type the PIN for the selected device" and a paragraph of instructions: "To configure this device for use on your network, type the PIN. You can find the PIN in the information that came with the device or on a sticker on the device." Below this is a text input field labeled "PIN:" containing the number "12345670". There is a checked checkbox labeled "Display characters". At the bottom right, there are two buttons: "Next" and "Cancel".

Configure a WCN device

Type the PIN for the selected device

To configure this device for use on your network, type the PIN. You can find the PIN in the information that came with the device or on a sticker on the device.

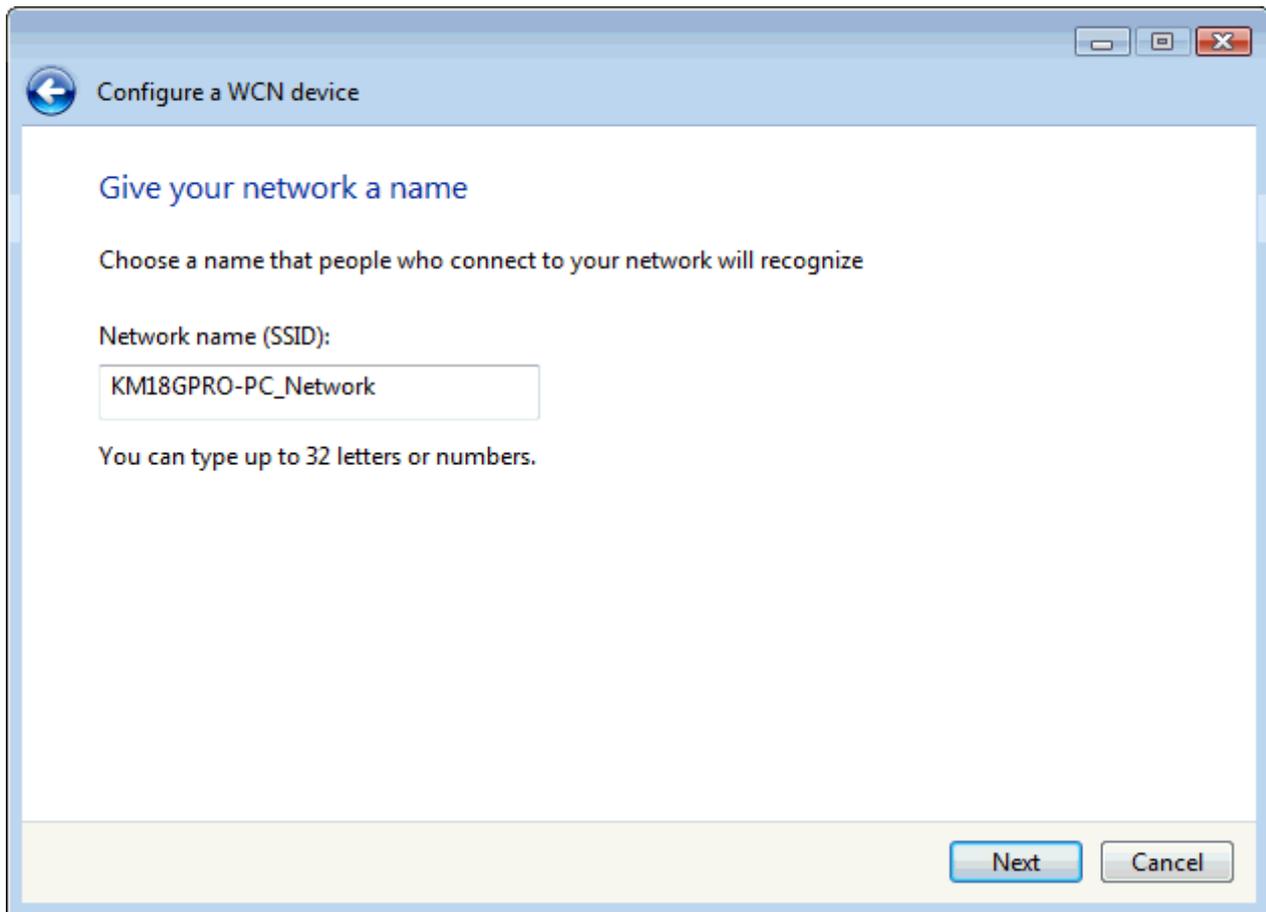
PIN:

12345670

Display characters

Next Cancel

12. Choose a name that people who connect to your network will recognize.



Configure a WCN device

### Give your network a name

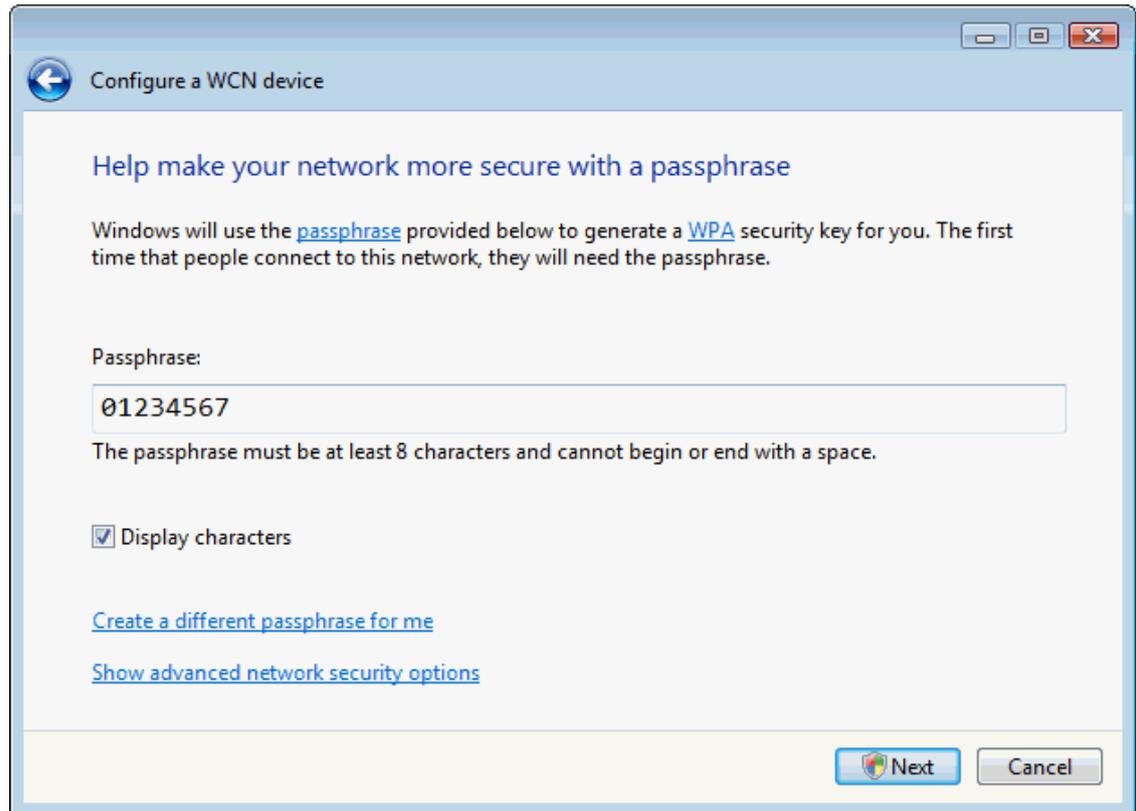
Choose a name that people who connect to your network will recognize

Network name (SSID):

You can type up to 32 letters or numbers.

Next Cancel

13. Enter the Passphrase and then click Next.



Configure a WCN device

Help make your network more secure with a passphrase

Windows will use the [passphrase](#) provided below to generate a [WPA](#) security key for you. The first time that people connect to this network, they will need the passphrase.

Passphrase:

01234567

The passphrase must be at least 8 characters and cannot begin or end with a space.

Display characters

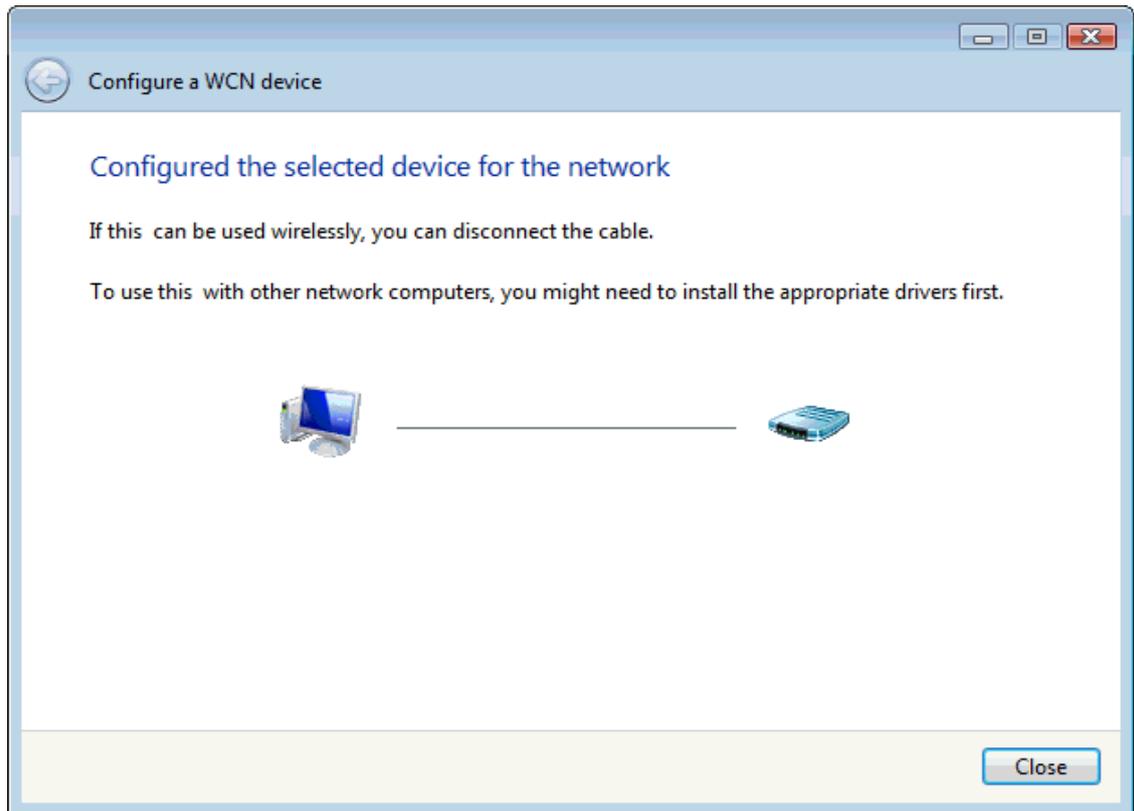
[Create a different passphrase for me](#)

[Show advanced network security options](#)

Next Cancel

14. A User Account Control screen pops up, click Continue.

15. AP is successfully configured by WCN.



16. Finally, AP will become configured (see WPS Status). The authentication algorithm, encryption algorithm, and key assigned by WCN will be displayed below "Current Key Info".

## Wi-Fi Protected Setup

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). Using this feature could let your wireless client automatically synchronize its setting and connect to the Access Point in a minute without any hassle.

