DrayTek

VigorAP 903

802.11ac Access Point

USER'S GUIDE

V1.0

VigorAP 903

802.11ac Access Point

User's Guide

Version: 1.0

Firmware Version: V1.3.1

Date: January 22, 2019

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Safety Instructions and Approval

Safety Instructions

- Read the installation guide thoroughly before you set up the modem.
- The modem is a complicated electronic unit that may be repaired only be authorized and qualified personnel. Do not try to open or repair the modem yourself.
- Do not place the modem in a damp or humid place, e.g. a bathroom.
- The modem should be used in a sheltered area, within a temperature range of +5 to +40 Celsius.
- Do not expose the modem to direct sunlight or other heat sources. The housing and electronic components may be damaged by direct sunlight or heat sources.
- Do not deploy the cable for LAN connection outdoor to prevent electronic shock hazards.
- Keep the package out of reach of children.
- When you want to dispose of the modem, please follow local regulations on conservation of the environment.

Warranty

We warrant to the original end user (purchaser) that the modem will be free from any defects in workmanship or materials for a period of one (1) year from the date of purchase from the dealer. Please keep your purchase receipt in a safe place as it serves as proof of date of purchase. During the warranty period, and upon proof of purchase, should the product have indications of failure due to faulty workmanship and/or materials, we will, at our discretion, repair or replace the defective products or components, without charge for either parts or labor, to whatever extent we deem necessary tore-store the product to proper operating condition. Any replacement will consist of a new or re-manufactured functionally equivalent product of equal value, and will be offered solely at our discretion. This warranty will not apply if the product is modified, misused, tampered with, damaged by an act of God, or subjected to abnormal working conditions. The warranty does not cover the bundled or licensed software of other vendors. Defects which do not significantly affect the usability of the product will not be covered by the warranty. We reserve the right to revise the manual and online documentation and to make changes from time to time in the contents hereof without obligation to notify any person of such revision or changes.

Be a Registered Owner

Web registration is preferred. You can register your Vigor modem via http://www.draytek.com.

Firmware & Tools Updates

Due to the continuous evolution of DrayTek technology, all modems will be regularly upgraded. Please consult the DrayTek web site for more information on newest firmware, tools and documents.

http://www.draytek.com

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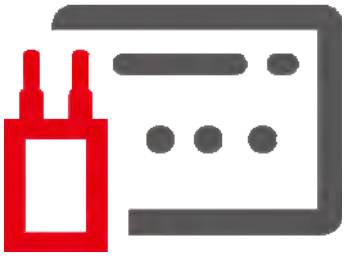


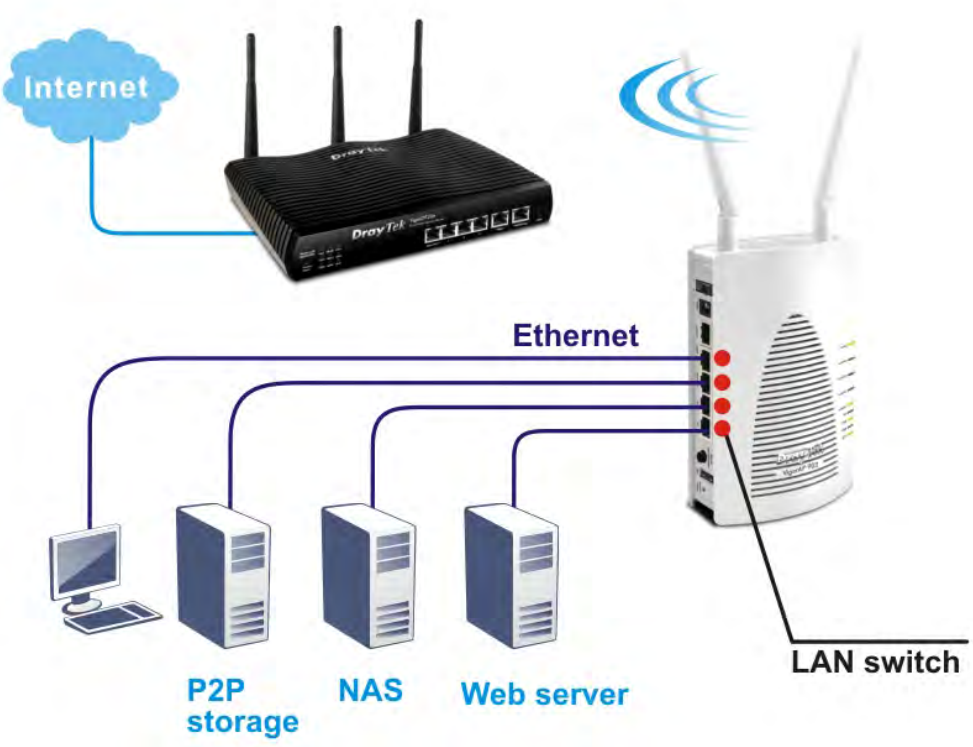
I-1 Introduction

This is a generic International version of the user guide. Specification, compatibility and features vary by region. For specific user guides suitable for your region or product, please contact local distributor.

Thank you for purchasing this VigorAP 903, the concurrent dual band wireless (2.4G/5G) access point offering high-speed data transmission. With this high cost-efficiency VigorAP 903, computers and wireless devices which are compatible with 802.11n/802.11a can connect to existing wired Ethernet network via this VigorAP 903, at the speed of 300Mbps.

Easy install procedures allows any computer users to setup a network environment in very short time - within minutes, even inexperienced users. Just follow the instructions given in this user manual, you can complete the setup procedure and release the power of this access point all by yourself!

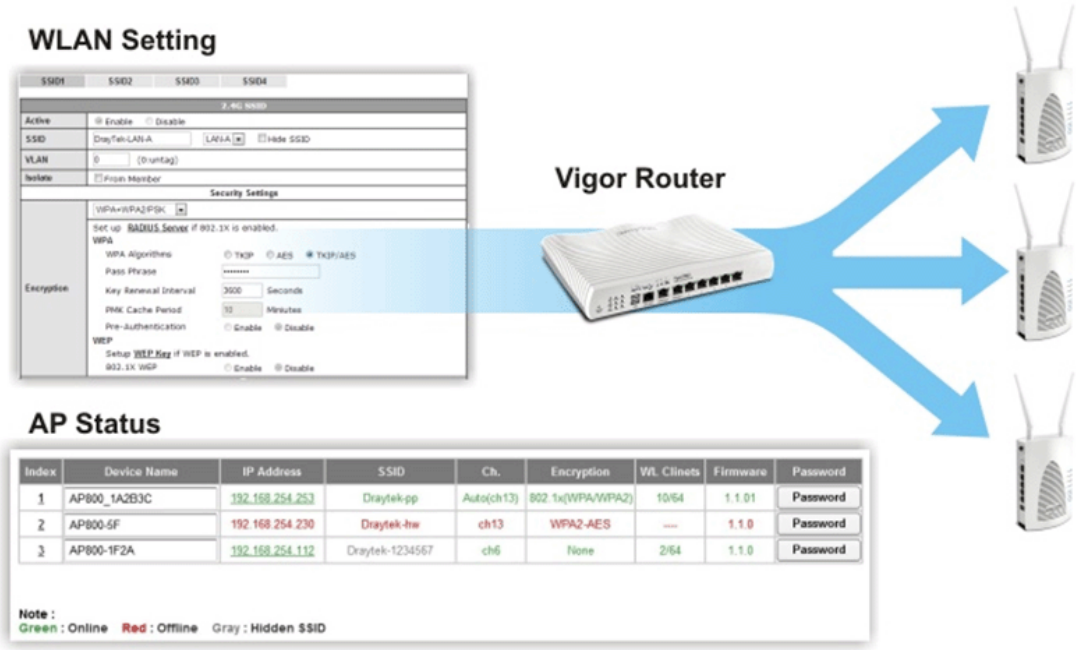
VigorAP 903 also is a Power over Ethernet Powered Device which adopts the technology of PoE for offering power supply and transmitting data through the Ethernet cable.



AP Management

The VigorAP 903 can operate in standalone mode for your office network or a classroom or a waiting room of some transportation terminals (e.g. ferry terminal, bus station, train station) or a clinic's waiting room ; connected to your LAN and offering you with wireless access. If your network requires several VigorAP 903 units, to centrally manage and monitor them individually as a group will be expected. DrayTek central wireless management (AP Management) lets control, efficiency, monitoring and security of your company-wide wireless access easier be managed. Inside the web user interface, we call “central wireless management” as Central AP Management which supports mobility, client monitoring / reporting and load-balancing to multiple APs. For central wireless management, you will need a Vigor2860 or Vigor2925 series router; there is no per-node licensing or subscription required. With the unified user interface of Vigor2860 Combo WAN series and Vigor2925 Triple WAN series, the multiple deployment of VigorAP 903

can be clear at the first sight. For multiple wireless clients to apply the AP Load Balancing to the multiple APs, AP management will manage wireless traffic with smooth flow and enhanced efficiency.



Support Mesh Network

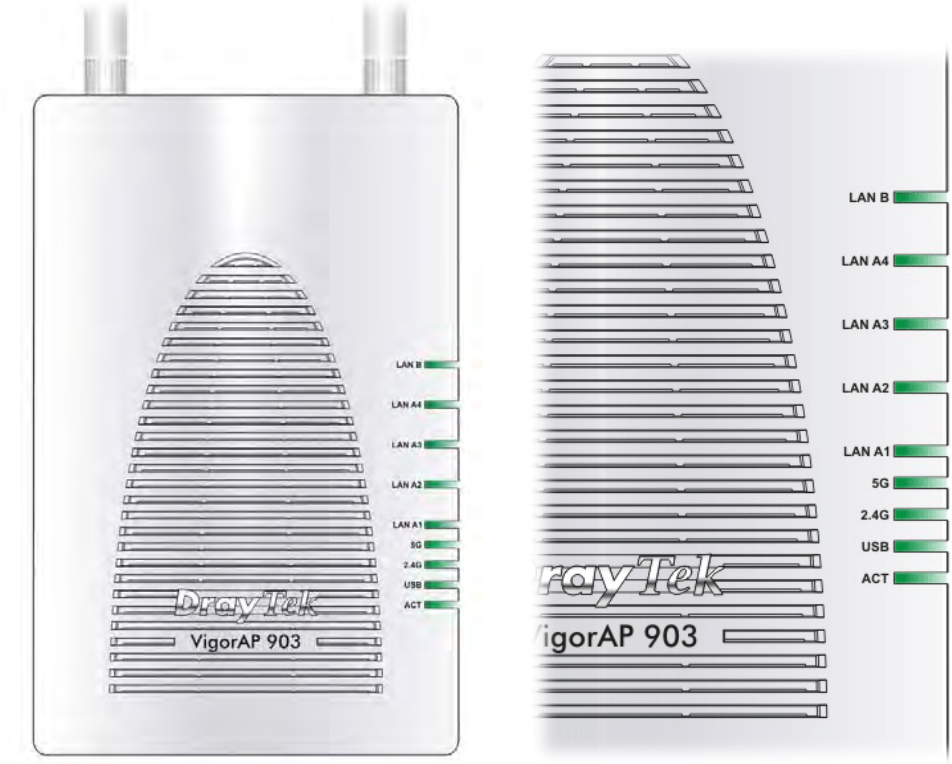
The message, information, and data can be transferred via wireless connection among VigorAP 903 devices without by using Ethernet cables. It can reduce the construction cost and eliminate the trouble of wiring. Therefore, mesh AP is suitable for outdoor activities, or meetings.

In short, VigorAP with mesh function has the following benefits:

- In the traditional wireless network, users must choose the best signal source manually from various SSIDs. The mesh AP can find out the best route automatically.
  Besides, if any one of the mesh AP devices disconnects due to unknown reason, the mesh system will determine another accessible AP and transfer the packets to that AP.
- Maintain a certain degree of normal operation for it is not easily affected by connection interference or terrain blocking of walls or floors.
- For the mesh network system adopts the mesh topology, each node in the network not only has a single connection but also interweaves to other nodes like a net. Because of such characteristics, the mesh network can set up stronger network architecture.
- Each node (mesh AP) in the mesh network can be operated as an independent wireless AP; therefore, the whole mesh network can offer a more stable and faster wireless connection.
- The mesh network is suitable for large spaces and large numbers of people for the configuration for each AP is easy and simple.

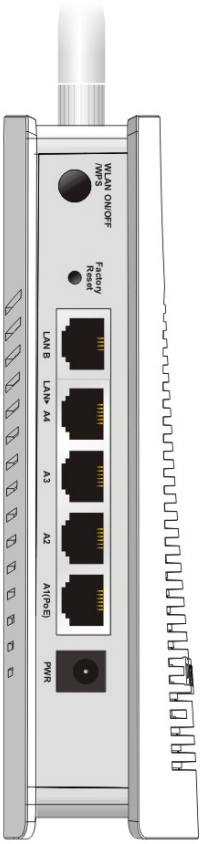
I-1-1 LED Indicators and Connectors

Before you use the Vigor modem, please get acquainted with the LED indicators and connectors first.



LED	Status	Explanation
ACT	Off	The system is not ready or is failed.
	Blinking	The system is ready and can work normally.
USB	On	A USB device is connected and active.
	Blinking	The data is transmitting.
2.4G	On	Wireless function is ready.
	Off	Wireless function is not ready.
	Blinking	Data is transmitting (sending/receiving).
5G	On	Wireless function is ready.
	Off	Wireless function is not ready.
	Blinking	Data is transmitting (sending/receiving).
LAN A1 - A4	On	A normal connection (rate with 100M/1000M) is through its corresponding port.
	Off	LAN is disconnected.
	Blinking	Data is transmitting (sending/receiving).
LAN B	On	A normal connection (rate with 100M/1000M) is through its corresponding port.
	Off	LAN is disconnected.
	Blinking	Data is transmitting (sending/receiving).

	Interface	Description



	Wireless band will be switched /changed according to the button pressed and released. For example, ● 2.4G (On) and 5G (On) – in default. ● 2.4G (Off) and 5G (On) – pressed and released the button once. ● 2.4G (On) and 5G (Off) – pressed and released the button twice. ● 2.4G (Off) and 5G (Off) – pressed and released the button three times. WPS - When WPS function is enabled by web user interface, press this button for more than 2 seconds. The router will wait for any wireless client connecting to it through WPS.
	Restore the default settings. Usage: Turn on the router. Press the button and keep for more than 10 seconds. Then the router will restart with the factory default configuration.
LAN B	Connecter for xDSL / Cable modem (Giga level) or router.
LAN A4, A3, A2 A1 (PoE)	Connecter for xDSL / Cable modem (Giga level) / computer or router. LAN A1 is used for PoE connection (for indoor use).
	PWR: Connecter for a power adapter.
	Connecter for a USB device (for temperature sensor).
	Power switch.

Note:

For the sake of security, make the accessory kit away from children.

I-2 Hardware Installation

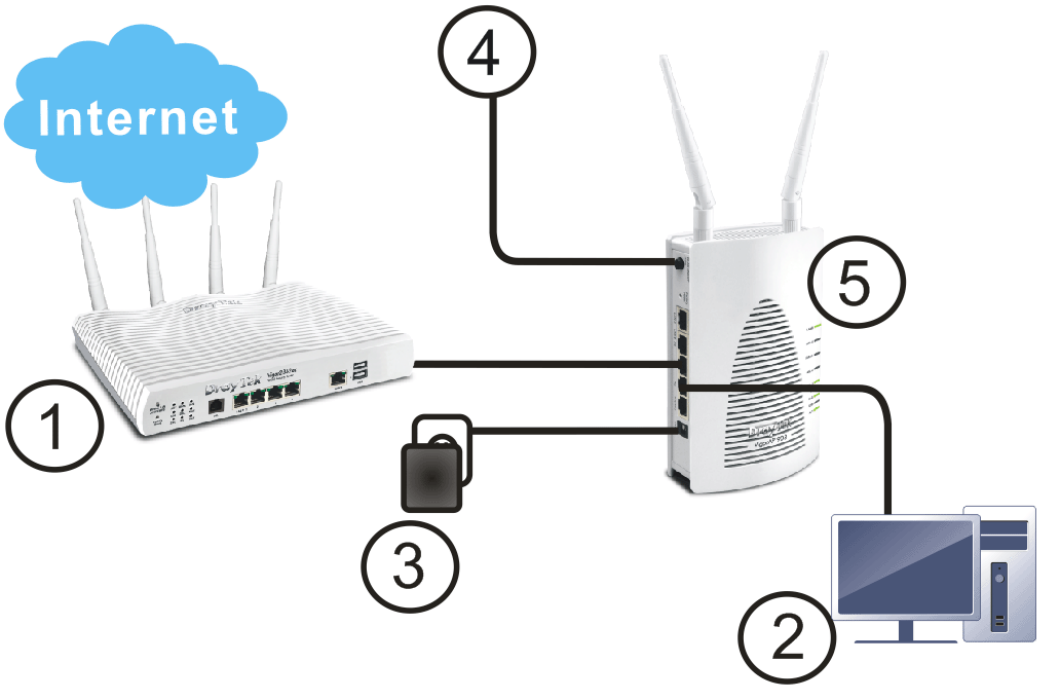
This section will guide you to install the VigorAP 903 through hardware connection and configure the device's settings through web browser.

Before starting to configure VigorAP 903, you have to connect your devices correctly.

I-2-1 Wired Connection for PC in LAN

1. Connect VigorAP 903 to ADSL modem, router, or switch/hub in your network through the **LAN A** port of the access point by Ethernet cable.
2. Connect a computer to other available LAN A port. Make sure the subnet IP address of the PC is the same as VigorAP 903 management IP, e.g., **192.168.1.X**.
3. Connect the A/C power adapter to the wall socket, and then connect it to the PWR connector of the access point.
4. Power on VigorAP 903.
5. Check all LEDs on the front panel. **ACT** LED should blink, **LAN** LEDs should be on if the access point is correctly connected to the xDSL modem, router or switch/hub.

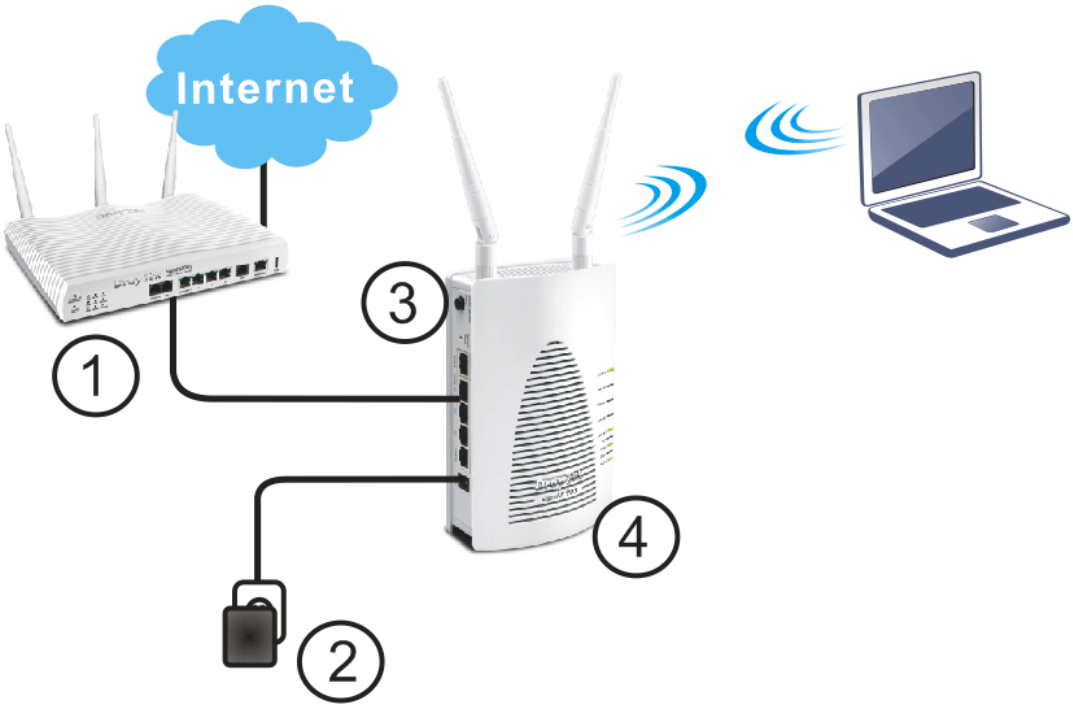
(For the detailed information of LED status, please refer to section I-1-1.)



I-2-2 Wired Connection for Notebook in WLAN

1. Connect VigorAP 903 to ADSL modem or router in your network through the **LAN A** port of the access point by Ethernet cable.
2. Connect the A/C power adapter to the wall socket, and then connect it to the PWR connector of the access point.
3. Power on VigorAP 903.
4. Check all LEDs on the front panel. **ACT** LED should be steadily on, **LAN** LEDs should be on if the access point is correctly connected to the ADSL modem or router.

(For the detailed information of LED status, please refer to section I-1-1.)



I-2-3 Wireless Connection

VigorAP 903 can access Internet via an ADSL modem, router, or switch/hub in your network through wireless connection.

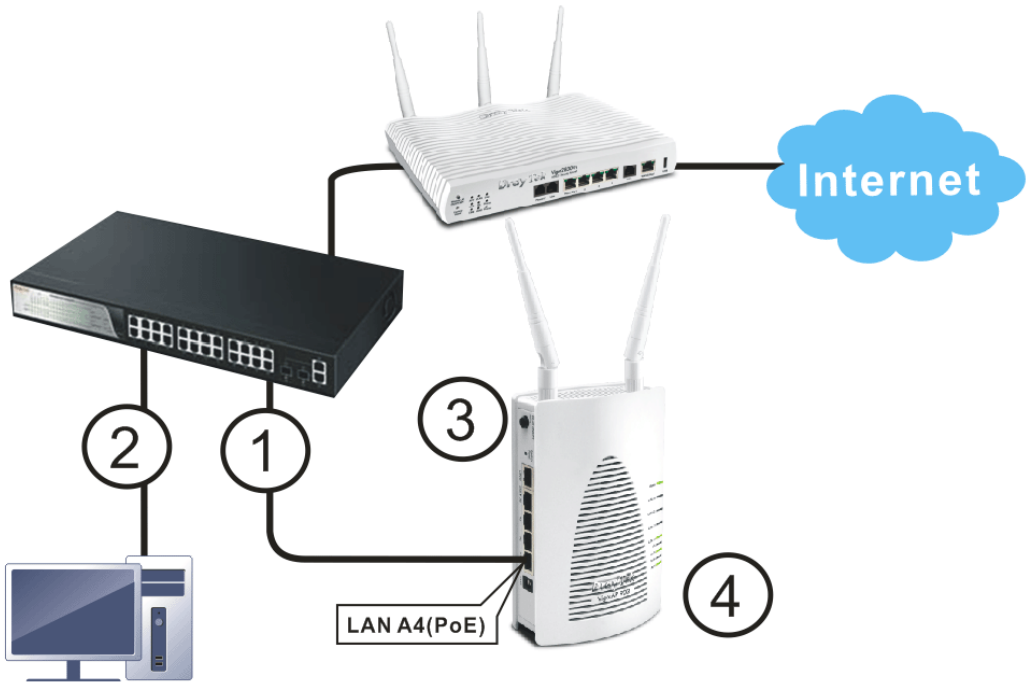
1. Connect the A/C power adapter to the wall socket, and then connect it to the PWR connector of the access point.
2. Power on VigorAP 903.
3. Check all LEDs on the front panel. **ACT** LED should be steadily on.
4. Connect VigorAP 903 to ADSL modem or router via wireless network.

(For the detailed information of LED status, please refer to section I-1-1.)

I-2-4 PoE Connection

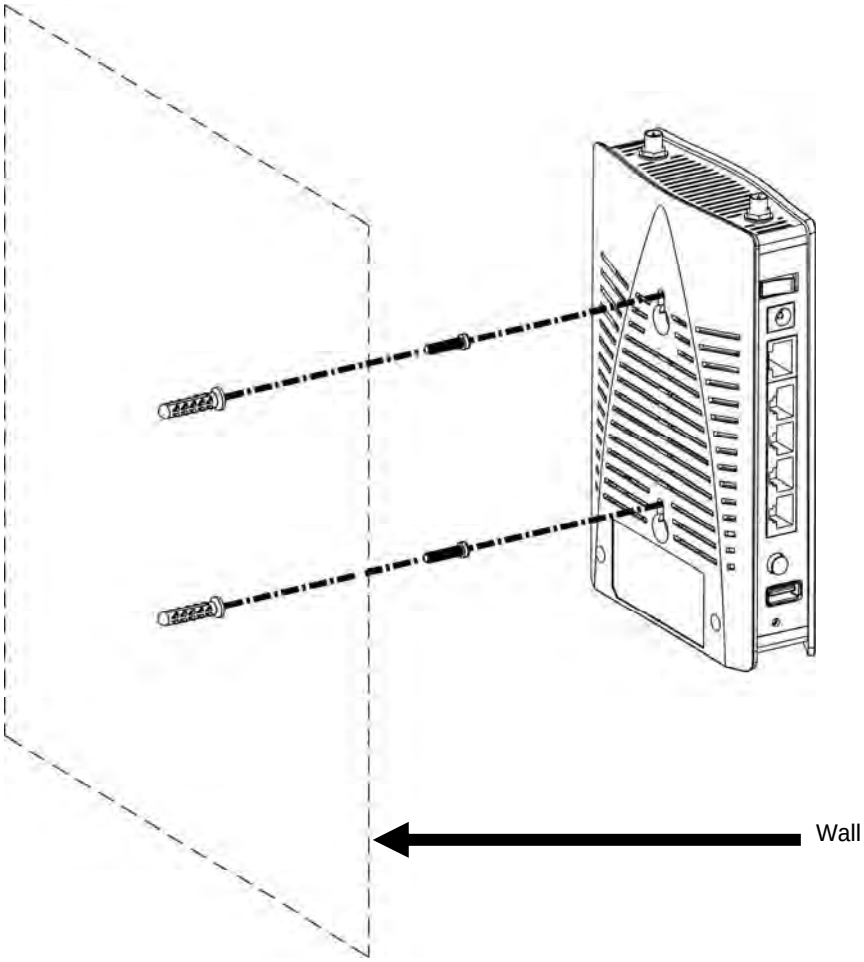
VigorAP 903 can gain the power from the connected switch, e.g., VigorSwitch P2260. PoE (Power over Ethernet) can break the install limitation caused by the fixed power supply.

1. Connect VigorAP 903 to a switch in your network through the **LAN A4 (PoE)** port of the access point by Ethernet cable.
2. Connect a computer to VigorSwitch P2260. Make sure the subnet IP address of the PC is the same as VigorAP 903 management IP, e.g., **192.168.1.X**.
3. Power on VigorAP 903.
4. Check all LEDs on the front panel. **ACT** LED should be steadily on, **LAN** LEDs should be on if the access point is correctly connected to the ADSL modem, router or switch/hub.



I-2-5 Wall-mount Connection

1. Drill two holes on the wall. The distance between the holes shall be 80mm. The recommended drill diameter shall be 6.5mm (1/4”).
2. Fit screws into the wall using the appropriate type of wall plug.
3. Hang the VigorAP directly onto the screws.



I-3 Network IP Configuration

After the network connection is built, the next step you should do is setup VigorAP 903 with proper network parameters, so it can work properly in your network environment.

Before you can connect to the access point and start configuration procedures, your computer must be able to get an IP address automatically (use dynamic IP address). If it's set to use static IP address, or you're unsure, please follow the following instructions to configure your computer to use dynamic IP address:

For the default IP address of this AP is set "192.168.1.2", we recommend you to use "192.168.1.X (except 2)" in the field of IP address on this section for your computer.

If the operating system of your computer is...

Windows 7 - please go to section I-3-1

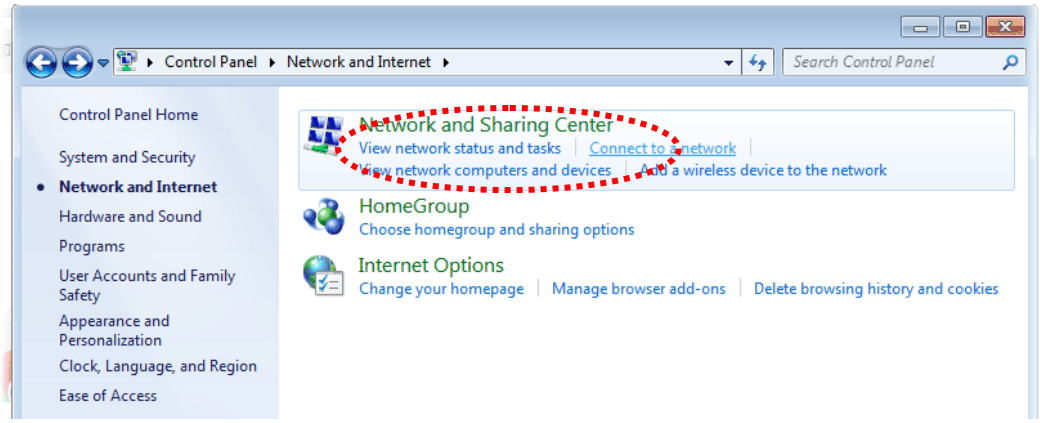
Windows 2000 - please go to section I-3-2

Windows XP - please go to section I-3-3

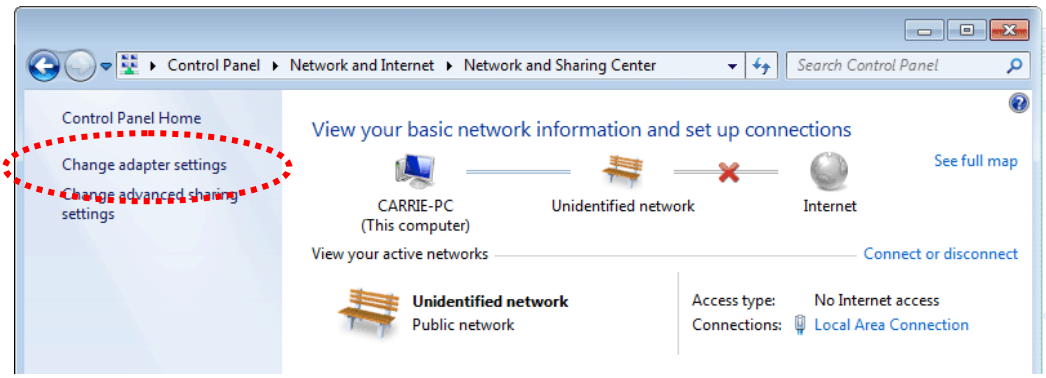
Windows Vista - please go to section I-3-4

I-3-1 Windows 7 IP Address Setup

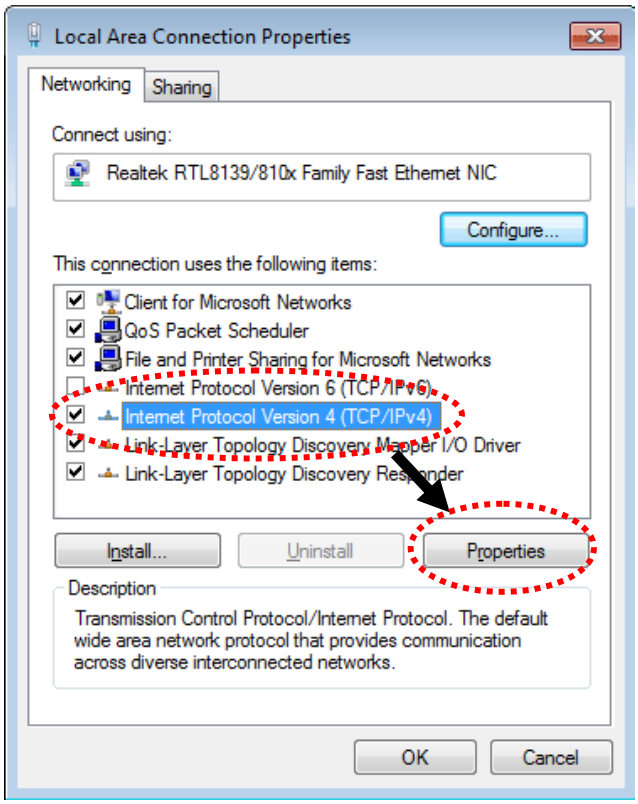
Click **Start** button (it should be located at lower-left corner of your computer), then click Control Panel. Double-click **Network and Internet**, and the following window will appear. Click **Network and Sharing Center**.



Next, click **Change adapter settings** and click **Local Area Connection**.



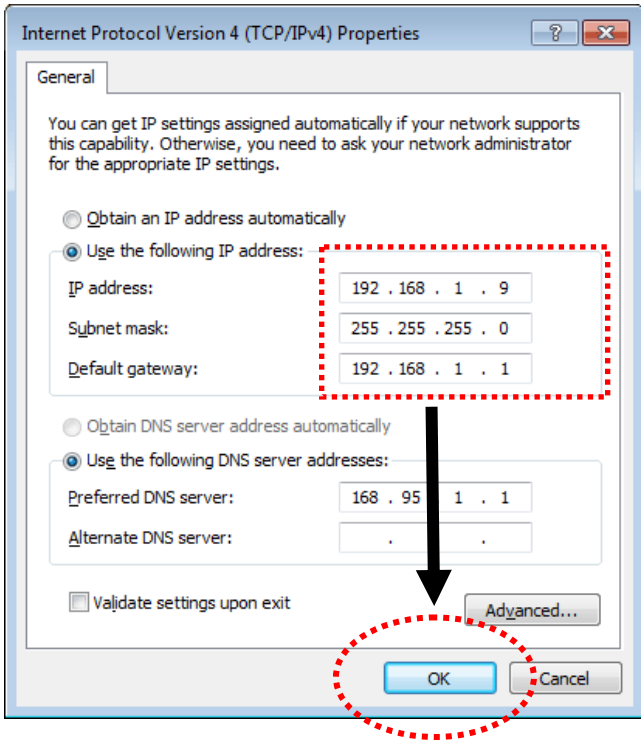
Then, select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.



Under the General tab, click **Use the following IP address.** Then input the following settings in respective field and click **OK** when finish.