**Disable WPS**

**WPS Status:**  Configured  UnConfigured

**Self-PIN Number:** 62828475

**Push Button Configuration:**

**Current Key Info:**

Authentication	Encryption	Key
WPA PSK	TKIP	C7Un2aEccjPyhkr01CTDX3

**Client PIN Number:**

17. The SSID field of Wireless Basic Settings page will also be modified with the value assigned by WCN.

## Wireless Basic Settings

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters.

**Disable Wireless LAN Interface**

**Band:** 2.4 GHz (B+G+N) ▼

**Mode:** AP ▼

Multiple AP

**Network Type:** Infrastructure ▼

**SSID:** KM18GPRO-PC\_Network

Add to Profile

**Channel Width:** 40MHz ▼

**Control Sideband:** Upper ▼

**Channel Number:** Auto ▼

**Broadcast SSID:** Enabled ▼

**WMM:** Enabled ▼

**Data Rate:** Auto ▼

**TX restrict:** 0 Mbps (0:no restrict)

**RX restrict:** 0 Mbps (0:no restrict)

**Associated Clients:** Show Active Clients

**Enable Mac Clone (Single Ethernet Client)**

**Enable Universal Repeater Mode (Acting as AP and client simultaneously)**

**SSID of Extended Interface:**

Add to Profile

Apply Changes

Reset



## Operations of AP - AP being a registrar

---

### AP mode

Whenever users enter station's PIN into AP's Wi-Fi Protected Setup page and click "Start PIN", AP will become a registrar. Users must start the PIN method on the station side within two minutes.

1. From the left-hand *Wireless* -> *WPS* menu. The following page is displayed:
2. Make sure AP is in un-configured state.
3. Enter the Client PIN Number.
4. Click *Start PIN*.

## Wi-Fi Protected Setup

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). Using this feature could let your wireless client automatically synchronize its setting and connect to the Access Point in a minute without any hassle.

---

**Disable WPS**

Apply Changes

Reset

---

**WPS Status:**

Configured  UnConfigured

Reset to UnConfigured

**Auto-lock-down state: unlocked**

Unlock

**Self-PIN Number:**

80856542

**Push Button Configuration:**

Start PBC

**STOP WSC**

Stop WSC

**Client PIN Number:**

Start PIN

---

- Users must start the PIN method on the station side within two minutes.

**Applied client's PIN successfully!**

**You have to run Wi-Fi Protected Setup in client within 2 minutes.**



- Users must start the PIN method on the station side within two minutes.

The screenshot shows the 'Planex wireless Utility' software interface. The 'WPS' tab is selected. The 'WPS AP List' shows one entry: ID: VoIP\_Wireless, MAC: 00-E0-4C-81-86-D1, Channel: 11. The 'WPS Profile List' is empty. The 'WPS status is disconnected'. The 'PIN' method is selected and highlighted with a red box. Other options include 'PBC', 'WPS Associate' (checked), 'WPS Probe IE' (checked), and 'Automatically select the AP' (unchecked). The 'Progress' bar is at 0%. The bottom section shows network statistics: Status: Disconnected, Link Quality: 0%, Signal Strength 1: 0%, Noise Strength: 0%. Transmit and Receive sections show Link Speed: Max and Throughput: 0.000 Kbps.

- If the device PIN is correct and the WPS handshake is successfully done on the station side, User's Wi-Fi Protected status will be shown as below.

The screenshot displays the Planex wireless Utility interface. At the top, there are navigation tabs: Profile, Network, Advanced, Statistics, WMM, WPS, Radio On/Off, and About. The WPS tab is currently selected.

**WPS AP List**

ID : 0x0000	VoIP_Wireless	00-E0-4C-81-86-D1	11
-------------	---------------	-------------------	----

**WPS Profile List**

- WPS693e0786d1

**WPS Configuration:**

- WPS Associate
- WPS Probe IE
- Automatically select the AP

**WPS status is connected successfully – WPS693e0786d1**

**Connection Metrics:**

- Link Quality >> 100%
- Signal Strength 1 >> 100%
- Noise Strength >> 70%

**Transmit:**

- Link Speed >> 54.0 Mbps
- Throughput >> 3.456 Kbps

**Receive:**

- Link Speed >> 54.0 Mbps
- Throughput >> 21.960 Kbps

**Device Information:**

- Status >> WPS693e0786d1 <-> 00-E0-4C-81-86-D1
- Extra Info >> Link is Up [TxPower:100%]
- Channel >> 11 <-> 2462 MHz
- Authentication >> WPA2-PSK
- Encryption >> AES
- Network Type >> Infrastructure
- IP Address >> 10.0.0.102
- Sub Mask >> 255.0.0.0
- Default Gateway >> 10.0.0.2

**Right Panel (Config Mode):**

- Rescan
- Information
- Pin Code: 19953533 (Renew)
- Config Mode: Enrollee
- Detail
- Connect
- Rotate
- Disconnect
- Export Profile
- Delete

8. If the device PIN is correct and the WPS handshake is successfully done, AP's Wi-Fi Protected Setup page will be shown as below.

## Wi-Fi Protected Setup

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). Using this feature could let your wireless client automatically synchronize its setting and connect to the Access Point in a minute without any hassle.

**Disable WPS**

Apply Changes

Reset

**WPS Status:**

Configured  UnConfigured

Reset to UnConfigured

**Auto-lock-down state: unlocked**

Unlock

**Self-PIN Number:**

02271385

**Push Button Configuration:**

Start PBC

**STOP WSC**

Stop WSC

**Client PIN Number:**

Start PIN

**Current Key Info:**

Authentication	Encryption	Key
WPA2-Mixed PSK	TKIP+AES	680338516cbd3fa954a9c5

Other pages such as *Wireless Basic Settings page* and *Wireless Security Setup page* will also be updated appropriately as described in previous sections. In this case, AP is in un-configured state before the station initiates the WPS handshake. According to the WPS spec, AP will create a wireless profile with WPA2-mixed mode and a random-generated key upon successfully doing the WPS handshake. However, AP will use the original wireless profile and give it to the station if AP is already in configured state. That means all settings of AP will not change. Hence, all WPS related pages keep the same.

### Push Button method

Wireless Gateway supports a virtual button “Start PBC” on the *Wi-Fi Protected Setup* page for Push Button method. If users push a virtual button “Start PBC”, AP will initiate a WPS session and wait for any station to join. At this moment, AP will detect whether there is more than one station that starts the PBC method. When multiple PBC sessions occur, users should try PIN method.

After users push AP’s virtual button “Start PBC”, they must go to station side to push its button within two minutes. If the WPS is successfully done, AP will give its wireless profile to that station. The station could use this profile to associate with AP.

1. From the left-hand *Wireless* -> *WPS* menu. The following page is displayed:
2. Make sure AP is in un-configured state.
3. Click *Start PBC*.

## Wi-Fi Protected Setup

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). Using this feature could let your wireless client automatically synchronize its setting and connect to the Access Point in a minute without any hassle.

---

**Disable WPS**

Apply Changes

Reset

---

**WPS Status:**

Configured  UnConfigured

Reset to UnConfigured

**Auto-lock-down state: unlocked**

Unlock

**Self-PIN Number:**

80856542

**Push Button Configuration:**

Start PBC

**STOP WSC**

Stop WSC

**Client PIN Number:**

Start PIN

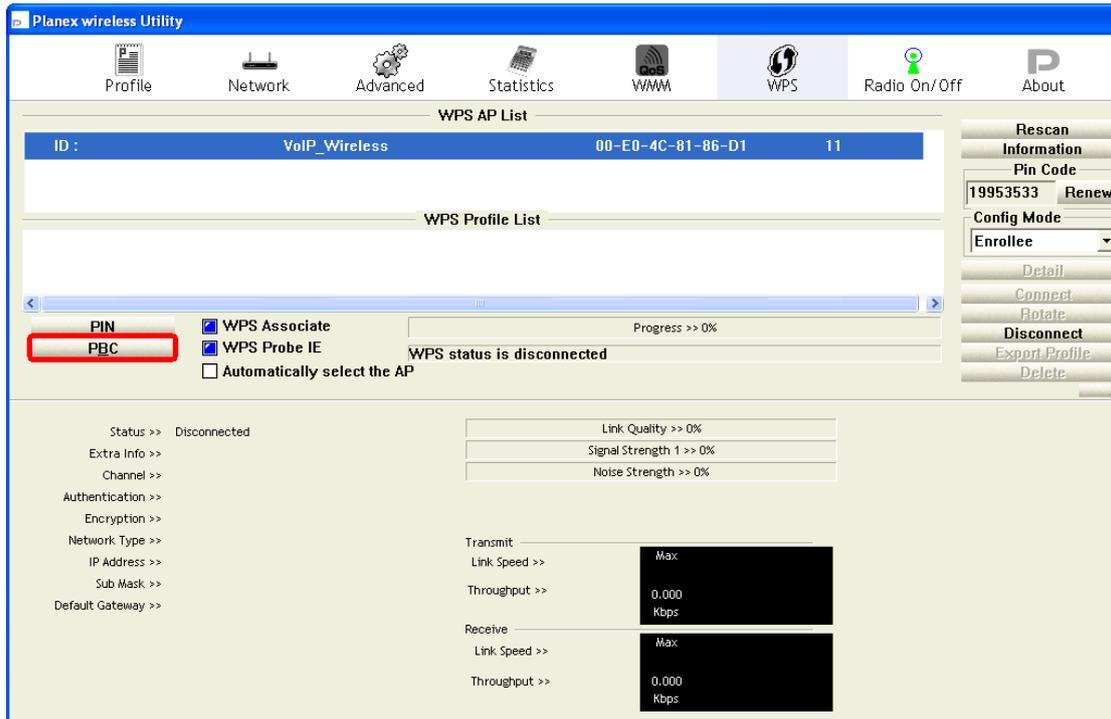
- Users must start the PBC method on the station side within two minutes.

**Start PBC successfully!**

**You have to run Wi-Fi Protected Setup in client within 2 minutes.**



- Users must start the PBC method on the station side within two minutes.



- If the device PCB and the WPS handshake is successfully done on the station side, User's Wi-Fi Protected status will be shown as below.

The screenshot displays the Planex wireless Utility interface. At the top, there is a navigation bar with icons for Profile, Network, Advanced, Statistics, WMM, WPS, Radio On/Off, and About. The main area is divided into several sections:

- WPS AP List:** Shows a table with columns for ID, Name, MAC Address, and Channel. The entry is: ID: 0x0000, Name: VoIP\_Wireless, MAC: 00-E0-4C-81-86-D1, Channel: 11.
- WPS Profile List:** Shows a profile named WPS693e0786d1.
- WPS Configuration:** Includes checkboxes for WPS Associate (checked), WPS Probe IE (checked), and Automatically select the AP (unchecked). A progress bar indicates "Progress >> 100%".
- Status:** A message states "WPS status is connected successfully - WPS693e0786d1".
- Link Quality Metrics:** Three horizontal bars show: Link Quality >> 100% (green), Signal Strength 1 >> 100% (green), and Noise Strength >> 70% (red).
- Network Statistics:**
  - Transmit:** Link Speed >> 54.0 Mbps, Throughput >> 3.456 Kbps. A bar chart shows a peak of 51,584 Kbps.
  - Receive:** Link Speed >> 54.0 Mbps, Throughput >> 21,960 Kbps. A bar chart shows a peak of 1,464 Mbps.
- Configuration Details:**
  - Status >> WPS693e0786d1 <-> 00-E0-4C-81-86-D1
  - Extra Info >> Link is Up [TxPower:100%]
  - Channel >> 11 <-> 2462 MHz
  - Authentication >> WPA2-PSK
  - Encryption >> AES
  - Network Type >> Infrastructure
  - IP Address >> 10.0.0.102
  - Sub Mask >> 255.0.0.0
  - Default Gateway >> 10.0.0.2
- Right Panel:** A vertical menu with buttons: Rescan, Information, Pin Code (19953533, Renew), Config Mode (Enrollee), Detail, Connect, Rotate, Disconnect, Export Profile, and Delete.