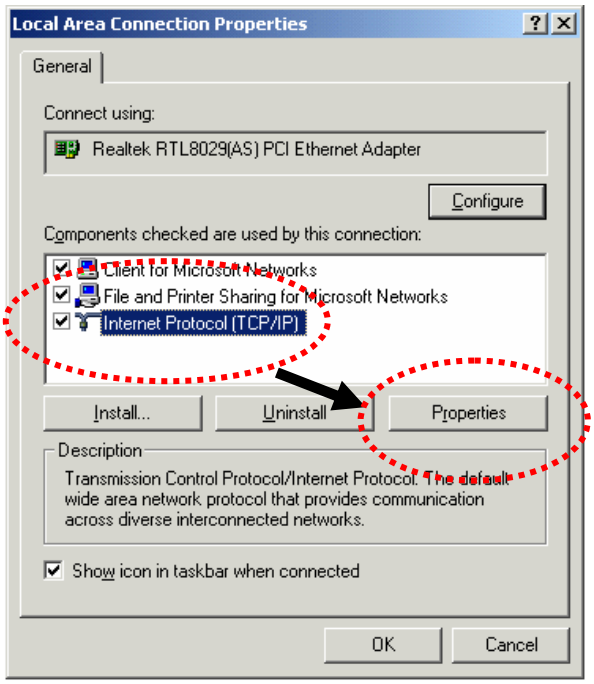
IP address: **192.168.1.9**

Subnet Mask: **255.255.255.0**



I-3-2 Windows 2000 IP Address Setup

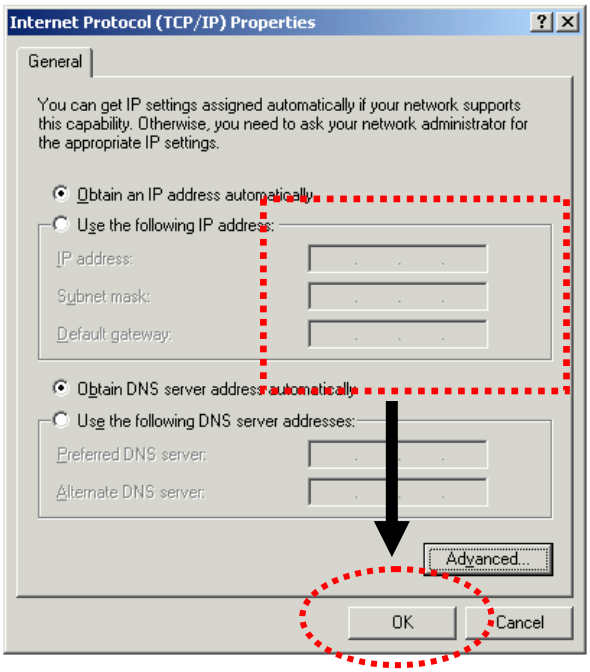
Click **Start** button (it should be located at lower-left corner of your computer), then click control panel. Double-click **Network and Dial-up Connections** icon, double click **Local Area Connection,** and **Local Area Connection Properties** window will appear. Select **Internet Protocol (TCP/IP)**, then click **Properties**.



Select **Use the following IP address**, then input the following settings in respective field and click **OK** when finish.

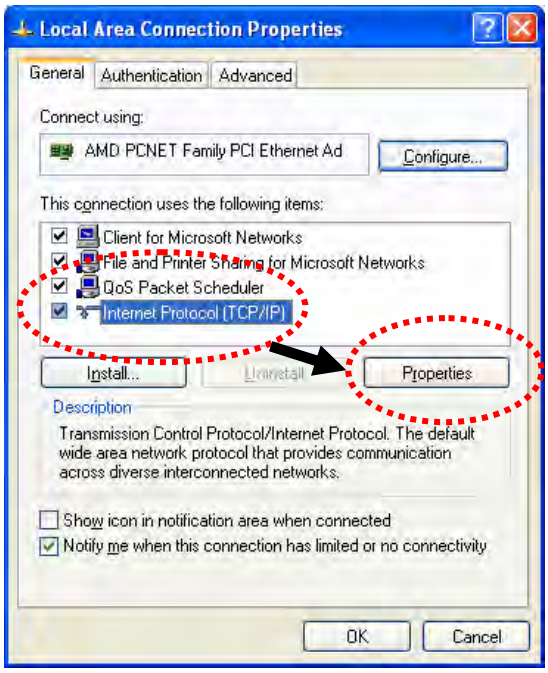
IP address: **192.168.1.9**

Subnet Mask: **255.255.255.0**



I-3-3 Windows XP IP Address Setup

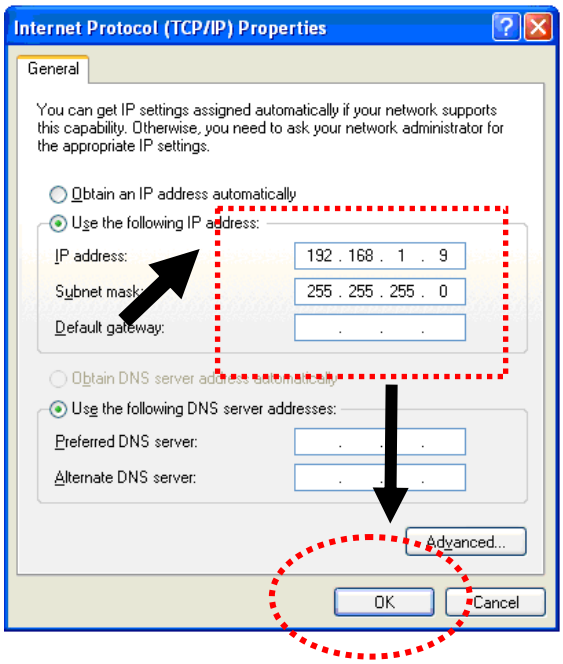
Click **Start** button (it should be located at lower-left corner of your computer), then click control panel. Double-click **Network and Internet Connections** icon, click **Network Connections,** and then double-click **Local Area Connection, Local Area Connection Status** window will appear, and then click **Properties**.



Select **Use the following IP address**, then input the following settings in respective field and click **OK** when finish:

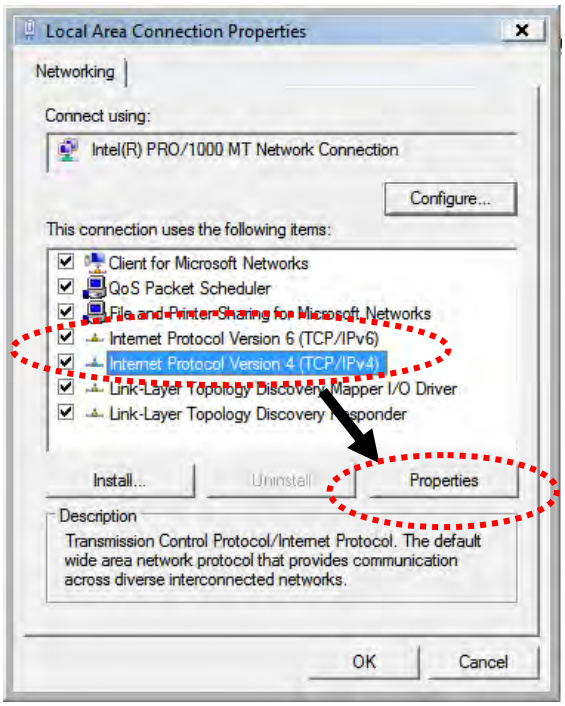
IP address: **192.168.1.9**

Subnet Mask: **255.255.255.0**.



I-3-4 Windows Vista IP Address Setup

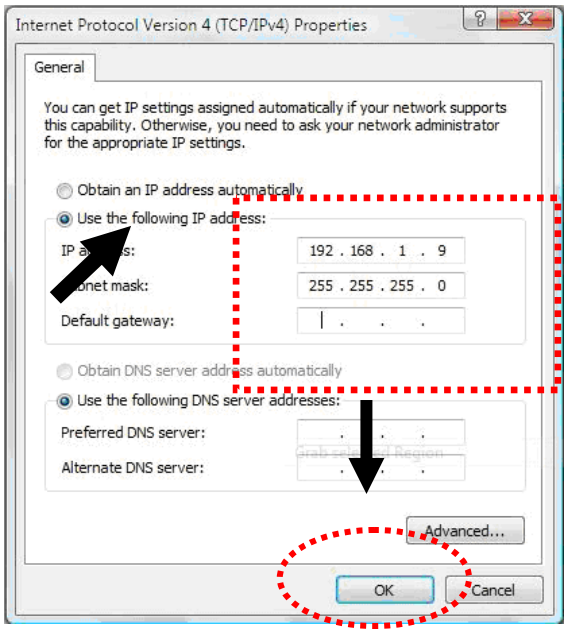
Click **Start** button (it should be located at lower-left corner of your computer), then click control panel. Click **View Network Status and Tasks**, then click **Manage Network Connections.** Right-click **Local Area Netwrok, then select 'Properties'. Local Area Connection Properties** window will appear, select I**nternet Protocol Version 4 (TCP / IPv4)**, and then click **Properties**.



Select **Use the following IP address**, then input the following settings in respective field and click **OK** when finish:

IP address: **192.168.1.9**

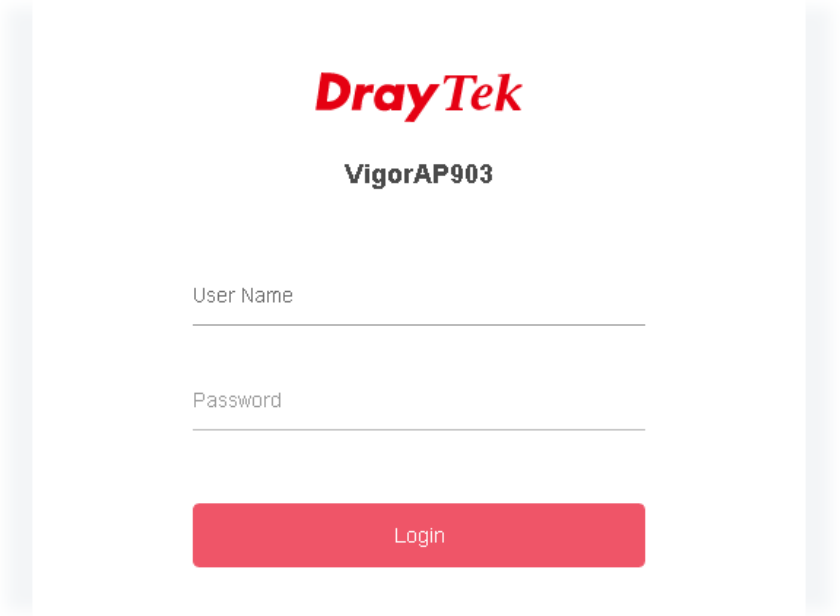
Subnet Mask: **255.255.255.0**.



I-4 Accessing to Web User Interface

All functions and settings of this access point must be configured via web user interface. Please start your web browser (e.g., Firefox).

1. Make sure your PC connects to the VigorAP 903 correctly.
2. Open a web browser on your PC and type **http://192.168.1.2.** A pop-up window will open to ask for username and password. Pease type “admin/admin” on Username/Password and click **OK**.

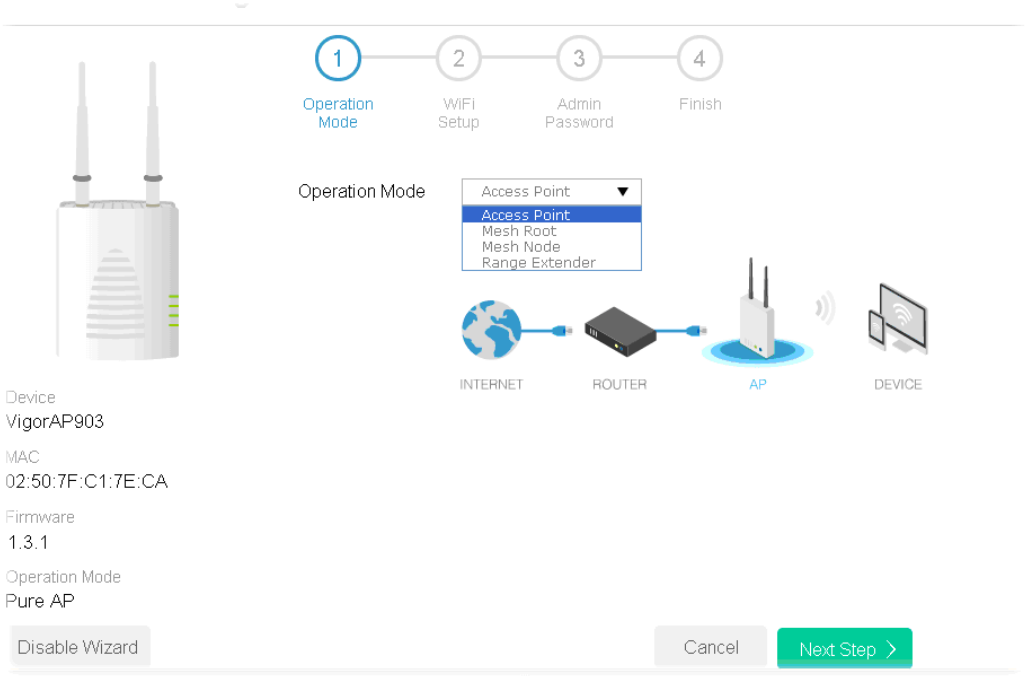


Note:

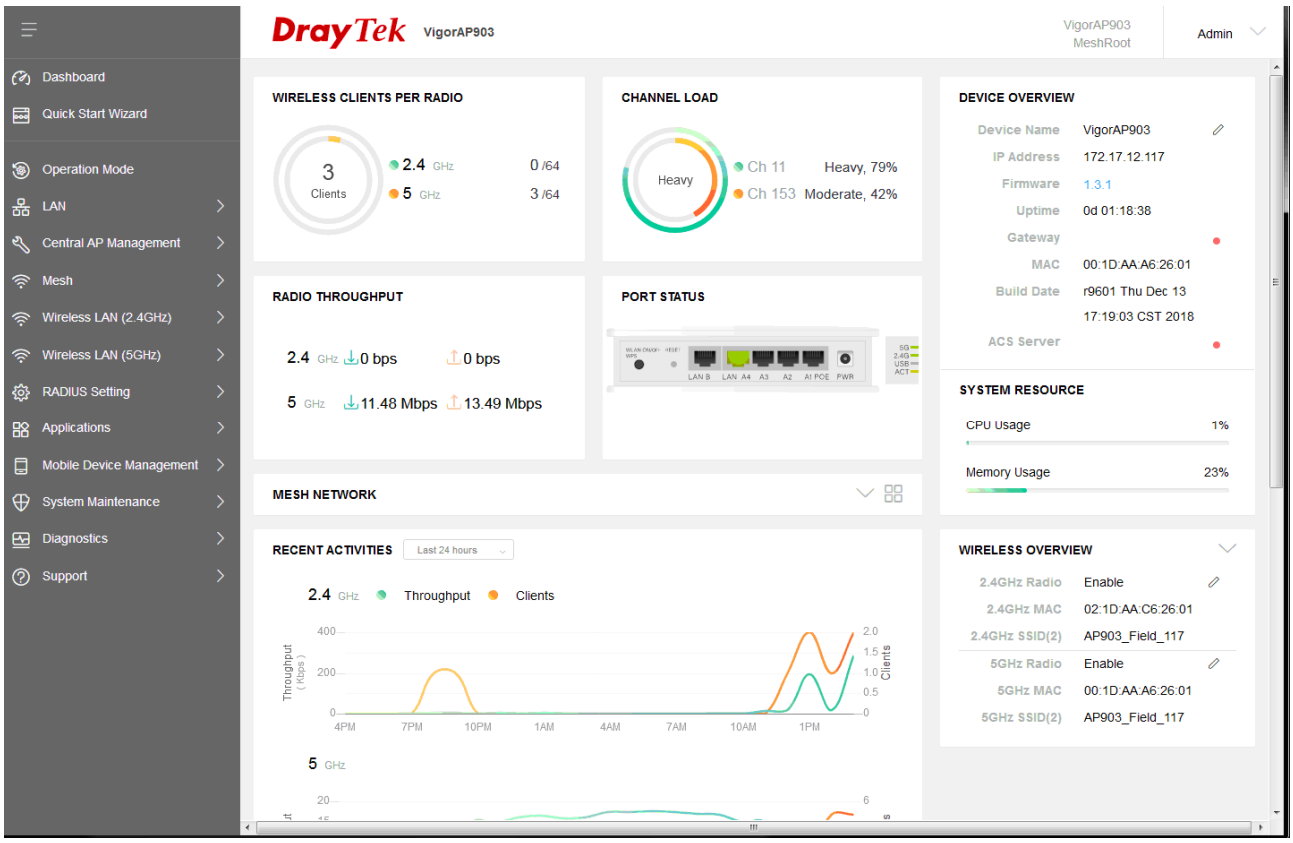
You may either simply set up your computer to get IP dynamically from the router or set up the IP address of the computer to be in the same subnet as **the IP address of VigorAP 903.**

- If there is no DHCP server on the network, then VigorAP 903 will have an IP address of 192.168.1.2.
- If there is DHCP available on the network, then VigorAP 903 will receive it’s IP address via the DHCP server.
- If you connect to VigorAP by wireless LAN, you could try to access the web user interface through http://vigorap.com.