- If the device PIN is correct and the WPS handshake is successfully done, AP's Wi-Fi Protected Setup page will be shown as below.

## Wi-Fi Protected Setup

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). Using this feature could let your wireless client automatically synchronize its setting and connect to the Access Point in a minute without any hassle.

**Disable WPS**

Apply Changes

Reset

**WPS Status:**

Configured  UnConfigured

Reset to UnConfigured

**Auto-lock-down state: unlocked**

Unlock

**Self-PIN Number:**

02271385

**Push Button Configuration:**

Start PBC

**STOP WSC**

Stop WSC

**Client PIN Number:**

Start PIN

**Current Key Info:**

Authentication	Encryption	Key
WPA2-Mixed PSK	TKIP+AES	680338516cbd3fa954a9c5

Other pages such as *Wireless Basic Settings page* and *Wireless Security Setup page* will also be updated appropriately as described in previous sections. In this case, AP is in un-configured state before the station initiates the WPS handshake. According to the WPS spec, AP will create a wireless profile with WPA2-mixed mode and a random-generated key upon successfully doing the WPS handshake. However, AP will use the original wireless profile and give it to the station if AP is already in configured state. That means all settings of AP will not change. Hence, all WPS related pages keep the same.

# 8 LAN Interface

This chapter is to configure the parameters for local area network which connects to the LAN port of your Access Point. Here you may change the setting for IP address, subnet mask, DHCP, etc...



## Note

*You should only change the addressing details if your ISP asks you to, or if you are familiar with network configuration. In most cases, you will not need to make any changes to this configuration.*

## LAN Interface Setup

---

To check the configuration of LAN Interface:

1. From the left-hand *Network Settings* -> *LAN Interface* menu. The following page is displayed:

## LAN Interface Setup

This page is used to configure the parameters for local area network which connects to the LAN port of your Access Point. Here you may change the setting for IP address, subnet mask, DHCP, etc..

---

<b>IP Address:</b>	<input type="text" value="192.168.1.1"/>
<b>Subnet Mask:</b>	<input type="text" value="255.255.255.0"/>
<b>Default Gateway:</b>	<input type="text" value="0.0.0.0"/>
<b>DHCP:</b>	<input type="text" value="Disabled"/> ▾
<b>DHCP Client Range:</b>	<input type="text" value="192.168.1.50"/> - <input type="text" value="192.168.1.200"/> <input type="button" value="Show Client"/>
<b>DHCP Lease Time:</b>	<input type="text" value="480"/> (1 ~ 10080 minutes)
<b>Static DHCP:</b>	<input type="button" value="Set Static DHCP"/>
<b>Domain Name:</b>	<input type="text" value="WAP-6110"/>
<b>802.1d Spanning Tree:</b>	<input type="text" value="Disabled"/> ▾
<b>Clone MAC Address:</b>	<input type="text" value="000000000000"/>

Field	Description
<b>IP Address</b>	<b>The LAN IP address</b> <b>Default: 192.168.1.1</b>
<b>Subnet Mask</b>	<b>The LAN netmask</b> <b>Default: 255.255.255.0</b>
<b>Default Gateway</b>	<b>The LAN Gateway</b> <b>Default: 0.0.0.0</b>
<b>DHCP</b>	<b>DHCP Type: Disable, DHCP Client or Server</b> <b>Default: DHCP Server</b>
<b>DHCP Client Range</b>	<b>Specify the starting/ending IP address of the IP address pool.</b> <b>Default Start IP: 192.168.1.50</b> <b>Default Ending IP: 192.168.1.200</b>
<b>DHCP Lease Time</b>	<b>Configure DHCP Lease Time</b>
<b>Static DHCP</b>	<b>Set Static DHCP</b>
<b>Show Client</b>	<b>DHCP client computers/devices connected to the device will have their information displayed in the DHCP Client List table. The table will show the IP Address, MAC Address, and Expired Time of the DHCP lease for each client computer/device.</b>
<b>Domain Name</b>	<b>A domain name is a user-friendly name used in place of its associated IP address. Domain names must be unique; their assignment is controlled by the Internet Corporation for Assigned Names and Numbers (ICANN). Domain names are a key element of URLs, which identify a specific file at a web site.</b>
<b>802.1d Spanning Tree</b>	<b>Enable or Disable Spanning Tree</b>
<b>Clone MAC Address</b>	<b>MAC Spoofing on LAN</b> <b>Default: 000000000000</b>

## Changing the LAN IP address and subnet mask

---

To check the configuration of LAN Interface:

- From the left-hand *Network Settings* -> *LAN Interface* menu. The following page is displayed:

### LAN Interface Setup

This page is used to configure the parameters for local area network which connects to the LAN port of your Access Point. Here you may change the setting for IP address, subnet mask, DHCP, etc..

---

<b>IP Address:</b>	<input type="text" value="192.168.1.1"/>
<b>Subnet Mask:</b>	<input type="text" value="255.255.255.0"/>
<b>Default Gateway:</b>	<input type="text" value="0.0.0.0"/>
<b>DHCP:</b>	<input type="text" value="Disabled"/> ▾
<b>DHCP Client Range:</b>	<input type="text" value="192.168.1.50"/> - <input type="text" value="192.168.1.200"/> <input type="button" value="Show Client"/>
<b>DHCP Lease Time:</b>	<input type="text" value="480"/> (1 ~ 10080 minutes)
<b>Static DHCP:</b>	<input type="button" value="Set Static DHCP"/>
<b>Domain Name:</b>	<input type="text" value="WAP-6110"/>
<b>802.1d Spanning Tree:</b>	<input type="text" value="Disabled"/> ▾
<b>Clone MAC Address:</b>	<input type="text" value="000000000000"/>

3. Type IP Address and *Change default LAN port IP address*.
4. Click in the *IP Address and Subnet Mask* box and type a new IP Address and Subnet Mask.
5. Change the *default DHCP Client Range*.
6. Click *Apply Changes*.

## LAN Interface Setup

This page is used to configure the parameters for local area network which connects to the LAN port of your Access Point. Here you may change the setting for IP address, subnet mask, DHCP, etc..

<b>IP Address:</b>	<input type="text" value="10.0.0.2"/>
<b>Subnet Mask:</b>	<input type="text" value="255.255.255.0"/>
<b>Default Gateway:</b>	<input type="text" value="0.0.0.0"/>
<b>DHCP:</b>	<input type="text" value="Disabled"/>
<b>DHCP Client Range:</b>	<input type="text" value="192.168.1.50"/> - <input type="text" value="192.168.1.200"/> <input type="button" value="Show Client"/>
<b>DHCP Lease Time:</b>	<input type="text" value="480"/> (1 ~ 10080 minutes)
<b>Static DHCP:</b>	<input type="button" value="Set Static DHCP"/>
<b>Domain Name:</b>	<input type="text" value="WAP-6110"/>
<b>802.1d Spanning Tree:</b>	<input type="text" value="Disabled"/>
<b>Clone MAC Address:</b>	<input type="text" value="000000000000"/>
<input type="button" value="Apply Changes"/> <input type="button" value="Reset"/>	

7. Change setting successfully! Please wait 20 seconds....

**Change setting successfully!**

**Do not turn off or reboot the Device during this time.**

**Please wait 17 seconds ...**

You may also need to reconfigure static IP address to correct one to access to the device.:



**Note**

*If you change the LAN IP address of the device while connected through your Web browser, you will be disconnected. You must open a new connection by entering your new LAN IP address as the URL.*

## Show Client

---

To the IP Address, MAC Address, and Expired Time of the DHCP lease for each client computer/device:

1. From the left-hand *Network Settings* -> *LAN Interface* menu. The following page is displayed:

## LAN Interface Setup

This page is used to configure the parameters for local area network which connects to the LAN port of your Access Point. Here you may change the setting for IP address, subnet mask, DHCP, etc..

<b>IP Address:</b>	<input type="text" value="192.168.1.1"/>
<b>Subnet Mask:</b>	<input type="text" value="255.255.255.0"/>
<b>Default Gateway:</b>	<input type="text" value="0.0.0.0"/>
<b>DHCP:</b>	<input type="text" value="Server"/>
<b>DHCP Client Range:</b>	<input type="text" value="192.168.1.50"/> - <input type="text" value="192.168.1.200"/> <input type="button" value="Show Client"/>
<b>DHCP Lease Time:</b>	<input type="text" value="480"/> (1 ~ 10080 minutes)
<b>Static DHCP:</b>	<input type="button" value="Set Static DHCP"/>
<b>Domain Name:</b>	<input type="text" value="WAP-6110"/>
<b>802.1d Spanning Tree:</b>	<input type="text" value="Disabled"/>
<b>Clone MAC Address:</b>	<input type="text" value="000000000000"/>

2. Click on *Show Client* button. The following page is displayed:

## Active DHCP Client Table

This table shows the assigned IP address, MAC address and time expired for each DHCP leased client.

IP Address	MAC Address	Time Expired(s)
192.168.1.50	00:24:1d:c4:b4:c0	28790

# 9 Status

This page displays the current information for the device. It will display the LAN, WAN, and system firmware information. This page will display different information, according to WAN setting (Static IP, DHCP, or PPPoE).

1. From the left-hand *Management* -> *Status* menu. The following page is displayed:

## Status

This page shows the current status and some basic settings of the device.

System	
<b>Uptime</b>	0day:0h:0m:49s
<b>Firmware Version</b>	v3.2.5
<b>Customer Version</b>	RE1P_E_v325_2T2R_LEV_03_130613
<b>Build Time</b>	Thu Jun 13 04:25:31 EDT 2013
Wireless Configuration	
<b>Mode</b>	AP
<b>Band</b>	2.4 GHz (B+G+N)
<b>SSID</b>	LevelOne
<b>Channel Number</b>	1
<b>Encryption</b>	Disabled
<b>BSSID</b>	00:13:33:5a:04:25
<b>Associated Clients</b>	0
TCP/IP Configuration	
<b>Attain IP Protocol</b>	Fixed IP
<b>IP Address</b>	192.168.1.1
<b>Subnet Mask</b>	255.255.255.0
<b>Default Gateway</b>	0.0.0.0
<b>DHCP Server</b>	Disabled
<b>MAC Address</b>	00:13:33:5a:04:23

# 10 Statistics

This page shows the packet counters for transmission and reception regarding to wireless and Ethernet networks.

1. From the left-hand *Management* -> *Statistics* menu. The following page is displayed:

## Statistics

This page shows the packet counters for transmission and reception regarding to wireless and Ethernet networks.

---

<b>Wireless LAN</b>	<i>Sent Packets</i>	135
	<i>Received Packets</i>	31439
<b>Ethernet LAN</b>	<i>Sent Packets</i>	5748
	<i>Received Packets</i>	5560
<b>Ethernet WAN</b>	<i>Sent Packets</i>	1840
	<i>Received Packets</i>	4385

Refresh

# 11 Log

This page can be used to set System log and show the system log.