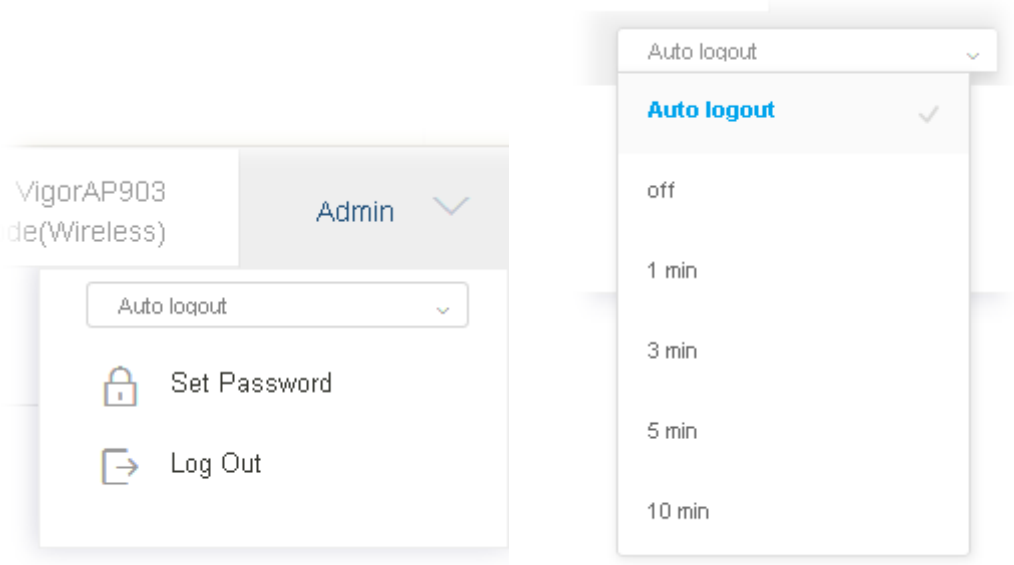
3. For the first time accessing VigorAP, the **Quick Start Wizard** for configuring wireless settings will appear as follows. Refer to *Section I-7 Quick Start Wizard for detailed information*.



4. If VigorAP has been configured previously, the Dashboard of VigorAP will appear as follows:



5. The web page can be logged out by clicking **Log Out** on the top right of the web page. Or, logout the web user interface according to the chosen condition. The default setting is **Auto Logout**, which means the web configuration system will logout after 5 minutes without any operation. Change the setting of auto logout if you want.



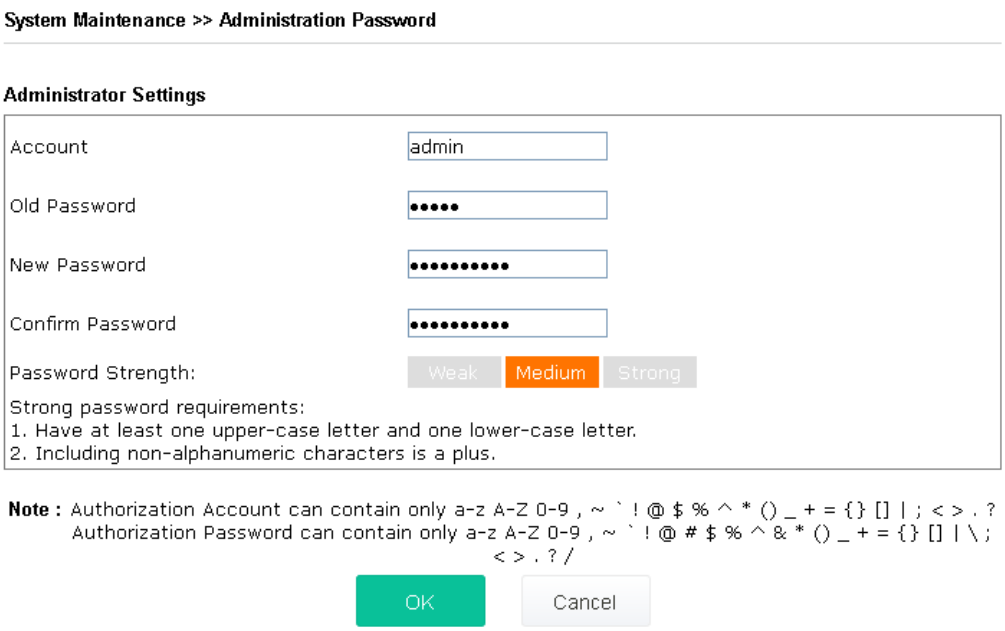
Note:

If you fail to access the web configuration, please go to the section “Trouble Shooting” for detecting and solving your problem.

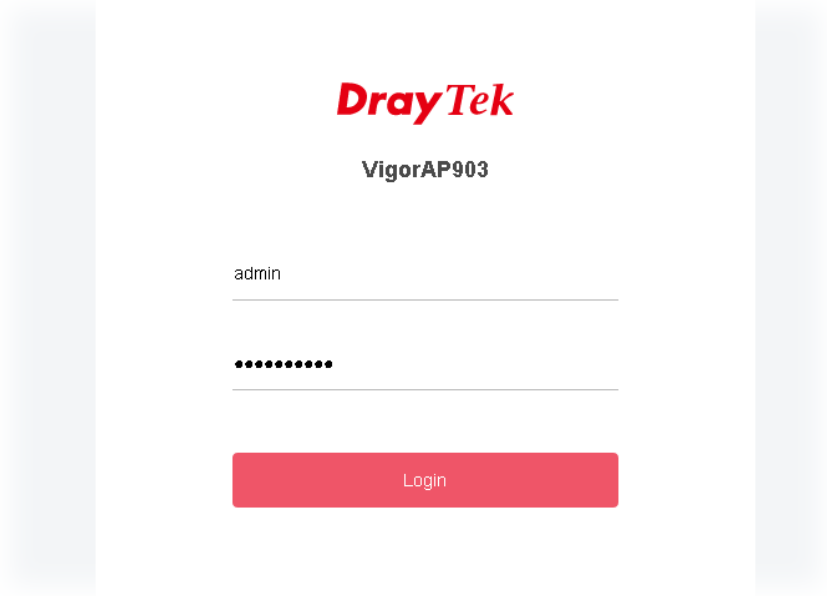
For using the device properly, it is necessary for you to change the password of web configuration for security and adjust primary basic settings.

I-5 Changing Password

1. Please change the password for the original security of the modem.
2. Go to **System Maintenance** page and choose **Administration Password.**



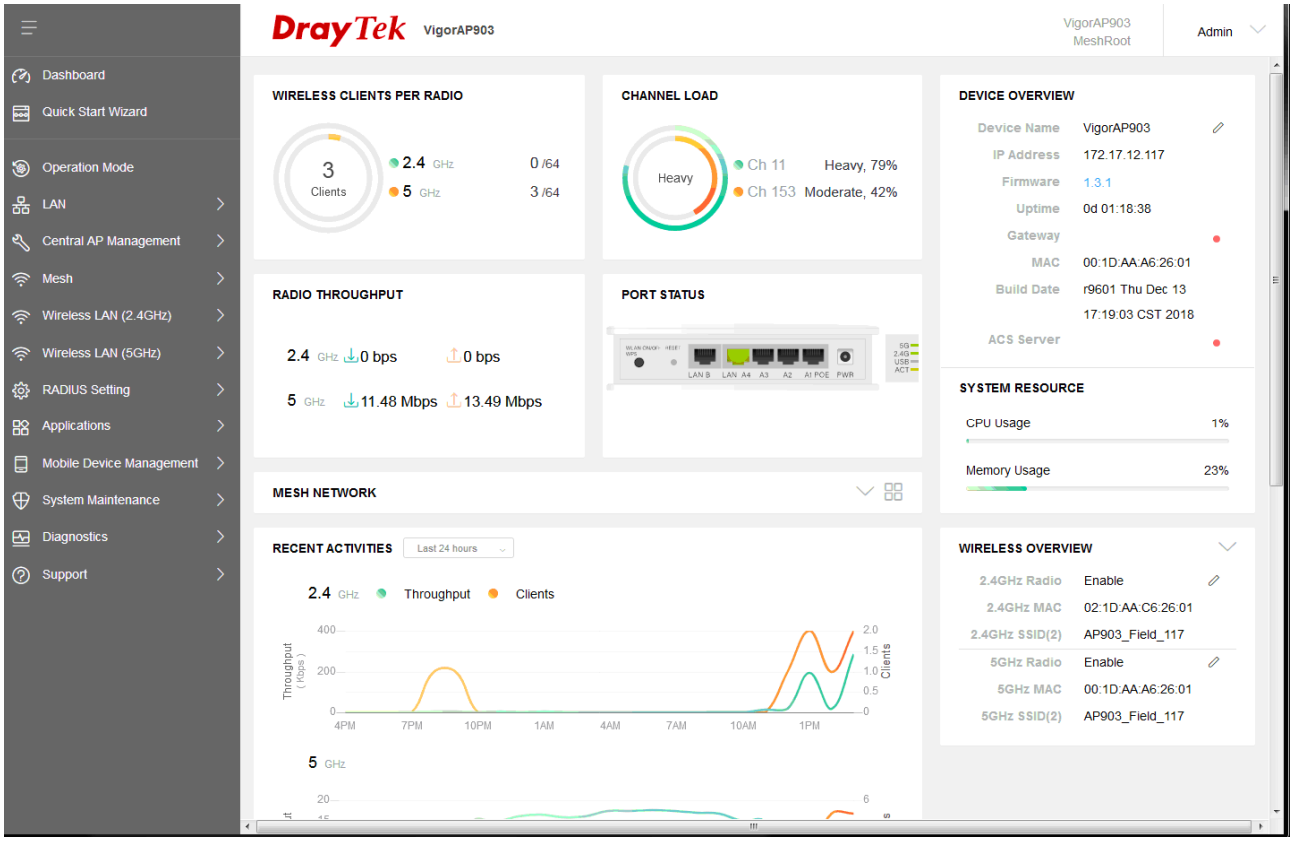
3. Enter the new login password on the field of **Password**. Then click **OK** to continue.
4. Now, the password has been changed. Next time, use the new password to access the Web User Interface for this modem.



I-6 Dashboard

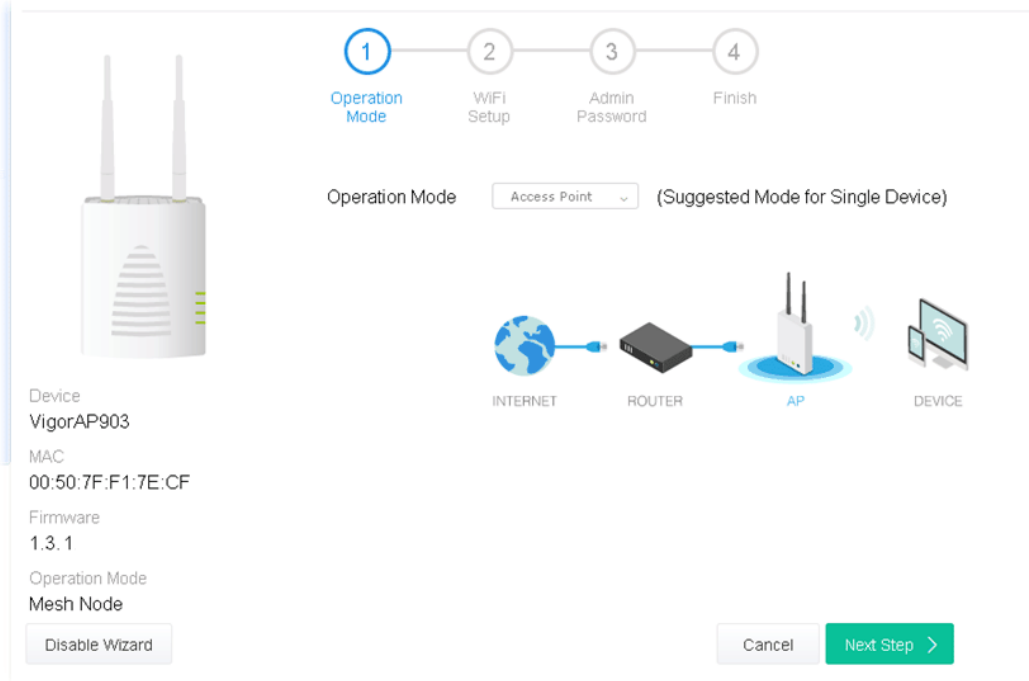
Dashboard shows system status including the number of client connected, throughput, gateway, physical connection status, radio (2.4GHz / 5GHz) status, backhaul network, recent activities, wireless network usage, and so on.

Click **Dashboard** from the main menu on the left side of the main page.



I-7 Quick Start Wizard

Quick Start Wizard will guide you to configure 2.4G wireless setting, 5G wireless setting and other corresponding settings for Vigor Access Point step by step.



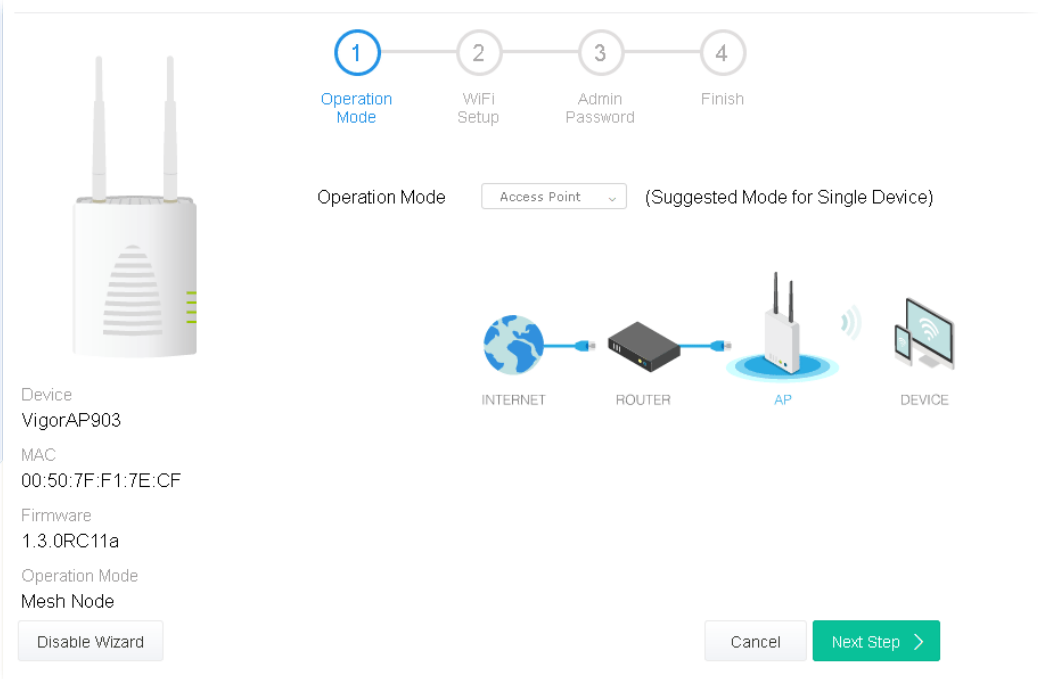
Available operation mode includes:

- Access Point
- Mesh Root
- Mesh Node
- Range Extender

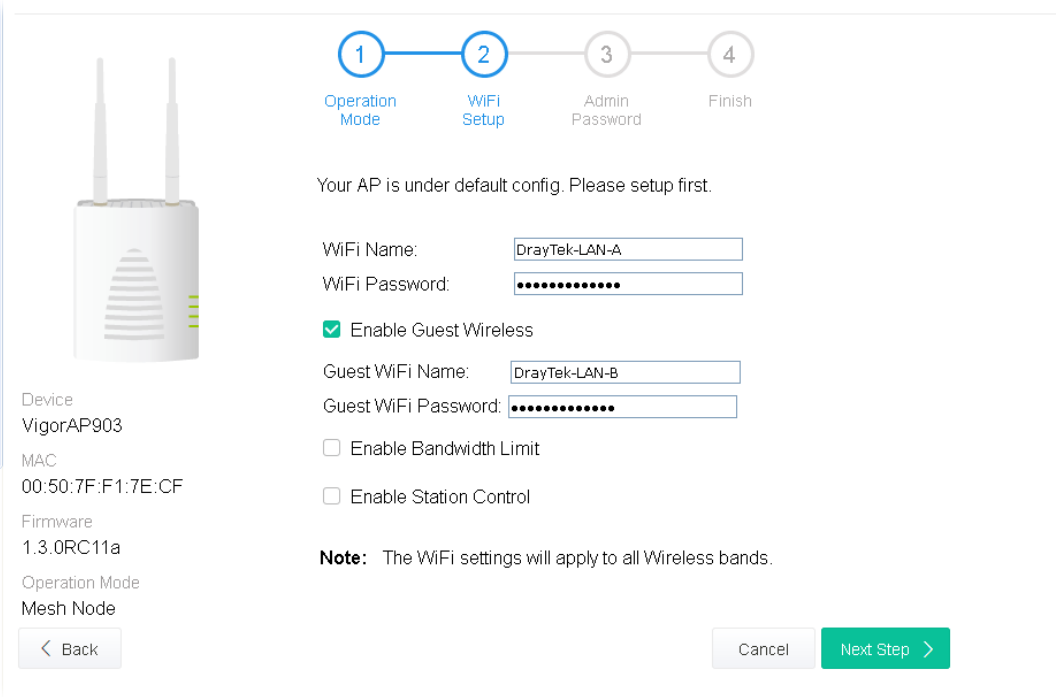
In this page, the advanced settings pages will vary according to the operation mode specified.

I-7-1 Settings for Access Point

1. Choose **Access Point** as the operation mode and click **Next Step**.



2. In the following page, configure the settings for wireless LAN (for both 2.4GHz and 5GHz) and click **Next Step**.

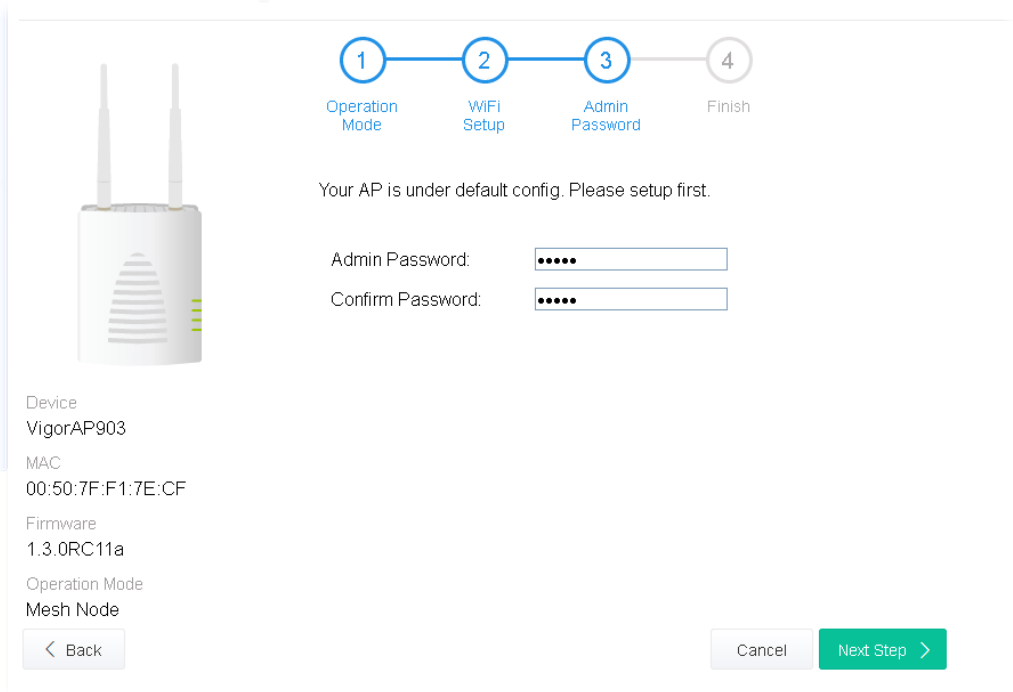


Available settings are explained as follows:

Item	Description
WiFi Name	Set a name for VigorAP 903 to be identified.
WiFi Password	Type **8~63** ASCII characters, such as 012345678..(or 64 Hexadecimal

	digits leading by 0x, such as "0x321253abcde...").
Enable Guest Wireless	Check the box to enable the **guest** wireless setting. Such feature is especially useful for free Wi-Fi service. For example, a coffee shop offers free Wi-Fi service for its guests for one hour every day. **Guest WiFi Name** - Set a name for VigorAP 903 which can be identified and connected by wireless guest. **Guest WiFi Password -** Set **8~63** ASCII characters which can be used for logging into VigorAP 903 by wireless guest.
Enable Bandwidth Limit	Check the box to define the maximum speed of the data uploading/downloading which will be used for the guest connecting to Vigor device with the same SSID. **Upload Limit** – Scroll the radio button to choose the value you want. **Download Limit** –Scroll the radio button to choose the value you want.
Enable Station Control	Check the box to set the duration for the guest connecting /reconnecting to Vigor device. **Connection Time** –Scroll the radio button to choose the value you want. **Reconnection Time** –Scroll the radio button to choose the value you want.

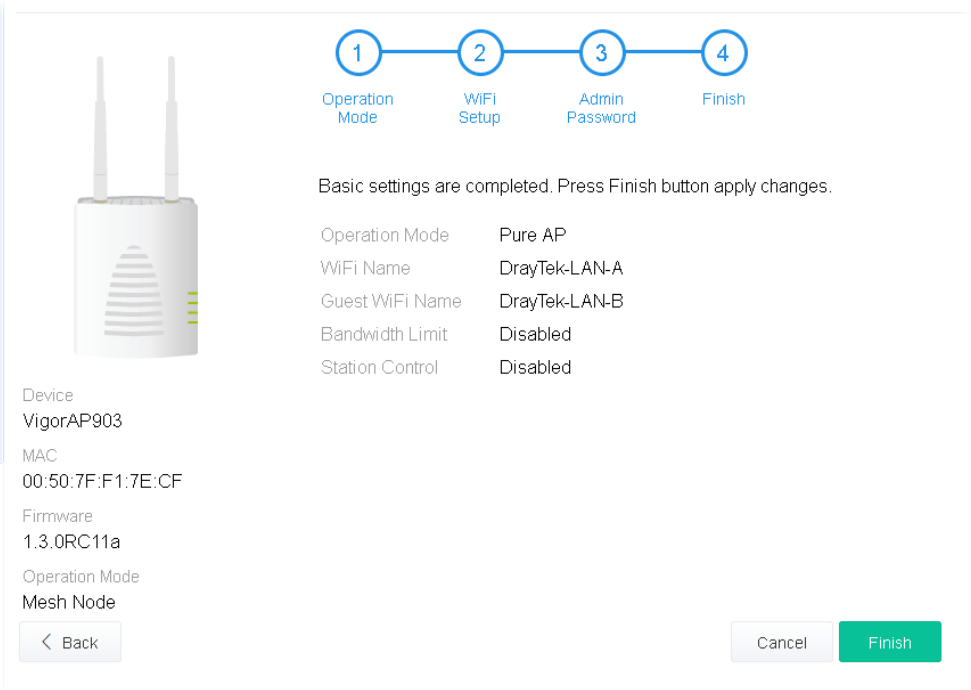
3. Change the default password for such device with new value. Then click **Next Step**.



Available settings are explained as follows:

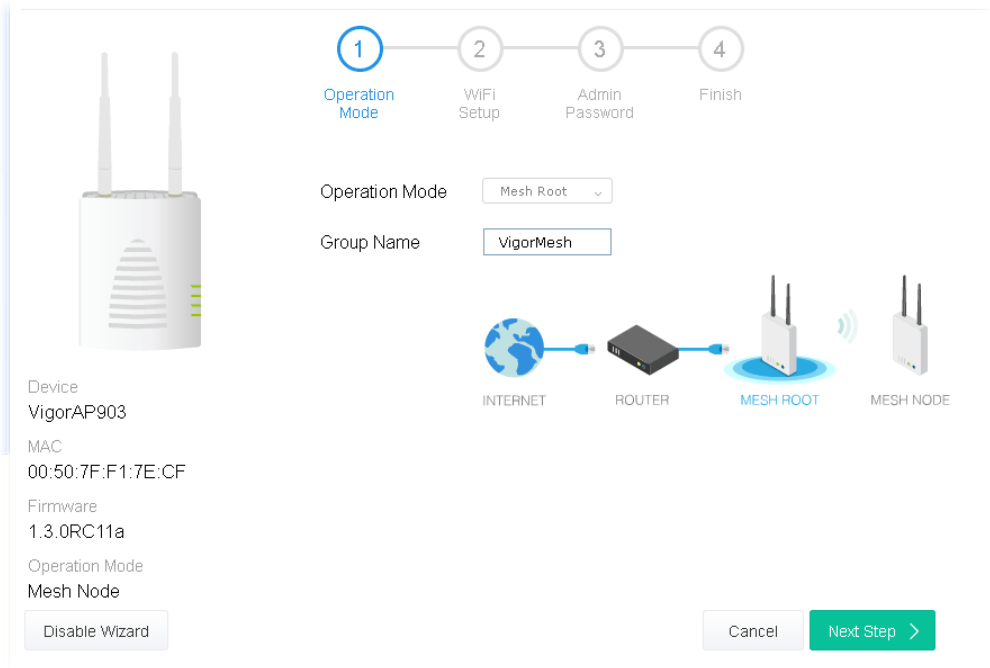
Item	Description
Admin Password	Enter a new password.
Confirm Password	Enter the new password again for confirmation.

4. A summary of settings configuration will be shown on screen. Click **Finish**.

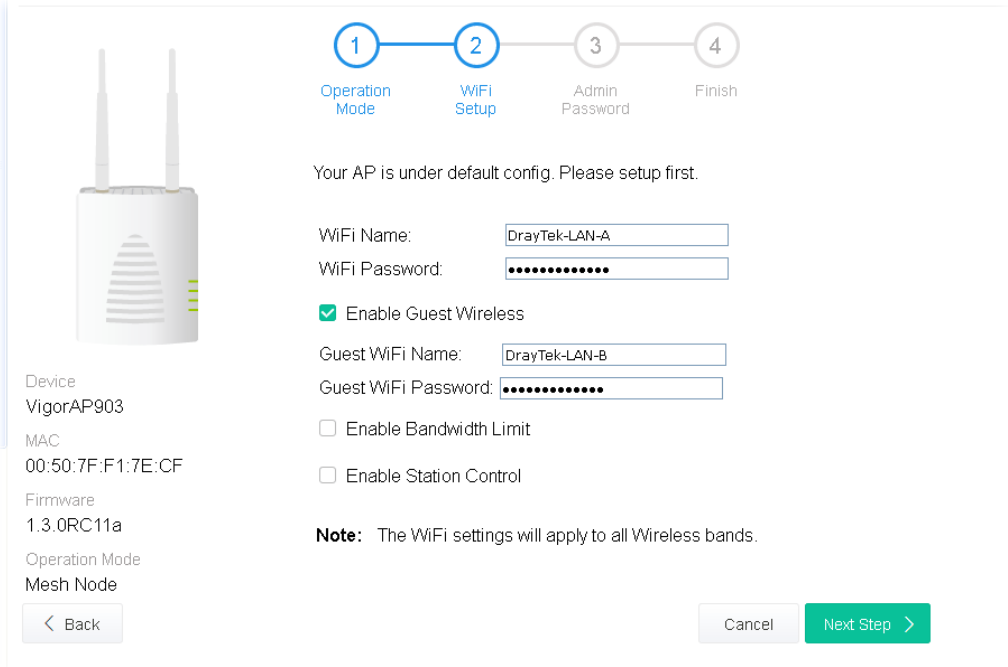

1
Operation Mode
2
WiFi Setup
3
Admin Password
4
Finish
Basic settings are completed. Press Finish button apply changes.
Operation Mode
Pure AP
WiFi Name
DrayTek-LAN-A
Guest WiFi Name
DrayTek-LAN-B
Bandwidth Limit
Disabled
Station Control
Disabled
Device
VigorAP903
MAC
00:50:7F:F1:7E:CF
Firmware
1.3.0RC11a
Operation Mode
Mesh Node
Back
Cancel
Finish

I-7-2 Settings for Mesh Root

1. Choose **Mesh Root** as the operation mode and click **Next Step**.



2. Configure the settings for wireless LAN (for both 2.4GHz and 5GHz) and click **Next Step**.

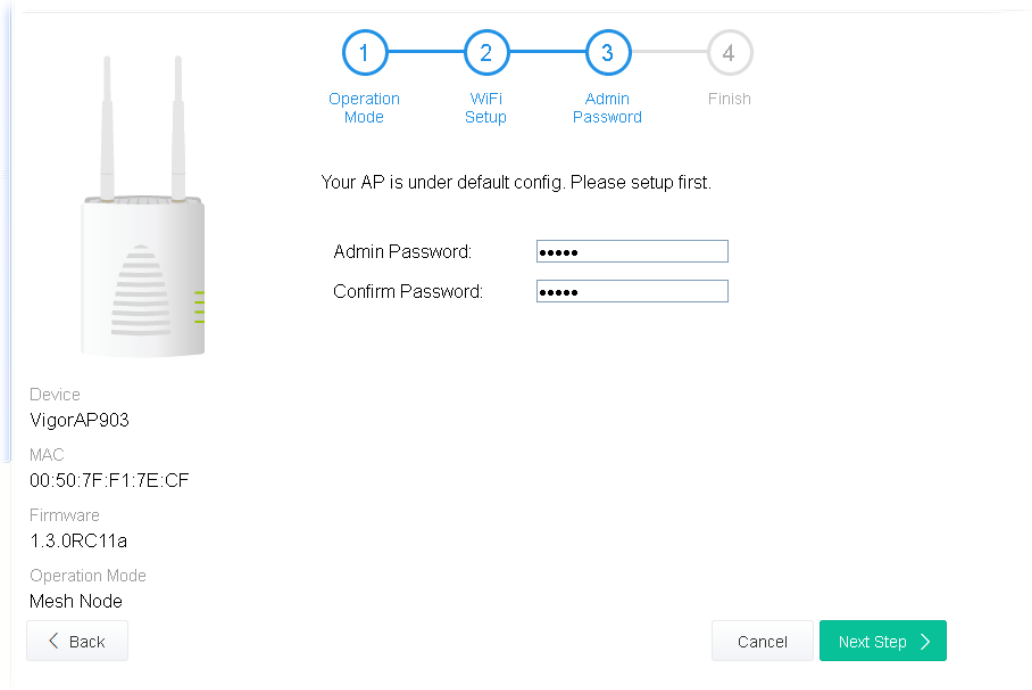


Available settings are explained as follows:

Item	Description
WiFi Name	Set a name for VigorAP 903 to be identified.
WiFi Password	Type **8~63** ASCII characters, such as 012345678..(or 64 Hexadecimal digits leading by 0x, such as "0x321253abcde...").
Enable Guest	Check the box to enable the **guest** wireless setting.

Wireless	Such feature is especially useful for free Wi-Fi service. For example, a coffee shop offers free Wi-Fi service for its guests for one hour every day. **Guest WiFi Name** - Set a name for VigorAP 903 which can be identified and connected by wireless guest. **Guest WiFi Password -** Set **8~63** ASCII characters or **8~63** ASCII characters which can be used for logging into VigorAP 903 by wireless guest.
Enable Bandwidth Limit	Check the box to define the maximum speed of the data uploading/downloading which will be used for the guest connecting to Vigor device with the same SSID. **Upload Limit** – Scroll the radio button to choose the value you want. **Download Limit** –Scroll the radio button to choose the value you want.
Enable Station Control	Check the box to set the duration for the guest connecting /reconnecting to Vigor device. **Connection Time** –Scroll the radio button to choose the value you want. **Reconnection Time** –Scroll the radio button to choose the value you want.

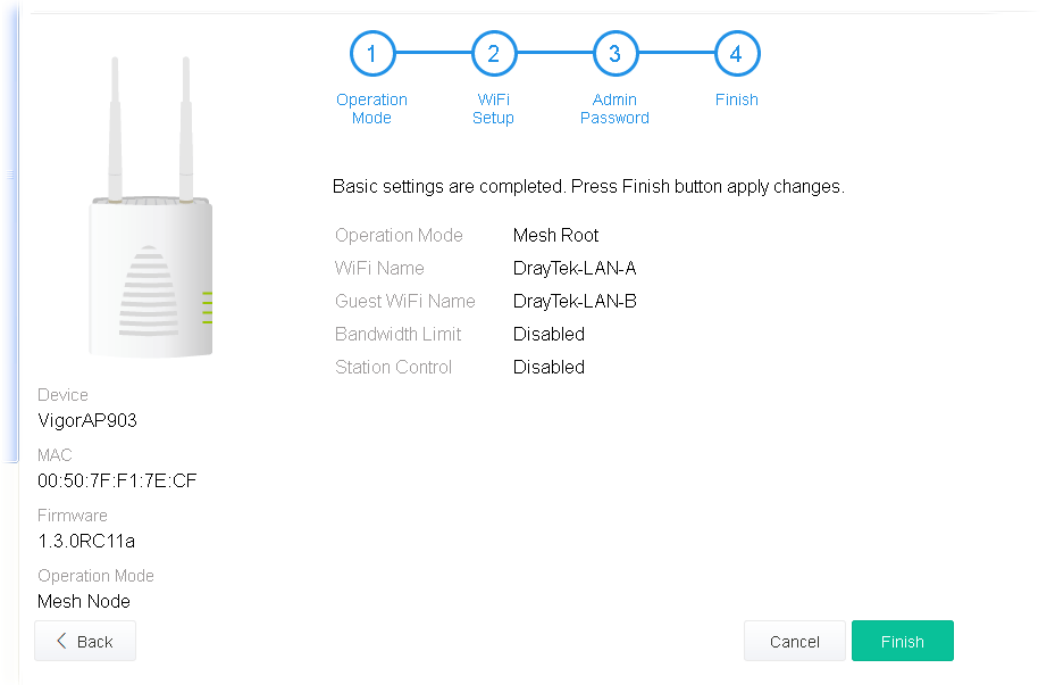
3. Change the default password for such device with new value. Then click **Next Step**.