## System Log

---

1. From the left-hand *Management* menu, click on *Log*. The following page is displayed:

## System Log

This page can be used to set and show the system log.

---

**Enable Log**

**wireless**

Apply Changes

Refresh

Clear

Option	Description
<b>Enable Log</b>	<b>Enable/Disable the feature.</b> <b>Default: Disable</b>
<b>system all</b>	<b>All system logs will be recorded in the system log</b>
<b>wireless</b>	<b>The wireless logs will be recorded in the system log</b>
<b>DoS</b>	<b>The DoS logs will be recorded in the system log</b>

2. Check the option *Enable Log*.
3. Check the option *wireless*.
4. Click *Apply Changes*.

# System Log

This page can be used to set and show the system log.

---

**Enable Log**

**wireless**

Apply Changes

Refresh

Clear

5. Change setting successfully! Click on *Reboot Now* button to confirm.

## Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

Reboot Now

Reboot Later

# 12 Firmware Update

## About firmware versions

---

Firmware is a software program. It is stored as read-only memory on your device.

Your device can check whether there are later firmware versions available. If there is a later version, you can download it via the Internet and install it on your device.



### Note

*If there is a firmware update available you are strongly advised to install it on your device to ensure that you take full advantage of any new feature developments.*

## Manually updating firmware

---

You can manually download the latest firmware version from provider's website to your PC's file directory.

Once you have downloaded the latest firmware version to your PC, you can manually select and install it as follows:

1. From the left-hand *Management* menu, click on *Upgrade Firmware Upgrade*. The following page is displayed:
2. Click on the *Browse...* button.

## Upgrade Firmware

This page allows you upgrade the Access Point firmware to new version. Please note, do not power off the device during the upload because it may crash the system.

---

**Firmware Version:** v3.2.5

**Select File:**

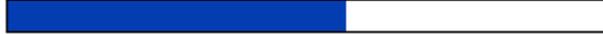
Figure 8: Manual Update Installation section

(Note that if you are using certain browsers (such as *Opera 7*) the *Browse* button is labeled *Choose*.)

Use the *Choose file* box to navigate to the relevant directory where the firmware version is saved.

3. Once you have selected the file to be installed, click *Open*. The file's directory path is displayed in the *New Firmware Image:* text box.
4. Click *Upload*. The device checks that the selected file contains an updated version of firmware. A status screen pops up, please wait for a while.....

Please wait...



5. Change setting successfully! Do not turn off or reboot the Device during this time. Please wait 90 seconds ...

**Change setting successfully!**

**Do not turn off or reboot the Device during this time.**

**Please wait 85 seconds ...**

# 13 Save/Reload Settings

This page allows you save current settings to a file or reload the settings from the file which was saved previously.

Besides, you could reset the current configuration to factory default.

If you do make changes to the default configuration but then wish to revert back to the original factory configuration, you can do so by resetting the device to factory defaults.

## Save Settings to File

---

It allows you save current settings to a file.

1. From the left-hand *Management* menu, click on *Reset factory default*. The following page is displayed:

## Save/Reload Settings

This page allows you save current settings to a file or reload the settings from the file which was saved previously. Besides, you could reset the current configuration to factory default.

Save Settings to File:

Load Settings from File:

Reset Settings to Default:

Figure 9: Reset to Defaults page

Option	Description
Save Settings to File	Save the Settings to a File
Load Settings from File	Load Settings from a File
Reset Settings to Default	Reset Settings to Factory Default

2. Click on Save....

## Save/Reload Settings

This page allows you save current settings to a file or reload the settings from the file which was saved previously. Besides, you could reset the current configuration to factory default.

Save Settings to File:

Save...

Load Settings from File:

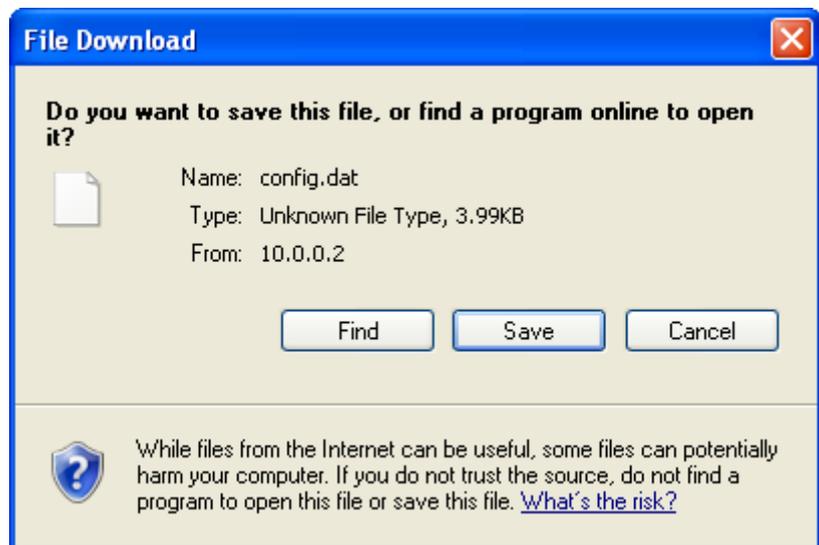
Browse...

Upload

Reset Settings to Default:

Reset

3. If you are happy with this, click *Save* and then browse to where the file to be saved. Or click *Cancel* to cancel it.



## Load Settings from File

---

It allows you to reload the settings from the file which was saved previously.

1. From the left-hand *Management* menu, click on *Reset factory default*. The following page is displayed:

## Save/Reload Settings

This page allows you save current settings to a file or reload the settings from the file which was saved previously. Besides, you could reset the current configuration to factory default.

---

**Save Settings to File:**

**Load Settings from File:**

**Reset Settings to Default:**

Figure 10: *Reset to Defaults page*

2. Click on *Browse...* to browse to where the config.dat is.

## Save/Reload Settings

This page allows you save current settings to a file or reload the settings from the file which was saved previously. Besides, you could reset the current configuration to factory default.

---

**Save Settings to File:**

**Load Settings from File:**

**Reset Settings to Default:**

3. If you are happy with this, click *Upload* to start to load settings from file.

## Save/Reload Settings

This page allows you save current settings to a file or reload the settings from the file which was saved previously. Besides, you could reset the current configuration to factory default.

---

**Save Settings to File:**

Save...

**Load Settings from File:**

C:\config.dat

Browse...

Upload

**Reset Settings to Default:**

Reset

4. Once it finished loading settings form file, it'll show the message below.

**Update successfully!**

**Update in progressing.**

**Do not turn off or reboot the Device during this time.**

**Please wait 44 seconds ...**

## Resetting to Defaults

---

If you do make changes to the default configuration but then wish to revert back to the original factory configuration, you can do so by resetting the device to factory defaults.



### Note

*If you reset your device to factory defaults, all previous configuration changes that you have made are overwritten by the factory default configuration.*

Software Reset:

1. From the left-hand *Management* menu, click on *Reset factory default*. The following page is displayed:

## Save/Reload Settings

This page allows you save current settings to a file or reload the settings from the file which was saved previously. Besides, you could reset the current configuration to factory default.

---

**Save Settings to File:**

**Load Settings from File:**

**Reset Settings to Default:**

Figure 11: Reset to Defaults page

2. Click on *Reset Settings to Default*.

## Save/Reload Settings

This page allows you save current settings to a file or reload the settings from the file which was saved previously. Besides, you could reset the current configuration to factory default.

---

Save Settings to File:

Save...

Load Settings from File:

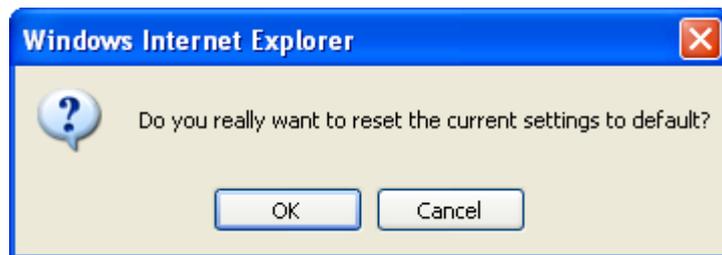
Browse...

Upload

Reset Settings to Default:

Reset

3. This page reminds you that resetting to factory defaults cannot be undone – any changes that you have made to the basic settings will be replaced. If you are happy with this, click *OK*. Or click *Cancel* to cancel it.



4. Reload setting successfully! Please wait for a moment while rebooting ...

**Reload setting successfully!**

**The WLAN 11n AP Router is booting.  
Do not turn off or reboot the Device during this time.**

**Please wait 56 seconds ...**

5. Once it finished resetting to factory, it'll show the Status page.

## Status

This page shows the current status and some basic settings of the device.

---

System	
Uptime	0day:0h:0m:49s
Firmware Version	v3.2.5
Customer Version	RE1P_E_v325_2T2R_LEV_03_130613
Build Time	Thu Jun 13 04:25:31 EDT 2013
Wireless Configuration	
Mode	AP
Band	2.4 GHz (B+G+N)
SSID	LevelOne
Channel Number	1
Encryption	Disabled
BSSID	00:13:33:5a:04:25
Associated Clients	0
TCP/IP Configuration	
Attain IP Protocol	Fixed IP
IP Address	192.168.1.1
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DHCP Server	Disabled
MAC Address	00:13:33:5a:04:23

# 14 Password

You can restrict access to your device's web pages using password protection. With password protection enabled, users must enter a username and password before gaining access to the web pages.

By default, password protection is enabled on your device, and the username and password set are as follows:

Username: **admin**

Password: **administrator**

## Setting your username and password



### Note

*Non-authorized users may try to access your system by guessing your username and password. We recommend that you change the default username and password to your own unique settings.*

To change the default password:

1. From the left-hand *Management* menu, click on *Password*.  
The following page is displayed:

## Password Setup

This page is used to set the account to access the web server of Access Point. Empty user name and password will disable the protection.

---

<b>User Name:</b>	<input type="text"/>
<b>New Password:</b>	<input type="text"/>
<b>Confirmed Password:</b>	<input type="text"/>

Figure 12: Currently Defined Administration Password: Setup page

2. This page displays the current username and password settings. Change your own unique password in the relevant boxes. They can be any combination of letters or numbers with a maximum of 30 characters. The default setting uses **admin** for the username and **administrator** for password.
3. If you are happy with these settings, click **Apply**. You will see following page that the new user has been displayed on the Currently Defined Users. You need to login to the web pages using your new username and new password.

## Password Setup

This page is used to set the account to access the web server of Access Point. Empty user name and password will disable the protection.

<b>User Name:</b>	<input type="text" value="root"/>
<b>New Password:</b>	<input type="password" value="••••"/>
<b>Confirmed Password:</b>	<input type="password" value="••••"/>

Figure 13: Administration Password

4. Change setting successfully.

**Change setting successfully!**

**Do not turn off or reboot the Router during this time.**

**Please wait 18 seconds ...**

5. Enter new *User name* and *Password*.
6. Click *OK*.

Connect to 192.168.1.1

The server 192.168.1.1 at 300Mbps Wireless PoE Access Point requires a username and password.

Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).

User name:

Password:

Remember my password

OK Cancel

Figure 14: Login page

# 15 Logout

This page is used to logout.

## Logout

---

To logout:

1. From the left-hand menu, click on *Logout*. The following page is displayed:
2. Click *Apply Change*.

## Logout

This page is used to logout.

---

Do you want to logout ?

Apply Change

Figure 15: Logout page

# A Configuring your Computers

This appendix provides instructions for configuring the Internet settings on your computers to work with the Wireless Gateway.

## Configuring Ethernet PCs

---

### Before you begin

By default, the Wireless Gateway automatically assigns the required Internet settings to your PCs. You need to configure the PCs to accept this information when it is assigned.



### Note

In some cases, you may want to assign Internet information manually to some or all of your computers rather than allow the Wireless Gateway to do so. See *Assigning static Internet information to your PCs* for instructions.

- If you have connected your LAN PCs via Ethernet to the Wireless Gateway, follow the instructions that correspond to the operating system installed on your PC:
  - Windows® XP PCs
  - Windows 2000 PCs
  - Windows Me PCs
  - Windows 95, 98 PCs
  - Windows NT 4.0 workstations

### Windows® XP PCs

1. In the Windows task bar, click the *Start* button, and then click *Control Panel*.
2. Double-click the Network Connections icon.
3. In the *LAN or High-Speed Internet* window, right-click on the icon corresponding to your network interface card (NIC) and select *Properties*. (Often, this icon is labeled *Local Area Connection*).

The *Local Area Connection* dialog box is displayed with a list of currently installed network items.

4. Ensure that the check box to the left of the item labeled *Internet Protocol TCP/IP* is checked and click *Properties*.
5. In the *Internet Protocol (TCP/IP) Properties* dialog box, click the radio button labeled *Obtain an IP address automatically*. Also click the radio button labeled *Obtain DNS server address automatically*.
6. Click *OK* twice to confirm your changes, and then close the Control Panel.

### Windows 2000 PCs

First, check for the IP protocol and, if necessary, install it:

1. In the Windows task bar, click the *Start* button, point to *Settings*, and then click *Control Panel*.
2. Double-click the Network and Dial-up Connections icon.

3. In the *Network and Dial-up Connections* window, right-click the Local Area Connection icon, and then select *Properties*. The *Local Area Connection Properties* dialog box is displayed with a list of currently installed network components. If the list includes Internet Protocol (TCP/IP), then the protocol has already been enabled. Skip to step 10.
4. If Internet Protocol (TCP/IP) does not display as an installed component, click *Install...*
5. In the *Select Network Component Type* dialog box, select *Protocol*, and then click *Add...*
6. Select *Internet Protocol (TCP/IP)* in the Network Protocols list, and then click *OK*.  
You may be prompted to install files from your Windows 2000 installation CD or other media. Follow the instructions to install the files.
7. If prompted, click *OK* to restart your computer with the new settings.

Next, configure the PCs to accept IP information assigned by the Wireless Gateway:

8. In the *Control Panel*, double-click the Network and Dial-up Connections icon.
9. In the *Network and Dial-up Connections* window, right-click the Local Area Connection icon, and then select *Properties*.
10. In the Local Area Connection Properties dialog box, select *Internet Protocol (TCP/IP)*, and then click *Properties*.
11. In the *Internet Protocol (TCP/IP) Properties* dialog box, click the radio button labeled *Obtain an IP address automatically*. Also click the radio button labeled *Obtain DNS server address automatically*.
12. Click *OK* twice to confirm and save your changes, and then close the Control Panel.

## Windows Me PCs

1. In the Windows task bar, click the *Start* button, point to *Settings*, and then click *Control Panel*.
2. Double-click the Network and Dial-up Connections icon.
3. In the *Network and Dial-up Connections* window, right-click the Network icon, and then select *Properties*.

The *Network Properties* dialog box displays with a list of currently installed network components. If the list includes Internet Protocol (TCP/IP), then the protocol has already been enabled. Skip to step 11.

4. If Internet Protocol (TCP/IP) does not display as an installed component, click *Add...*
5. In the *Select Network Component Type* dialog box, select *Protocol*, and then click *Add...*
6. Select *Microsoft* in the Manufacturers box.
7. Select *Internet Protocol (TCP/IP)* in the Network Protocols list, and then click *OK*.

You may be prompted to install files from your Windows Me installation CD or other media. Follow the instructions to install the files.

8. If prompted, click *OK* to restart your computer with the new settings.

Next, configure the PCs to accept IP information assigned by the Wireless Gateway:

9. In the *Control Panel*, double-click the Network and Dial-up Connections icon.
10. In *Network and Dial-up Connections window*, right-click the Network icon, and then select *Properties*.
11. In the *Network Properties* dialog box, select *TCP/IP*, and then click *Properties*.
12. In the TCP/IP Settings dialog box, click the radio button labeled **Server assigned IP address**. Also click the radio button labeled *Server assigned name server address*.
13. Click *OK* twice to confirm and save your changes, and then close the *Control Panel*.

## Windows 95, 98 PCs

First, check for the IP protocol and, if necessary, install it:

1. In the Windows task bar, click the *Start* button, point to *Settings*, and then click *Control Panel*.
2. Double-click the Network icon.  
The *Network* dialog box displays with a list of currently installed network components. If the list includes TCP/IP, and then the protocol has already been enabled. Skip to step 9.
3. If TCP/IP does not display as an installed component, click *Add...*  
The *Select Network Component Type* dialog box displays.
4. Select *Protocol*, and then click *Add...*  
The Select Network Protocol dialog box displays.

5. Click on *Microsoft* in the Manufacturers list box, and then click *TCP/IP* in the Network Protocols list box.
6. Click *OK* to return to the Network dialog box, and then click *OK* again.

You may be prompted to install files from your Windows 95/98 installation CD. Follow the instructions to install the files.

7. Click *OK* to restart the PC and complete the TCP/IP installation.

Next, configure the PCs to accept IP information assigned by the Wireless Gateway:

8. Open the Control Panel window, and then click the Network icon.
9. Select the network component labeled TCP/IP, and then click *Properties*.

If you have multiple TCP/IP listings, select the listing associated with your network card or adapter.

10. In the TCP/IP Properties dialog box, click the IP Address tab.
11. Click the radio button labeled *Obtain an IP address automatically*.
12. Click the DNS Configuration tab, and then click the radio button labeled *Obtain an IP address automatically*.
13. Click *OK* twice to confirm and save your changes.  
You will be prompted to restart Windows.
14. Click *Yes*.

### **Windows NT 4.0 workstations**

First, check for the IP protocol and, if necessary, install it:

1. In the Windows NT task bar, click the *Start* button, point to *Settings*, and then click *Control Panel*.
2. In the Control Panel window, double click the Network icon.
3. In the *Network dialog* box, click the *Protocols* tab.

The *Protocols* tab displays a list of currently installed network protocols. If the list includes TCP/IP, then the protocol has already been enabled. Skip to step 9.

4. If TCP/IP does not display as an installed component, click *Add...*
5. In the *Select Network Protocol* dialog box, select *TCP/IP*, and then click *OK*.

You may be prompted to install files from your Windows NT installation CD or other media. Follow the instructions to install the files.

After all files are installed, a window displays to inform you that a TCP/IP service called DHCP can be set up to dynamically assign IP information.

6. Click *Yes* to continue, and then click *OK* if prompted to restart your computer.

Next, configure the PCs to accept IP information assigned by the Wireless Gateway:

7. Open the Control Panel window, and then double-click the Network icon.
8. In the *Network* dialog box, click the *Protocols* tab.
9. In the *Protocols* tab, select *TCP/IP*, and then click *Properties*.
10. In the *Microsoft TCP/IP Properties* dialog box, click the radio button labeled *Obtain an IP address from a DHCP server*.
11. Click *OK* twice to confirm and save your changes, and then close the Control Panel.

### **Assigning static Internet information to your PCs**

If you are a typical user, you will not need to assign static Internet information to your LAN PCs because your ISP automatically assigns this information for you.

In some cases however, you may want to assign Internet information to some or all of your PCs directly (often called “statically”), rather than allowing the Wireless Gateway to assign it. This option may be desirable (but not required) if:

- You have obtained one or more public IP addresses that you want to always associate with specific computers (for example, if you are using a computer as a public web server).
- You maintain different subnets on your LAN (subnets are described in Appendix B).

Before you begin, you must have the following information available:

- The IP address and subnet mask of each PC
- The IP address of the default gateway for your LAN. In most cases, this is the address assigned to the LAN port on the Wireless Gateway. By default, the LAN port is assigned the IP address *192.168.1.1*. (You can change this number or another number can be assigned by your ISP. See *Addressing* for more information.)
- The IP address of your ISP's Domain Name System (DNS) server.

On each PC to which you want to assign static information, follow the instructions relating only to checking for and/or installing the IP protocol. Once it is installed, continue to follow the instructions for displaying each of the Internet Protocol (TCP/IP) properties. Instead of enabling dynamic assignment of the IP addresses for the computer, DNS server and default gateway, click the radio buttons that enable you to enter the information manually.



#### **Note**

*Your PCs must have IP addresses that place them in the same subnet as the Wireless Gateway's LAN port. If you manually assign IP information to all your LAN PCs, you can follow the instructions in *Addressing* to change the LAN port IP address accordingly.*



# B IP Addresses, Network Masks, and Subnets

## IP Addresses



**Note**

*This section refers only to IP addresses for IPv4 (version 4 of the Internet Protocol). IPv6 addresses are not covered.*

*This section assumes basic knowledge of binary numbers, bits, and bytes.*

IP addresses, the Internet's version of telephone numbers, are used to identify individual nodes (computers or devices) on the Internet. Every IP address contains four numbers, each from 0 to 255 and separated by dots (periods), e.g. 20.56.0.211. These numbers are called, from left to right, field1, field2, field3, and field4.

This style of writing IP addresses as decimal numbers separated by dots is called *dotted decimal notation*. The IP address 20.56.0.211 is read "twenty dot fifty-six dot zero dot two-eleven."

### Structure of an IP address

IP addresses have a hierarchical design similar to that of telephone numbers. For example, a 7-digit telephone number starts with a 3-digit prefix that identifies a group of thousands of telephone lines, and ends with four digits that identify one specific line in that group.

Similarly, IP addresses contain two kinds of information:

- *Network ID*  
Identifies a particular network within the Internet or intranet
- *Host ID*  
Identifies a particular computer or device on the network

The first part of every IP address contains the network ID, and the rest of the address contains the host ID. The length of the network ID depends on the network's *class* (see following section). The table below shows the structure of an IP address.

	Field1	Field2	Field3	Field4
Class A	Network ID	Host ID		
Class B	Network ID		Host ID	
Class C	Network ID			Host ID

Here are some examples of valid IP addresses:

Class A: 10.30.6.125 (network = 10, host = 30.6.125)

Class B: 129.88.16.49 (network = 129.88, host = 16.49)

Class C: 192.60.201.11 (network = 192.60.201, host = 11)

### Network classes

The three commonly used network classes are A, B, and C. (There is also a class D but it has a special use beyond the

scope of this discussion.) These classes have different uses and characteristics.

Class A networks are the Internet's largest networks, each with room for over 16 million hosts. Up to 126 of these huge networks can exist, for a total of over 2 billion hosts. Because of their huge size, these networks are used for WANs and by organizations at the infrastructure level of the Internet, such as your ISP.

Class B networks are smaller but still quite large, each able to hold over 65,000 hosts. There can be up to 16,384 class B networks in existence. A class B network might be appropriate for a large organization such as a business or government agency.