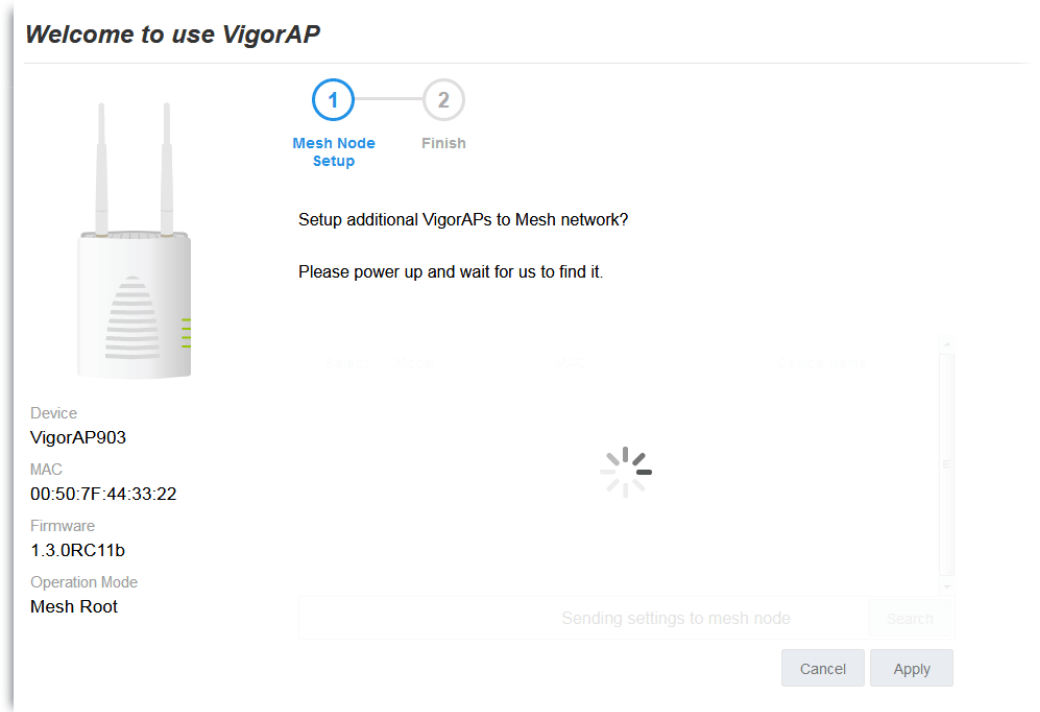
Available settings are explained as follows:

Item	Description
Admin Password	Enter a new password.
Confirm Password	Enter the new password again for confirmation.

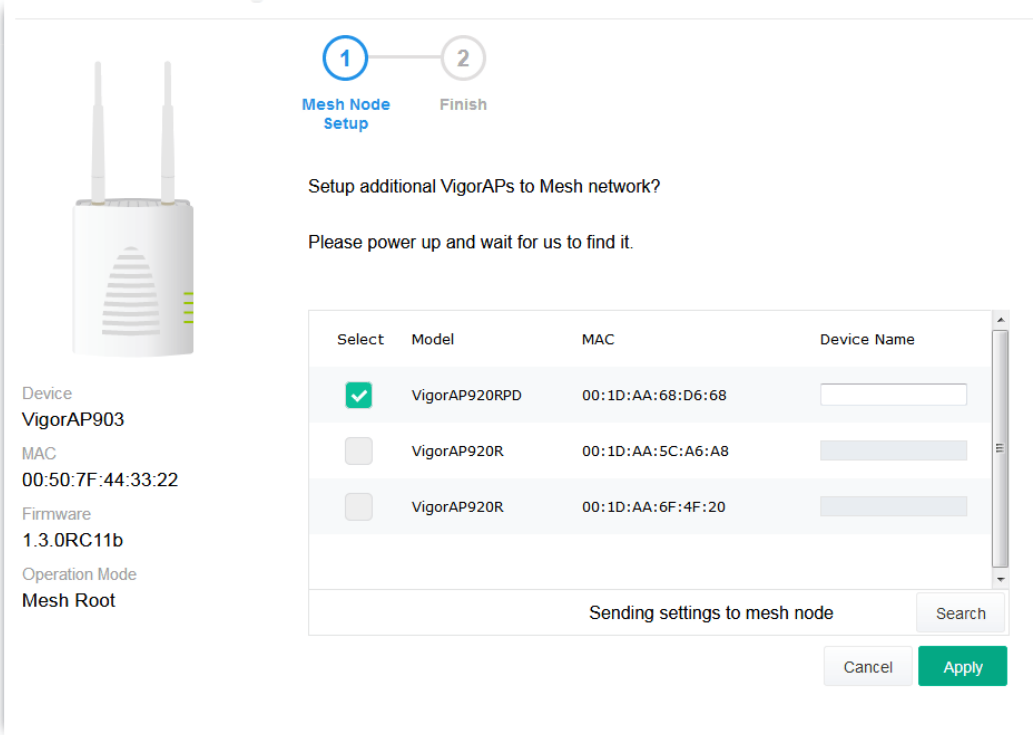
4. A summary of settings configuration will be shown on screen. Click **Finish**.



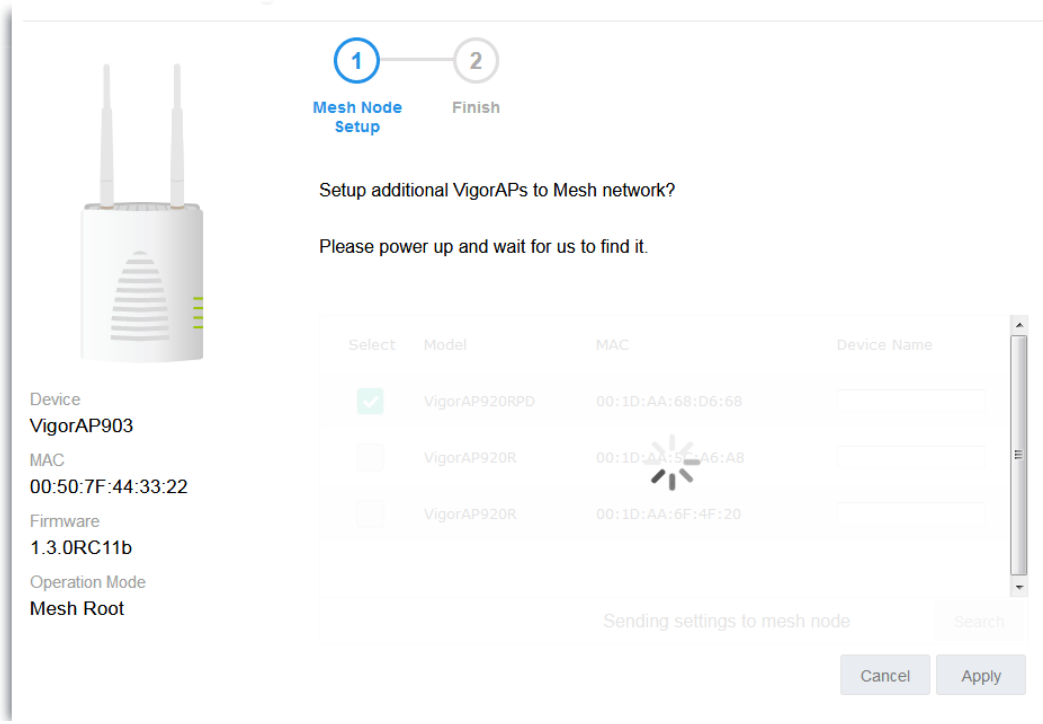
5. After clicking **Finish**, the following web page appears. VigorAP will search for mesh node around the network.



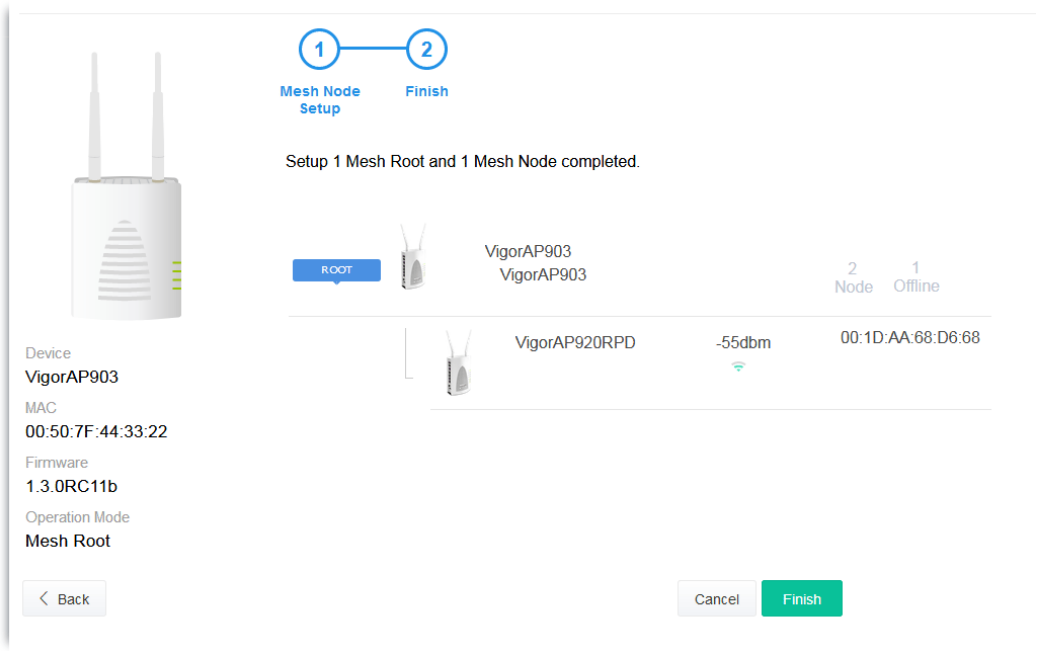
6. Available VigorAP devices will be shown on the screen. Select the device (as a mesh node) for grouping under such mesh group and enter a device name for identification.