Class C networks are the smallest, only able to hold 254 hosts at most, but the total possible number of class C networks exceeds 2 million (2,097,152 to be exact). LANs connected to the Internet are usually class C networks.

Some important notes regarding IP addresses:

- The class can be determined easily from field1:  
field1 = 1-126:                   Class A  
field1 = 128-191:               Class B  
field1 = 192-223:               Class C  
(field1 values not shown are reserved for special uses)
- A host ID can have any value except all fields set to 0 or all fields set to 255, as those values are reserved for special uses.

## Subnet masks

---



### Definition mask

*A mask looks like a regular IP address, but contains a pattern of bits that tells what parts of an IP address are the network ID and what parts are the host ID: bits set to 1 mean "this bit is part of the network ID" and bits set to 0 mean "this bit is part of the host ID."*

Subnet masks are used to define *subnets* (what you get after dividing a network into smaller pieces). A subnet's network ID is created by "borrowing" one or more bits from the host ID portion of the address. The subnet mask identifies these host ID bits.

For example, consider a class C network 192.168.1. To split this into two subnets, you would use the subnet mask:

255.255.255.128

It's easier to see what's happening if we write this in binary:

11111111. 11111111. 11111111.10000000

As with any class C address, all of the bits in field1 through field3 are part of the network ID, but note how the mask specifies that the first bit in field4 is also included. Since this extra bit has only two values (0 and 1), this means there are two subnets. Each subnet uses the remaining 7 bits in field4 for its host IDs, which range from 1 to 126 hosts (instead of the usual 0 to 255 for a class C address).

Similarly, to split a class C network into four subnets, the mask is:

255.255.255.192 or 11111111.11111111.  
11111111.11000000

The two extra bits in field4 can have four values (00, 01, 10, 11), so there are four subnets. Each subnet uses the remaining six bits in field4 for its host IDs, ranging from 1 to 62.



### Note

*Sometimes a subnet mask does not specify any additional network ID bits, and thus no subnets. Such a mask is called a default subnet mask. These masks are:*

Class A: 255.0.0.0  
Class B: 255.255.0.0  
Class C: 255.255.255.0

*These are called default because they are used when a network is initially configured, at which time it has no subnets.*

# C UPnP Control Point Software on Windows ME/XP

This appendix provides instructions for configuring the UPnP on your computers to work with the Wireless Gateway.

UPnP is an architecture for pervasive peer-to-peer network connectivity of intelligent appliances, Wireless devices, and PCs of all form factors. It is designed to bring easy-to-use, flexible, standards-based connectivity to ad-hoc or unmanaged networks whether in the home, in a small business, public spaces, or attached to the Internet. UPnP is a distributed, open networking architecture that leverages TCP/IP and the Web technologies to enable seamless proximity networking in addition to control and data transfer among networked devices in the home, office, and public spaces.

UPnP is more than just a simple extension of the plug and play peripheral model. It is designed to support zero-configuration, "invisible" networking, and automatic discovery for a breadth of device categories from a wide range of vendors. This means a device can dynamically join a network, obtain an IP address, convey its capabilities, and learn about the presence and capabilities of other devices. DHCP and DNS servers are optional and are used only if available on the network. Finally, a device can leave a network smoothly and automatically without leaving any unwanted state behind.

## **UPnP Control Point Software on Windows ME**

---

To install the control point software on Windows ME:

1. In the Control Panel, select "Add/Remove Programs".
2. In the "Add/Remove Programs Properties" dialog box, select the "Windows Setup" tab. In the "Components" list, double click on the "Communications" entry.
3. In the "Communications" dialog box, scroll down the "Components" list to display the UPnP entry. Select the entry, click "OK".
4. Click "OK" to finish the "Add/Remove Programs" dialog.
5. Reboot your system.

Once you have installed the UPnP software and you have rebooted (and your network includes the IGD system), you should be able to see the IGD controlled device on your network.

## **UPnP Control Point Software on Windows XP with Firewall**

---

On Windows XP versions earlier than SP2, Firewall support is provided by the Windows XP Internet Connection Firewall. You cannot use the Windows XP Internet Connection Firewall support on a system that you intend to use as a UPnP control point. If this feature is enabled, although the control point system may display controlled devices in the list of network devices, the control point system cannot participate in UPnP communication. (This restriction also applies to controlled devices running on Windows XP systems earlier than SP2.)

On Windows XP SP2 and later, Firewall support is provided by Windows Firewall. Unlike earlier versions, Windows XP SP2 can be used on a system that you intend to use as a UPnP control point.

To turn off the Firewall capability on any version of Windows XP, follow the steps below:

1. In the Control Panel, select "Network and Internet Connections".
2. In the "Network and Internet Connections" dialog box, select "Network Connections".
3. In the "Network Connections" dialog box, right-click on the local area connection entry for your network; this will display a menu. Select the "Properties" menu entry.
4. In the "Local Area Connection Properties" dialog box, select the "Advanced" tab. Disable the Internet Connection Firewall by de-selecting the entry with the following label:  
"Protect my computer and network by limiting or preventing access to the computer from the Internet".
5. Click "OK".

### **SSDP requirements**

You must have SSDP Discovery Service enabled on your Windows XP system to use the UPnP Control point software.

SSDP Discovery Service is enabled on a default installation of Windows XP. To check if it is enabled on your system, look in Control Panel > Administrative Tools > Services).

### Installation procedure

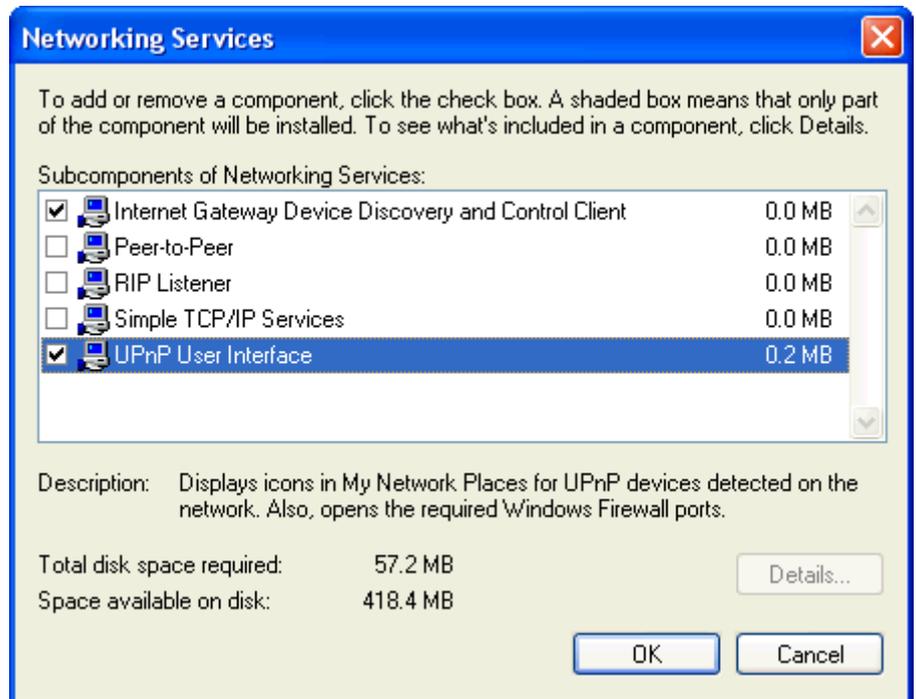
To install the Control point software on Windows XP, follow the steps below:

1. In the Control Panel, select "Add/Remove Programs".
2. In the "Add or Remove Programs" dialog box, click the "Add / Remove Windows Components" button.
3. In the "Windows Component Wizard" dialog box, scroll down the list to display the "Networking Services" entry. Highlight (select) the entry, and click on the "Details" button.

4. The "Networking Services" window is displayed.

The subcomponents shown in the Networking Services window will be different depending on if you are using Windows XP, Windows XP (SP1), or Windows XP (SP2).

If you are using Windows XP SP2, the Networking Services window will display the following list of sub-components:



5. Select the following entries from the "Networking Services" window and then click "OK":

If you are using **Windows XP**, select:

- "Universal Plug and Play".

If you are using **Windows XP SP1**, select:

- "Internet Gateway Device discovery and Control Client".
- "Universal Plug and Play".

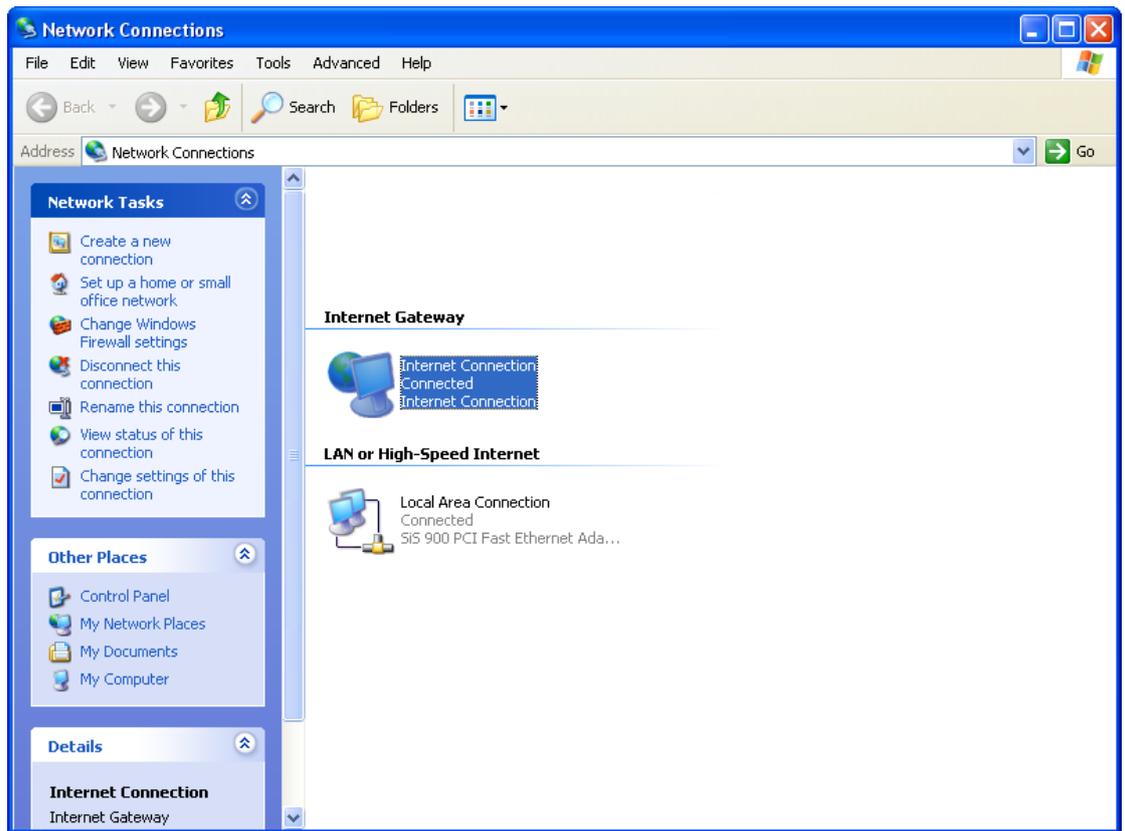
If you are using **Windows XP SP2**, select:

- "Internet Gateway Device discovery and Control Client".
- "UPnP User Interface".

6. Reboot your system.

Once you have installed the UPnP software and you have rebooted (and your network includes the IGD system), you should be able to see the IGD controlled device on your network.

For example, from the Network Connections window you should see the Internet Gateway Device:



# D Troubleshooting

This appendix suggests solutions for problems you may encounter in installing or using the Wireless Gateway, and provides instructions for using several IP utilities to diagnose problems.

Contact Customer Support if these suggestions do not resolve the problem.

## Troubleshooting Suggestions

Problem	Troubleshooting Suggestion
<b>LEDs</b>	
<i>Power LED does not illuminate after product is turned on.</i>	Verify that you are using the power cable provided with the device and that it is securely connected to the Wireless Gateway and a wall socket/power strip.
<i>LINK LAN LED does not illuminate after Ethernet cable is attached.</i>	Verify that the Ethernet cable is securely connected to your LAN hub or PC and to the Wireless Gateway. Make sure the PC and/or hub is turned on. Verify that your cable is sufficient for your network requirements. A 100 Mbit/sec network (10BaseTx) should use cables labeled CAT 5. A 10Mbit/sec network may tolerate lower quality cables.
<b>Internet Access</b>	
<i>My PC cannot access the Internet</i>	Use the ping utility (discussed in the following section) to check whether your PC can communicate with the device's LAN IP address (by default 192.168.1.1). If it cannot, check the Ethernet cabling. If you statically assigned a private IP address to the computer, (not a registered public address), verify the following: <ul style="list-style-type: none"> <li>• Check that the gateway IP address on the computer is your public IP address (see Current Status for instructions on viewing the IP information.) If it is not, correct the address or configure the PC to receive IP information automatically.</li> <li>• Verify with your ISP that the DNS server specified for the PC is valid. Correct the address or configure the PC to receive this information automatically.</li> </ul>
<i>My LAN PCs cannot display web pages on the Internet.</i>	Verify that the DNS server IP address specified on the PCs is correct for your ISP, as discussed in the item above. If you specified that the DNS server be assigned dynamically from a server, then verify with your ISP that the address configured on the Wireless Gateway is correct, then You can use the ping utility, to test connectivity with your ISP's DNS server.
<b>Web pages</b>	

Problem	Troubleshooting Suggestion
<i>I forgot/lost my user ID or password.</i>	If you have not changed the password from the default, try using "admin" the user ID and "administrator" as password. Otherwise, you can reset the device to the default configuration by pressing the Reset Default button on the Rare panel of the device (see <i>Rare Panel</i> ). Then, type the default User ID and password shown above. <b>WARNING:</b> Resetting the device removes any custom settings and returns all settings to their default values.
<i>I cannot access the web pages from my browser.</i>	Use the ping utility, discussed in the following section, to check whether your PC can communicate with the device's LAN IP address (by default 192.168.1.1). If it cannot, check the Ethernet cabling. Verify that you are using Internet Explorer or Netscape Navigator v4.0 or later. Verify that the PC's IP address is defined as being on the same subnet as the IP address assigned to the LAN port on the Wireless Gateway.
<i>My changes to the web pages are not being retained.</i>	Be sure to use the <i>Confirm Changes/Apply</i> function after any changes.

## Diagnosing Problem using IP Utilities

---

### ping

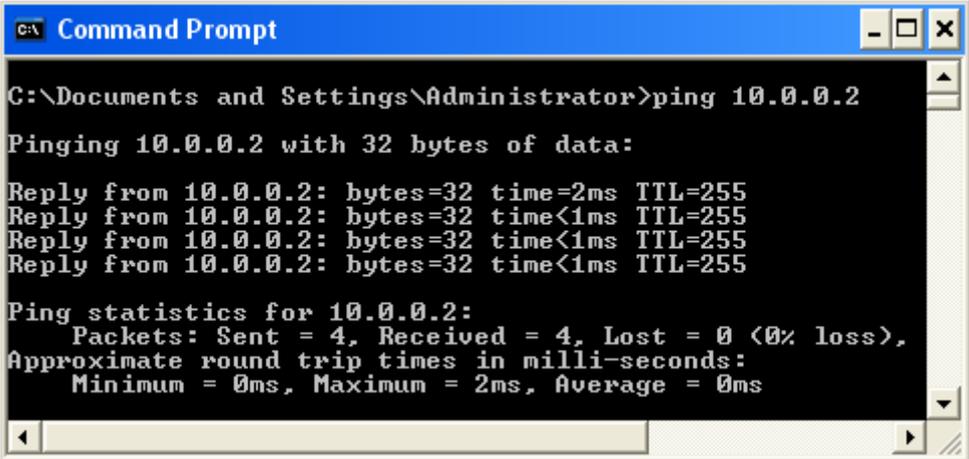
*Ping* is a command you can use to check whether your PC can recognize other computers on your network and the Internet. A ping command sends a message to the computer you specify. If the computer receives the message, it sends messages in reply. To use it, you must know the IP address of the computer with which you are trying to communicate.

On Windows-based computers, you can execute a ping command from the Start menu. Click the *Start* button, and then click *Run*. In the *Open* text box, type a statement such as the following:

### ping 192.168.1.1

Click *OK*. You can substitute any private IP address on your LAN or a public IP address for an Internet site, if known.

If the target computer receives the message, a *Command Prompt* window is displayed:



```
C:\Documents and Settings\Administrator>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=2ms TTL=255
Reply from 10.0.0.2: bytes=32 time<1ms TTL=255
Reply from 10.0.0.2: bytes=32 time<1ms TTL=255
Reply from 10.0.0.2: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms
```

Figure 16: Using the ping Utility

If the target computer cannot be located, you will receive the message *Request timed out*.

Using the ping command, you can test whether the path to the Wireless Gateway is working (using the preconfigured default LAN IP address 192.168.1.1) or another address you assigned.

You can also test whether access to the Internet is working by typing an external address, such as that for *www.yahoo.com* (216.115.108.243). If you do not know the IP address of a particular Internet location, you can use the *nslookup* command, as explained in the following section.

From most other IP-enabled operating systems, you can execute the same command at a command prompt or through a system administration utility.

### nslookup

You can use the *nslookup* command to determine the IP address associated with an Internet site name. You specify the common name, and the *nslookup* command looks up the name in on your DNS server (usually located with your ISP). If that

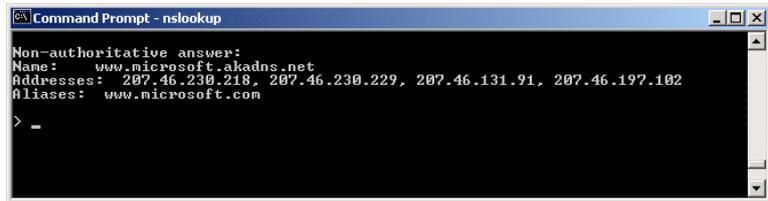
name is not an entry in your ISP's DNS table, the request is then referred to another higher-level server, and so on, until the entry is found. The server then returns the associated IP address.

On Windows-based computers, you can execute the nslookup command from the *Start* menu. Click the *Start* button, and then click *Run*. In the *Open* text box, type the following:

### **Nslookup**

Click *OK*. A Command Prompt window displays with a bracket prompt (>). At the prompt, type the name of the Internet address that you are interested in, such as *www.microsoft.com*.

The window will display the associate IP address, if known, as shown below:



```
Command Prompt - nslookup
Non-authoritative answer:
Name:   www.microsoft.akadns.net
Addresses: 207.46.230.218, 207.46.230.229, 207.46.131.91, 207.46.197.102
Aliases: www.microsoft.com
>
```

*Figure 17: Using the nslookup Utility*

There may be several addresses associated with an Internet name. This is common for web sites that receive heavy traffic; they use multiple, redundant servers to carry the same information.

To exit from the nslookup utility, type **exit** and press **[Enter]** at the command prompt.

# E

## Glossary

<b>10BASE-T</b>	A designation for the type of wiring used by Ethernet networks with a data rate of 10 Mbps. Also known as Category 3 (CAT 3) wiring. See <i>data rate</i> , <i>Ethernet</i> .
<b>100BASE-T</b>	A designation for the type of wiring used by Ethernet networks with a data rate of 100 Mbps. Also known as Category 5 (CAT 5) wiring. See <i>data rate</i> , <i>Ethernet</i> .
<b>ADSL</b>	<b>Asymmetric Digital Subscriber Line</b> The most commonly deployed "flavor" of DSL for home users is asymmetrical DSL. The term asymmetrical refers to its unequal data rates for downloading and uploading (the download rate is higher than the upload rate). The asymmetrical rates benefit home users because they typically download much more data from the Internet than they upload.
<b>analog</b>	An analog signal is a signal that has had its frequency modified in some way, such as by amplifying its strength or varying its frequency, in order to add information to the signal. The voice component in DSL is an analog signal. See <i>digital</i> .
<b>ATM</b>	<b>Asynchronous Transfer Mode</b> A standard for high-speed transmission of data, text, voice, and video, widely used within the Internet. ATM data rates range from 45 Mbps to 2.5 Gbps. See <i>data rate</i> .
<b>authenticate</b>	To verify a user's identity, such as by prompting for a password.
<b>binary</b>	The "base two" system of numbers, that uses only two digits, 0 and 1, to represent all numbers. In binary, the number 1 is written as 1, 2 as 10, 3 as 11, 4 as 100, etc. Although expressed as decimal numbers for convenience, IP addresses in actual use are binary numbers; e.g., the IP address 209.191.4.240 is 11010001.10111111.00000100.11110000 in binary. See <i>bit</i> , <i>IP address</i> , <i>network mask</i> .
<b>bit</b>	Short for "binary digit," a bit is a number that can have two values, 0 or 1. See <i>binary</i> .
<b>bps</b>	bits per second
<b>bridging</b>	Passing data from your network to your ISP and vice versa using the hardware addresses of the devices at each location. Bridging contrasts with routing, which can add more intelligence to data transfers by using network addresses instead. The Wireless Gateway can perform both routing and bridging. Typically, when both functions are enabled, the device routes IP data and bridges all other types of data. See <i>routing</i> .
<b>broadband</b>	A telecommunications technology that can send different types of data over the same medium. DSL is a broadband technology.
<b>broadcast</b>	To send data to all computers on a network.
<b>DHCP</b>	<b>Dynamic Host Configuration Protocol</b> DHCP automates address assignment and management.