7. Click **Apply** and wait for a while.

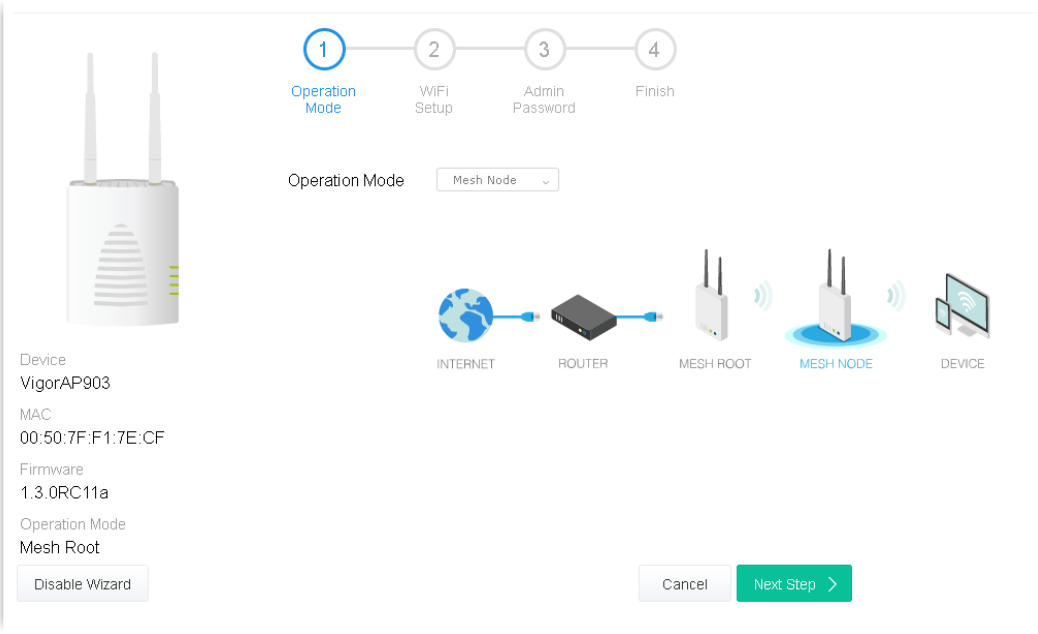


8. Later, a summary page of mesh root with mesh node will be shown on the screen.

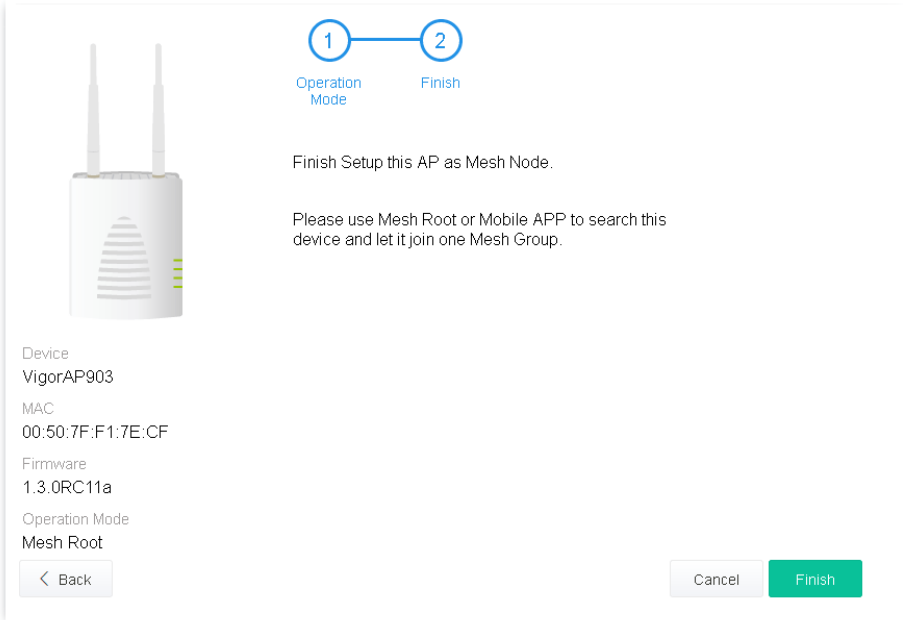


I-7-3 Settings for Mesh Node

1. Choose **Mesh Node** as the operation mode and click **Next Step**.

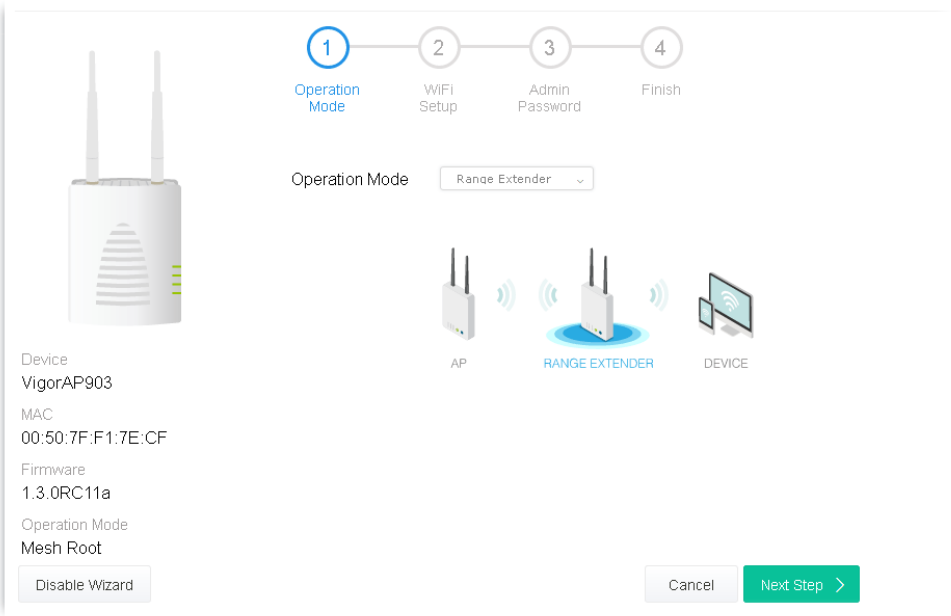


2. A summary of settings configuration will be shown on screen. Click **Finish**.

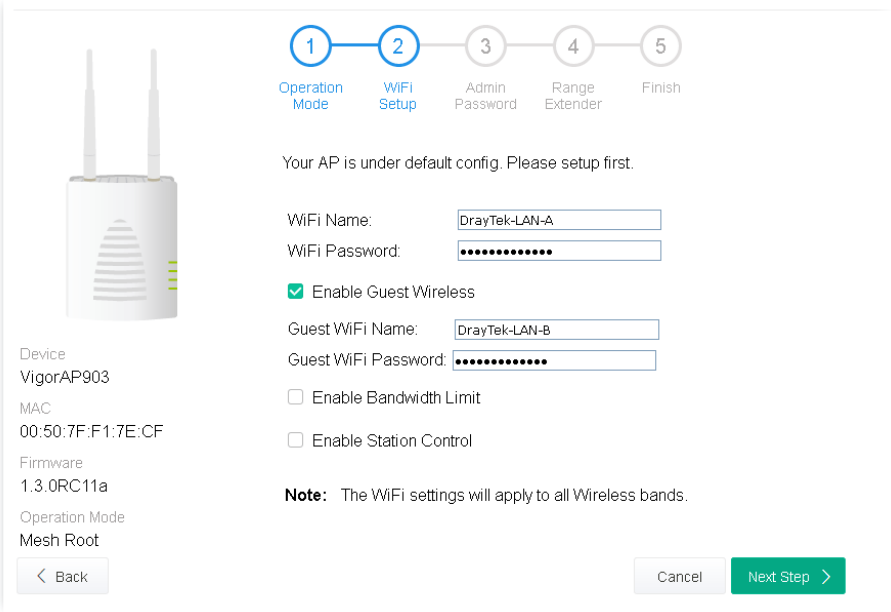


I-7-4 Settings for Range Extender

1. Choose **Range Extender** as the operation mode and click **Next Step**.



2. Configure the settings for wireless LAN (for both 2.4GHz and 5GHz) and click **Next Step**.

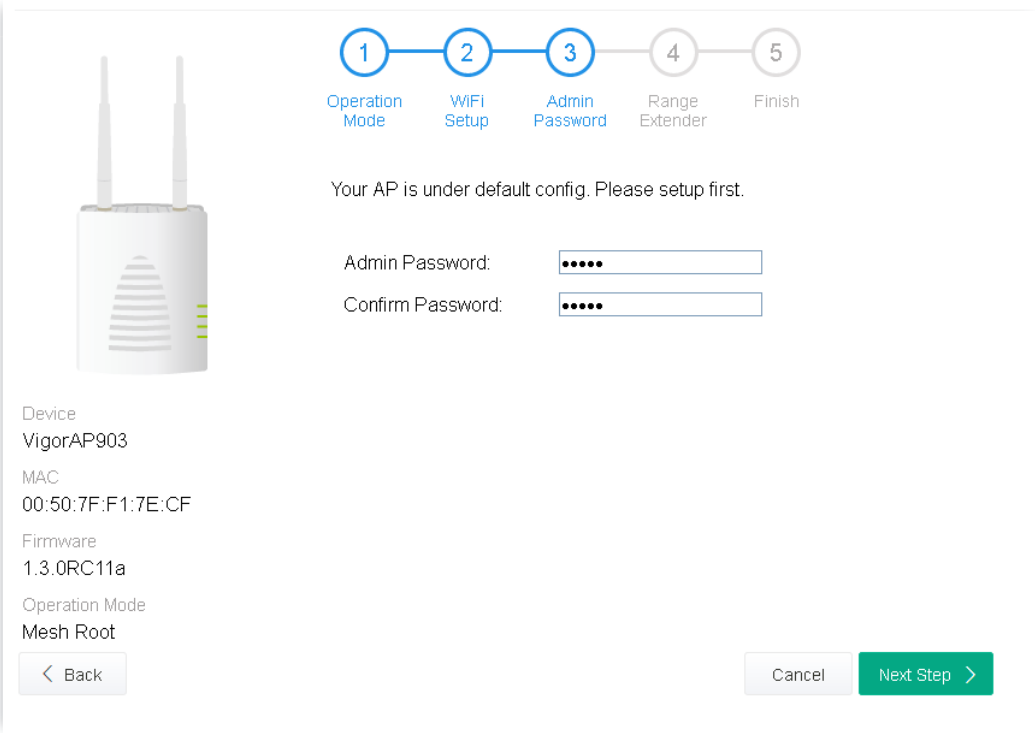


Available settings are explained as follows:

Item	Description
WiFi Name	Set a name for VigorAP 903 to be identified.
WiFi Password	Type **8~63** ASCII characters, such as 012345678..(or 64 Hexadecimal digits leading by 0x, such as "0x321253abcde...").
Enable Guest Wireless	Check the box to enable the **guest** wireless setting. Such feature is especially useful for free Wi-Fi service. For example, a coffee shop offers free Wi-Fi service for its guests for one hour every day.

	Guest WiFi Name - Set a name for VigorAP 903 which can be identified and connected by wireless guest. **Guest WiFi Password -** Set **8~63** ASCII characters or **8~63** ASCII characters which can be used for logging into VigorAP 903 by wireless guest.
Enable Bandwidth Limit	Check the box to define the maximum speed of the data uploading/downloading which will be used for the guest connecting to Vigor device with the same SSID. **Upload Limit** – Scroll the radio button to choose the value you want. **Download Limit** –Scroll the radio button to choose the value you want.
Enable Station Control	Check the box to set the duration for the guest connecting /reconnecting to Vigor device. **Connection Time** –Scroll the radio button to choose the value you want. **Reconnection Time** –Scroll the radio button to choose the value you want.

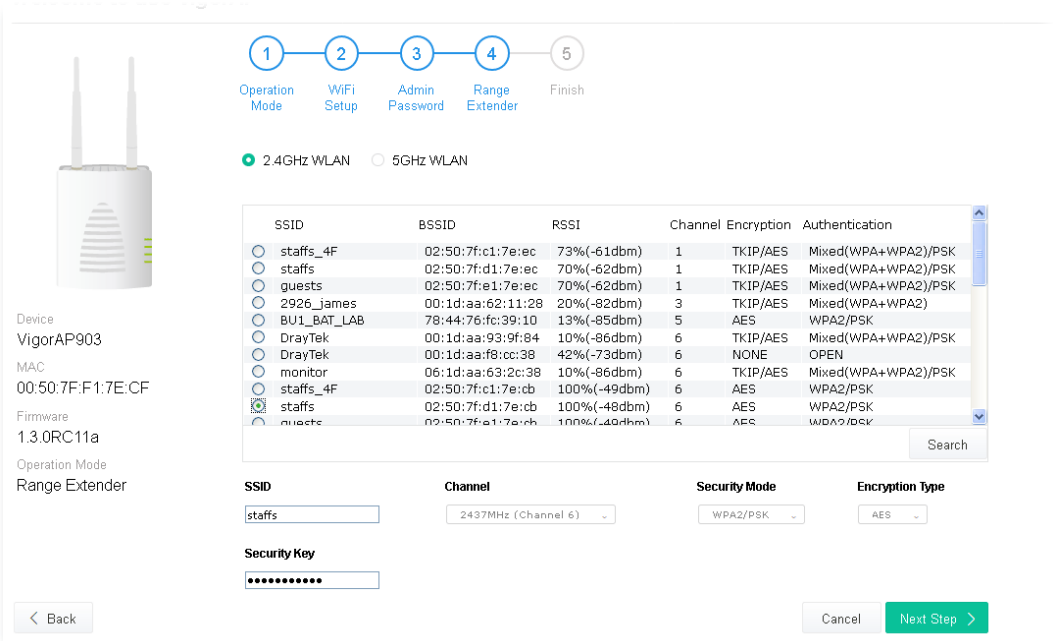
3. Change the default password for such device with new value. Then click **Next Step**.



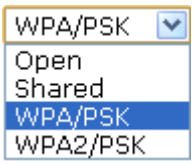
Available settings are explained as follows:

Item	Description
Admin Password	Enter a new password.
Confirm Password	Enter the new password again for confirmation.

4. In the following page, click **Search** to find out neighboring access point. When all the available access points appear on the page, click the one you want to connect. Corresponding settings (e.g., SSID, security key) of the selected device will be shown below. Then click **Next Step**.

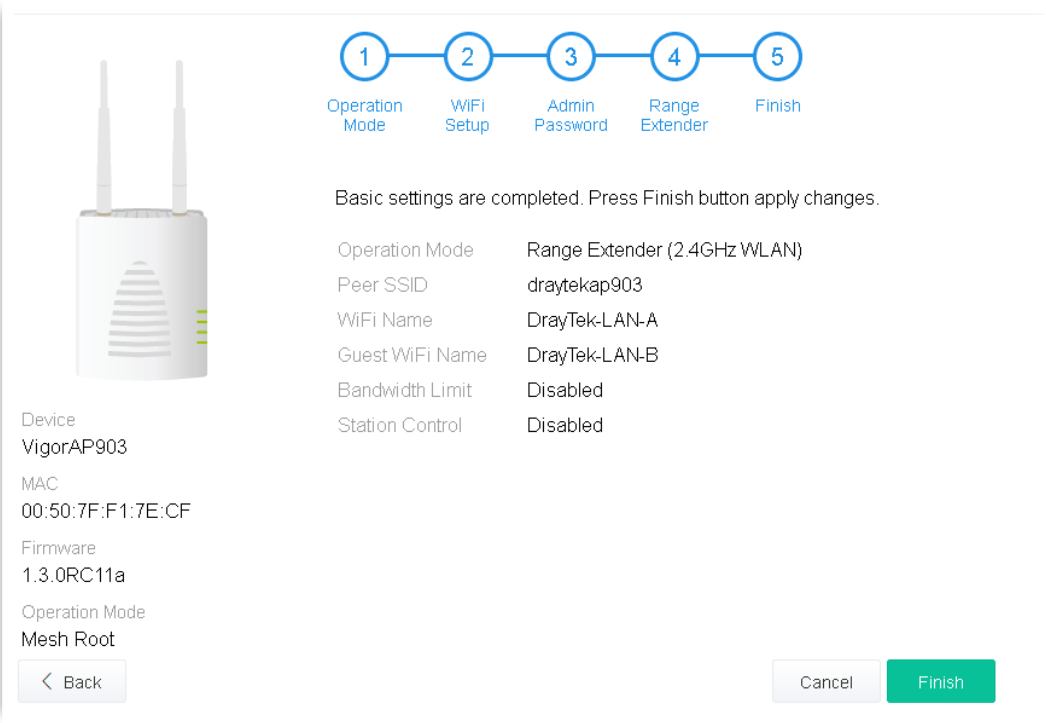


Available settings are explained as follows:

Item	Description
SSID / Security Key	Once the access point specified above, the name / security key of the AP will be shown automatically in these fields.
Channel	Means the channel frequency of the wireless LAN. You may switch channel if the selected channel is under serious interference.
Security Mode	There are several modes provided for you to choose. Each mode will bring up different parameters (e.g., WEP keys, Pass Phrase) for you to configure. 
Encryption Type	Available options will vary according to the selected **Security Mode**. **When Open is selected**: ● Choose **None** to disable the WEP Encryption. Data sent to the AP will not be encrypted. ● **WEP Keys** –To enable WEP encryption for data transmission, please choose **WEP**. Four keys can be entered here, but only one key can be selected at a time. The format of WEP Key is restricted to 5 ASCII characters or 10 hexadecimal values in 64-bit encryption level, or restricted to 13 ASCII characters or 26 hexadecimal values in 128-bit encryption level. The allowed content is the ASCII characters from 33(!) to 126(~) except '#' and ','. **When Shared is selected**: ● **WEP Keys** - To enable WEP encryption for data transmission, please choose **WEP**. Four keys can be entered here, but only one key can be selected at a time. The format of WEP Key is restricted to 5 ASCII characters or 10 hexadecimal values in 64-bit encryption level, or restricted to 13 ASCII characters or 26 hexadecimal values in 128-bit encryption level. The allowed content is the ASCII characters from 33(!) to 126(~) except '#' and ','. **When WPA/PSK or WPA2/PSK is selected**: ● Select **TKIP** or **AES** as the algorithm for WPA. ● **Security Key** - Select WEP, TKIP or AES as the encryption algorithm.

	Type **8~63** ASCII characters, such as 012345678..(or 64 Hexadecimal digits leading by 0x, such as "0x321253abcde...").

5. A summary of settings configuration will be shown on screen. Click **Finish**.



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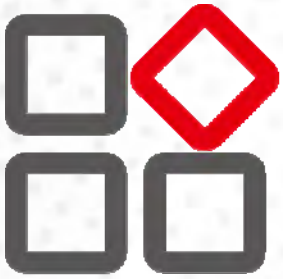
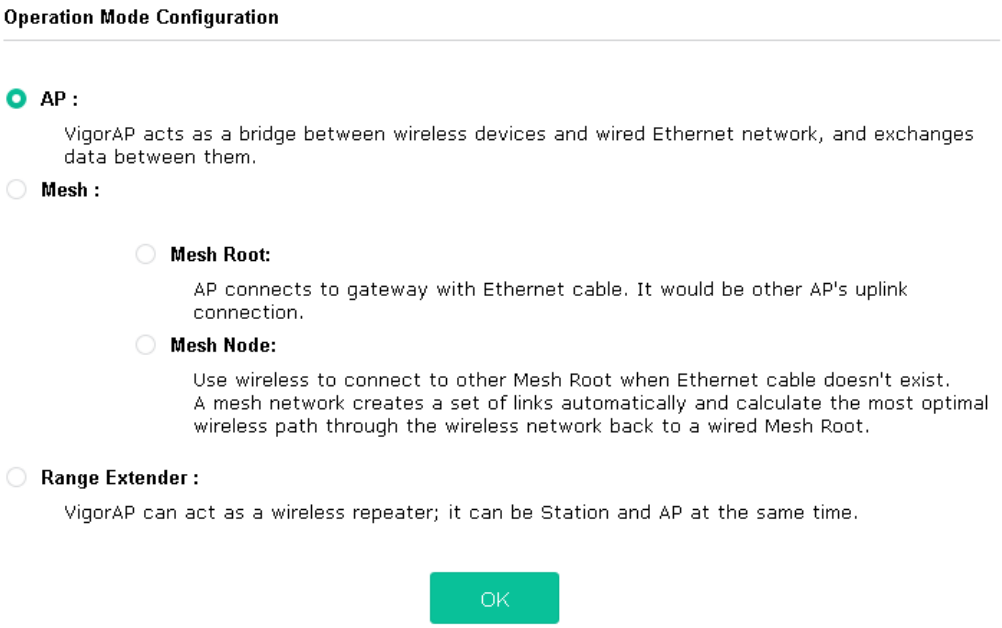
Chapter II Connectivity



II-1 Operation Mode

This page provides several available modes for you to choose for different conditions. Click any one of them and click **OK**. The system will configure the required settings automatically.



Available settings are explained as follows:

Item	Description
AP	This mode allows wireless clients to connect to access point and exchange data with the devices connected to the wired network.
Mesh	**Mesh Root –** VigorAP must connect to a gateway with an Ethernet cable. **Mesh Node –** VigorAP can connect to other mesh root via wireless connection. A mesh network creates one set of links automatically and calculates the most optimal wireless path through the wireless network back to a wired mesh root.
Range Extender	VigorAP can act as a wireless repeater which will help you to extend the networking wirelessly. The access point can act as Station and AP at the same time. It can use Station function to connect to a Root AP and use AP function to service all wireless clients within its coverage.

Note:

The Wireless LAN settings will be changed according to the Operation Mode selected here. For the detailed information, please refer to the section of Wireless LAN.

II-2 General Concepts for Wireless LAN (2.4GHz/5GHz)

VigorAP 903 is a highly integrated wireless local area network (WLAN) for 5 GHz 802.11ac or 2.4/5 GHz 802.11n WLAN applications. It supports channel operations of 20/40 MHz at 2.4 GHz and 20/40/80 MHz at 5 GHz. VigorAP 903 can support data rates up to 867 MBps in 802.11ac 80 MHz channels.

Note:

* The actual data throughput will vary according to the network conditions and environmental factors, including volume of network traffic, network overhead and building materials.

VigorAP 903 plays a role as an Access Point (AP) connecting to lots of wireless clients or Stations (STA). All the STAs will share the same Internet connection via VigorAP 903. The **General Setup** will set up the information of this wireless network, including its SSID as identification, located channel etc.

Security Overview

WEP (Wired Equivalent Privacy) is a legacy method to encrypt each frame transmitted via radio using either a 64-bit or 128-bit key. Usually access point will preset a set of four keys and it will communicate with each station using only one out of the four keys.

WPA (Wi-Fi Protected Access), the most dominating security mechanism in industry, is separated into two categories: WPA-personal or called WPA Pre-Share Key (WPA/PSK), and WPA-Enterprise or called WPA/802.1x.

In WPA-Personal, a pre-defined key is used for encryption during data transmission. WPA applies Temporal Key Integrity Protocol (TKIP) for data encryption while WPA2 applies AES. The WPA-Enterprise combines not only encryption but also authentication.

Since WEP has been proved vulnerable, you may consider using WPA for the most secure connection. You should select the appropriate security mechanism according to your needs. No matter which security suite you select, they all will enhance the over-the-air data protection and /or privacy on your wireless network. The VigorAP 903 is very flexible and can support multiple secure connections with both WEP and WPA at the same time.

WPS Introduction

WPS (Wi-Fi Protected Setup) provides easy procedure to make network connection between wireless station and wireless access point (VigorAP 903) with the encryption of WPA and WPA2.