	When a computer connects to the LAN, DHCP assigns it an IP address from a shared pool of IP addresses; after a specified time limit, DHCP returns the address to the pool.
<b>DHCP relay</b>	Dynamic Host Configuration Protocol relay A DHCP relay is a computer that forwards DHCP data between computers that request IP addresses and the DHCP server that assigns the addresses. Each of the Wireless Gateway's interfaces can be configured as a DHCP relay. See <i>DHCP</i> .
<b>DHCP server</b>	Dynamic Host Configuration Protocol server A DHCP server is a computer that is responsible for assigning IP addresses to the computers on a LAN. See <i>DHCP</i> .
<b>digital</b>	Of data, having a form based on discrete values expressed as binary numbers (0's and 1's). The data component in DSL is a digital signal. See <i>analog</i> .
<b>DNS</b>	Domain Name System The DNS maps domain names into IP addresses. DNS information is distributed hierarchically throughout the Internet among computers called DNS servers. For example, <i>www.yahoo.com</i> is the domain name associated with IP address 216.115.108.243. When you start to access a web site, a DNS server looks up the requested domain name to find its corresponding IP address. If the DNS server cannot find the IP address, it communicates with higher-level DNS servers to determine the IP address. See <i>domain name</i> .
<b>domain name</b>	A domain name is a user-friendly name used in place of its associated IP address. Domain names must be unique; their assignment is controlled by the Internet Corporation for Assigned Names and Numbers (ICANN). Domain names are a key element of URLs, which identify a specific file at a web site. See <i>DNS</i> .
<b>download</b>	To transfer data in the downstream direction, i.e., from the Internet to the user.
<b>DSL</b>	Digital Subscriber Line A technology that allows both digital data and analog voice signals to travel over existing copper telephone lines.
<b>encryption keys</b>	See <i>network keys</i>
<b>Ethernet</b>	The most commonly installed computer network technology, usually using twisted pair wiring. Ethernet data rates are 10 Mbps and 100 Mbps. See also <i>10BASE-T</i> , <i>100BASE-T</i> , <i>twisted pair</i> .
<b>FTP</b>	File Transfer Protocol A program used to transfer files between computers connected to the Internet. Common uses include uploading new or updated files to a web server, and downloading files from a web server.
<b>Gbps</b>	Abbreviation of Gigabits per second, or one billion bits per second. Internet data rates are often expressed in Gbps.
<b>host</b>	A device (usually a computer) connected to a network.
<b>HTTP</b>	Hyper-Text Transfer Protocol HTTP is the main protocol used to transfer data from web

sites so that it can be displayed by web browsers. See *web browser*, *web site*.

<b>Hub</b>	A hub is a place of convergence where data arrives from one or more directions and is forwarded out in one or more directions. It connects an Ethernet bridge to a group of PCs on a LAN and allows communication to pass between the networked devices.
<b>ICMP</b>	Internet Control Message Protocol An Internet protocol used to report errors and other network-related information. The ping command makes use of ICMP.
<b>IEEE</b>	The Institute of Electrical and Electronics Engineers is a technical professional society that fosters the development of standards that often become national and international standards.
<b>Internet</b>	The global collection of interconnected networks used for both private and business communications.
<b>intranet</b>	A private, company-internal network that looks like part of the Internet (users access information using web browsers), but is accessible only by employees.
<b>IP</b>	See <i>TCP/IP</i> .
<b>IP address</b>	Internet Protocol address The address of a host (computer) on the Internet, consisting of four numbers, each from 0 to 255, separated by periods, e.g., 209.191.4.240. An IP address consists of a <i>network ID</i> that identifies the particular network the host belongs to, and a <i>host ID</i> uniquely identifying the host itself on that network. A network mask is used to define the network ID and the host ID. Because IP addresses are difficult to remember, they usually have an associated domain name that can be specified instead. See <i>domain name</i> , <i>network mask</i> .
<b>ISP</b>	Internet Service Provider A company that provides Internet access to its customers, usually for a fee.
<b>LAN</b>	Local Area Network A network limited to a small geographic area, such as a home or small office.
<b>LED</b>	Light Emitting Diode An electronic light-emitting device. The indicator lights on the front of the Wireless Gateway are LEDs.
<b>MAC address</b>	Media Access Control address The permanent hardware address of a device, assigned by its manufacturer. MAC addresses are expressed as six pairs of hex characters, with each pair separated by colons. For example; <i>NN:NN:NN:NN:NN:NN</i> .
<b>mask</b>	See <i>network mask</i> .
<b>Mbps</b>	Abbreviation for Megabits per second, or one million bits per second. Network data rates are often expressed in Mbps.
<b>NAT</b>	Network Address Translation A service performed by many Wireless APs that translates your network's publicly known IP address into a <i>private</i> IP address for each computer on your LAN. Only your Wireless AP and your LAN know these addresses; the outside world

sees only the public IP address when talking to a computer on your LAN.

<b>network</b>	A group of computers that are connected together, allowing them to communicate with each other and share resources, such as software, files, etc. A network can be small, such as a <i>LAN</i> , or very large, such as the <i>Internet</i> .
<b>network mask</b>	A network mask is a sequence of bits applied to an IP address to select the network ID while ignoring the host ID. Bits set to 1 mean "select this bit" while bits set to 0 mean "ignore this bit." For example, if the network mask 255.255.255.0 is applied to the IP address 100.10.50.1, the network ID is 100.10.50, and the host ID is 1. See <i>binary</i> , <i>IP address</i> , <i>subnet</i> .
<b>NIC</b>	Network Interface Card An adapter card that plugs into your computer and provides the physical interface to your network cabling. For Ethernet NICs this is typically an RJ-45 connector. See <i>Ethernet</i> , <i>RJ-45</i> .
<b>packet</b>	Data transmitted on a network consists of units called packets. Each packet contains a payload (the data), plus overhead information such as where it came from (source address) and where it should go (destination address).
<b>ping</b>	Packet Internet (or Inter-Network) Groper A program used to verify whether the host associated with an IP address is online. It can also be used to reveal the IP address for a given domain name.
<b>port</b>	A physical access point to a device such as a computer or Wireless AP, through which data flows into and out of the device.
<b>PPP</b>	Point-to-Point Protocol A protocol for serial data transmission that is used to carry IP (and other protocol) data between your ISP and your computer. The WAN interface on the Wireless Gateway uses two forms of PPP called PPPoA and PPPoE. See <i>PPPoA</i> , <i>PPPoE</i> .
<b>PPPoA</b>	Point-to-Point Protocol over ATM One of the two types of PPP interfaces you can define for a Virtual Circuit (VC), the other type being PPPoE. You can define only one PPPoA interface per VC.
<b>PPPoE</b>	Point-to-Point Protocol over Ethernet One of the two types of PPP interfaces you can define for a Virtual Circuit (VC), the other type being PPPoA. You can define one or more PPPoE interfaces per VC.
<b>protocol</b>	A set of rules governing the transmission of data. In order for a data transmission to work, both ends of the connection have to follow the rules of the protocol.
<b>remote</b>	In a physically separate location. For example, an employee away on travel who logs in to the company's intranet is a remote user.
<b>RIP</b>	Routing Information Protocol The original TCP/IP routing protocol. There are two versions of RIP: version I and version II.

<b>RJ-11</b>	Registered Jack Standard-11 The standard plug used to connect telephones, fax machines, modems, etc. to a telephone port. It is a 6-pin connector usually containing four wires.
<b>RJ-45</b>	Registered Jack Standard-45 The 8-pin plug used in transmitting data over phone lines. Ethernet cabling usually uses this type of connector.
<b>routing</b>	Forwarding data between your network and the Internet on the most efficient route, based on the data's destination IP address and current network conditions. A device that performs routing is called a Wireless AP.
<b>SDNS</b>	Secondary Domain Name System (server) A DNS server that can be used if the primary DSN server is not available. See <i>DNS</i> .
<b>subnet</b>	A subnet is a portion of a network. The subnet is distinguished from the larger network by a <i>subnet mask</i> that selects some of the computers of the network and excludes all others. The subnet's computers remain physically connected to the rest of the parent network, but they are treated as though they were on a separate network. See <i>network mask</i> .
<b>subnet mask</b>	A mask that defines a subnet. See <i>network mask</i> .
<b>TCP</b>	See <i>TCP/IP</i> .
<b>TCP/IP</b>	Transmission Control Protocol/Internet Protocol The basic protocols used on the Internet. TCP is responsible for dividing data up into packets for delivery and reassembling them at the destination, while IP is responsible for delivering the packets from source to destination. When TCP and IP are bundled with higher-level applications such as HTTP, FTP, Telnet, etc., TCP/IP refers to this whole suite of protocols.
<b>Telnet</b>	An interactive, character-based program used to access a remote computer. While HTTP (the web protocol) and FTP only allow you to download files from a remote computer, Telnet allows you to log into and use a computer from a remote location.
<b>TFTP</b>	Trivial File Transfer Protocol A protocol for file transfers, TFTP is easier to use than File Transfer Protocol (FTP) but not as capable or secure.
<b>TKIP</b>	Temporal Key Integrity Protocol (TKIP) provides WPA with a data encryption function. It ensures that a unique master key is generated for each packet, supports message integrity and sequencing rules and supports re-keying mechanisms.
<b>triggers</b>	Triggers are used to deal with application protocols that create separate sessions. Some applications, such as NetMeeting, open secondary connections during normal operations, for example, a connection to a server is established using one port, but data transfers are performed on a separate connection. A trigger tells the device to expect these secondary sessions and how to handle them.  Once you set a trigger, the embedded IP address of each incoming packet is replaced by the correct host address so that NAT can translate packets to the correct destination. You can specify whether you want to carry out address replacement, and

if so, whether to replace addresses on TCP packets only, UDP packets only, or both.

**twisted pair**

The ordinary copper telephone wiring used by telephone companies. It contains one or more wire pairs twisted together to reduce inductance and noise. Each telephone line uses one pair. In homes, it is most often installed with two pairs. For Ethernet LANs, a higher grade called Category 3 (CAT 3) is used for 10BASE-T networks, and an even higher grade called Category 5 (CAT 5) is used for 100BASE-T networks. See *10BASE-T*, *100BASE-T*, *Ethernet*.

**unnumbered interfaces**

An unnumbered interface is an IP interface that does not have a local subnet associated with it. Instead, it uses a Wireless AP-*id* that serves as the source and destination address of packets sent to and from the Wireless AP. Unlike the IP address of a normal interface, the Wireless AP-*id* of an unnumbered interface is allowed to be the same as the IP address of another interface. For example, the WAN unnumbered interface of your device uses the same IP address of the LAN interface (192.168.1.1).

The unnumbered interface is temporary – PPP or DHCP will assign a ‘real’ IP address automatically.

**upstream**

The direction of data transmission from the user to the Internet.

**VC**

Virtual Circuit  
A connection from your DSL Wireless AP to your ISP.

**VCI**

Virtual Circuit Identifier  
Together with the Virtual Path Identifier (VPI), the VCI uniquely identifies a VC. Your ISP will tell you the VCI for each VC they provide. See *VC*.

**VPI**

Virtual Path Identifier  
Together with the Virtual Circuit Identifier (VCI), the VPI uniquely identifies a VC. Your ISP will tell you the VPI for each VC they provide. See *VC*.

**WAN**

Wide Area Network  
Any network spread over a large geographical area, such as a country or continent. With respect to the Wireless Gateway, WAN refers to the Internet.

**Web browser**

A software program that uses Hyper-Text Transfer Protocol (HTTP) to download information from (and upload to) web sites, and displays the information, which may consist of text, graphic images, audio, or video, to the user. Web browsers use Hyper-Text Transfer Protocol (HTTP). Popular web browsers include Netscape Navigator and Microsoft Internet Explorer. See *HTTP*, *web site*, *WWW*.

**Web page**

A web site file typically containing text, graphics and hyperlinks (cross-references) to the other pages on that web site, as well as to pages on other web sites. When a user accesses a web site, the first page that is displayed is called the *home page*. See *hyperlink*, *web site*.

**Web site**

A computer on the Internet that distributes information to (and gets information from) remote users through web browsers. A web site typically consists of web pages that

contain text, graphics, and hyperlinks. See *hyperlink*, *web page*.

## **WWW**

World Wide Web

Also called *(the) Web*. Collective term for all web sites anywhere in the world that can be accessed via the Internet.