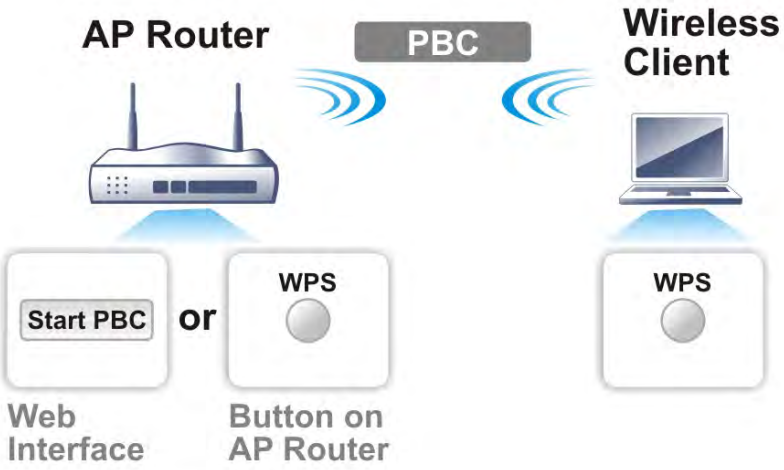
It is the simplest way to build connection between wireless network clients and VigorAP 903. Users do not need to select any encryption mode and type any long encryption passphrase to setup a wireless client every time. He/she only needs to press a button on wireless client, and WPS will connect for client and VigorAP 903 automatically.

Note:

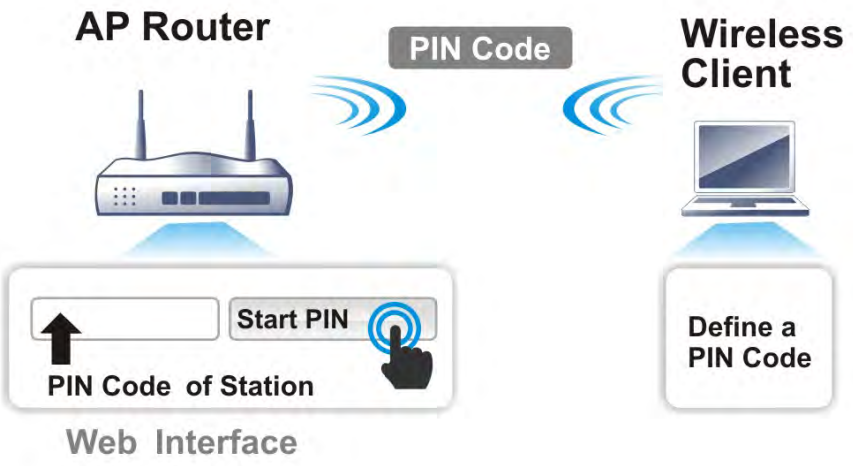
Such function is available for the wireless station with WPS supported.

There are two methods to do network connection through WPS between AP and Stations: pressing the ***Start PBC*** button or using ***PIN Code***.

On the side of VigorAP 903 series which served as an AP, press **WPS** button once on the front panel of VigorAP 903 or click **Start PBC** on web configuration interface. On the side of a station with network card installed, press **Start PBC** button of network card.

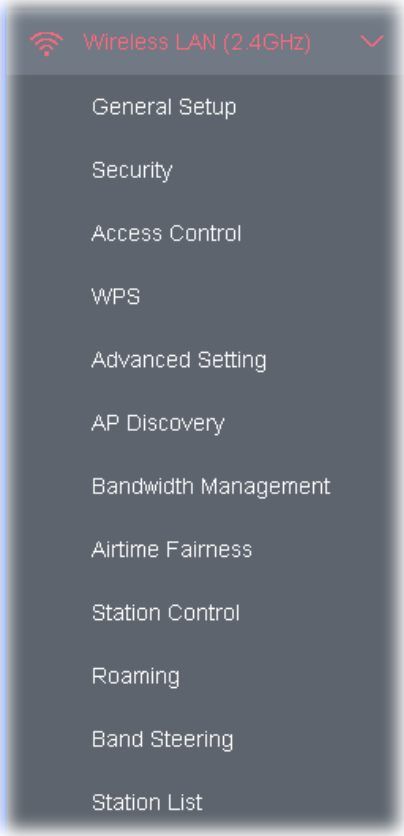


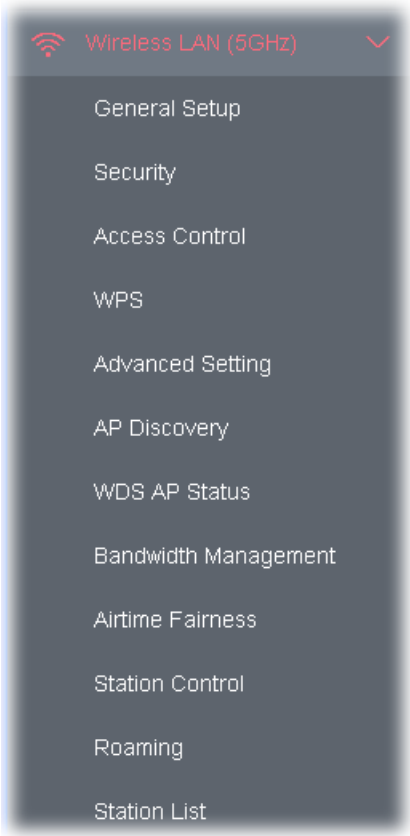
If you want to use PIN code, you have to know the PIN code specified in wireless client. Then provide the PIN code of the wireless client you wish to connect to the VigorAP 903.


AP Router
PIN Code
Wireless Client
Start PIN
PIN Code of Station
Define a PIN Code
Web Interface

II-3 Wireless LAN (2.4GHz/5GHz) Settings for AP Mode

When you choose **AP** as the operation mode, the Wireless LAN menu items will include General Setup, Security, Access Control, WPS, Advanced Setting, AP Discovery, Bandwidth Management, Airtime Fairness, Station Control, Roaming, Band Steering and Station List.

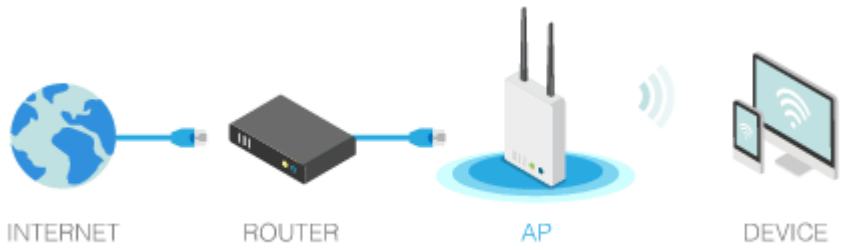




Note:

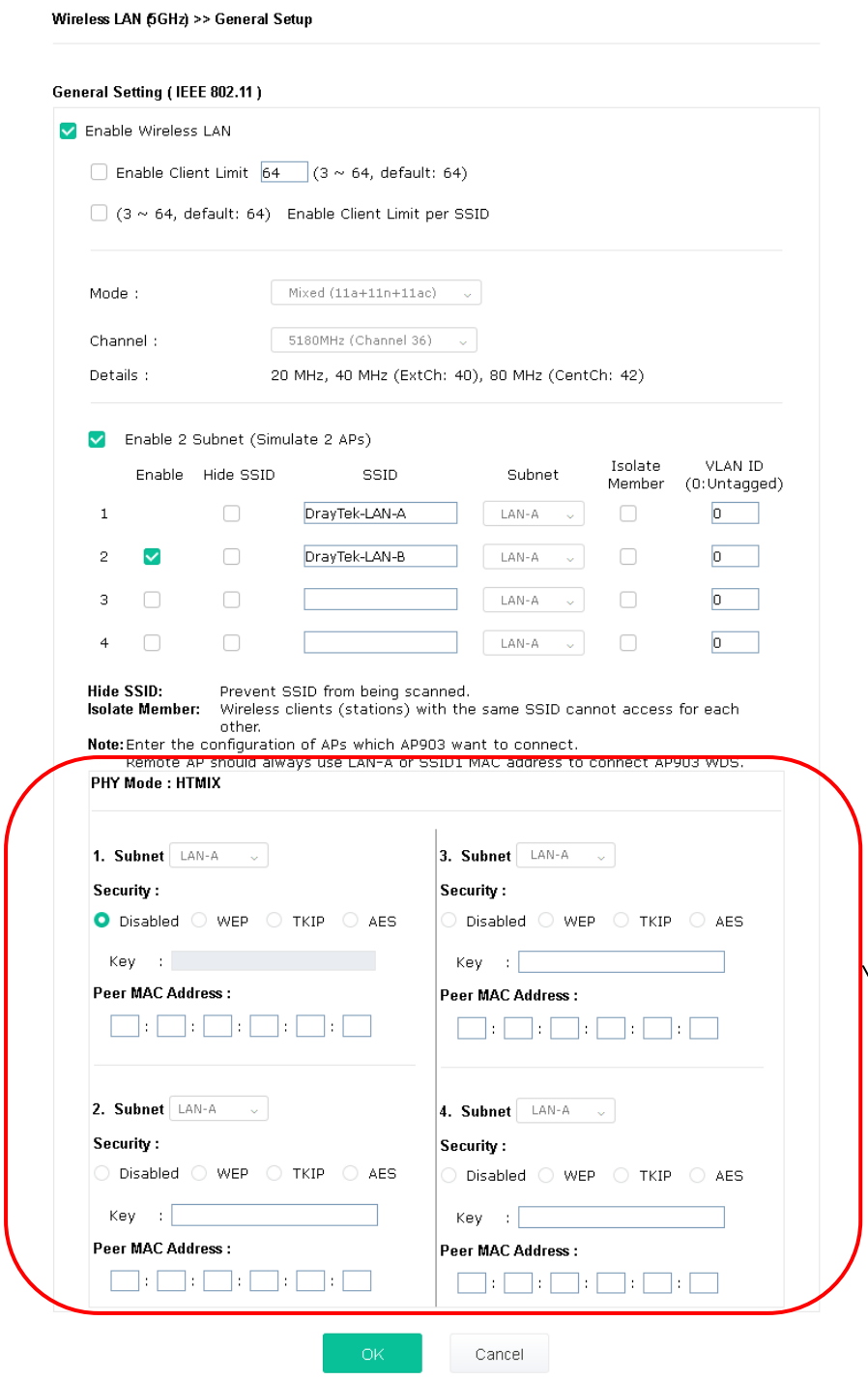
Available settings for **Wireless LAN (2.4GHz) and Wireless LAN (5Ghz)** are almost the same, except for Band Steering.

The following figure shows how VigorAP runs as AP (Access Point)



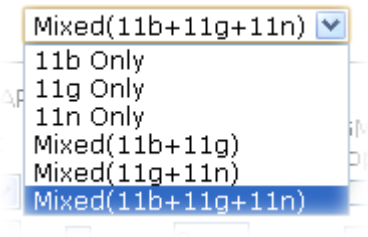
II-3-1 General Setup

By clicking the **General Setup**, a new web page will appear so that you could configure the SSID, the wireless channel and WDS (for 5GHz only). Please refer to the following figure for more information.



Available settings are explained as follows:

Item	Description
Enable Wireless LAN	Check the box to enable wireless function.
Enable Client Limit	Check the box to set the maximum number of wireless stations which try to connect Internet through Vigor device. The number you can set is from 3

	to 64.
Enable Client Limit per SSID	Define the maximum number of wireless stations per SSID which try to connect to Internet through Vigor device. The number you can set is from 3 to 64.
Mode	At present, VigorAP 903 can connect to 11b only, 11g only, 11n only, Mixed (11b+11g), Mixed (11g+11n) and Mixed (11b+11g+11n) stations simultaneously. Simply choose Mixed (11b+11g+11n) mode. 
Channel	Means the channel of frequency of the wireless LAN. You may switch channel if the selected channel is under serious interference. If you have no idea of choosing the frequency, please select **AutoSelect** to let system determine for you.
Extension Channel	With 802.11n, there is one option to double the bandwidth per channel. The available extension channel options will be varied according to the **Channel** selected above. Configure the extension channel you want.
Enable 2 Subnet (Simulate 2 APs)	Check the box to enable the function for two independent subnets. Once you enable this function, LAN-A and LAN-B would be independent. Next, you can connect one router in LAN-A, and another router in LAN-B. Such mechanism can make you feeling that you have two independent AP/subnet functions in one VigorAP 903. If you disable this function, LAN-A and LAN-B ports are in the same domain. You could only connect one router (no matter connecting to LAN-A or LAN-B) in this environment.
Hide SSID	Check it to prevent from wireless sniffing and make it harder for unauthorized clients or STAs to join your wireless LAN. Depending on the wireless utility, the user may only see the information except SSID or just cannot see any thing about VigorAP 903 while site surveying. The system allows you to set four sets of SSID for different usage.
SSID	Set a name for VigorAP 903 to be identified. Default settings are DrayTek-LAN-A and DrayTek-LAN-B. When **Enable 2 Subnet** is enabled, you can specify subnet interface (LAN-A or LAN-B) for each SSID by using the drop down menu.
Subnet	Choose LAN-A or LAN-B for each SSID. If you choose LAN-A, the wireless clients connecting to this SSID could only communicate with LAN-A.
Isolate Member	Check this box to make the wireless clients (stations) with the same SSID not access for each other.
VLAN ID	Type the value for such SSID. Packets transferred from such SSID to LAN will be tagged with the number. If your network uses VLANs, you can assign the SSID to a VLAN on your network. Client devices that associate using the SSID are grouped into this VLAN. The VLAN ID range is from 3 to 4095. The VLAN ID is 0 by default, it means disabling the VLAN function for the SSID.
PHY Mode	Data will be transmitted via HTMIX mode. Each access point should be setup to the same **Phy Mode** for connecting with each other.

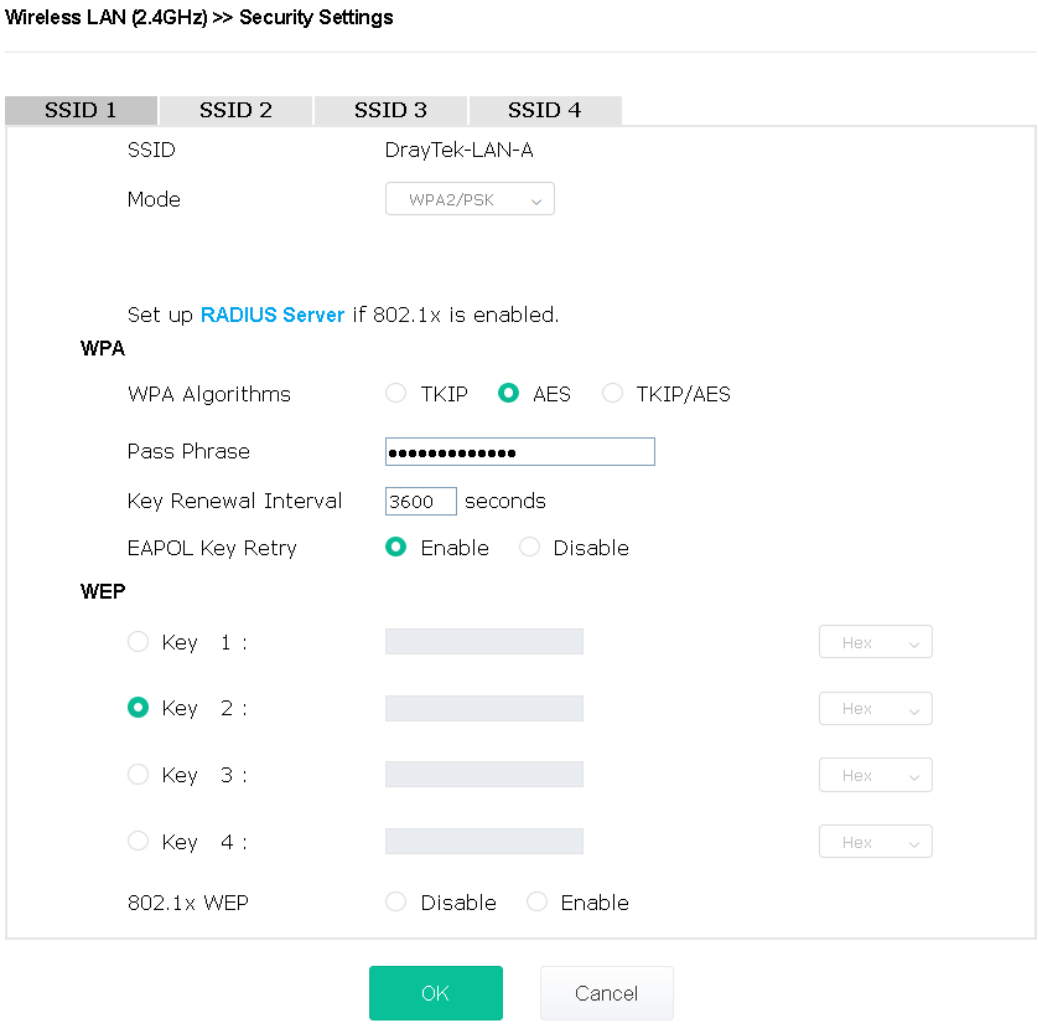
Subnet	Choose LAN-A or LAN-B for each SSID. A remote AP should use **LAN-A** to connect to VigorAP 903 via **WDS**.
Security	Select WEP, TKIP or AES as the encryption algorithm. Type **8~63** ASCII characters, such as 012345678..(or 64 Hexadecimal digits leading by 0x, such as "0x321253abcde...").
Peer MAC Address	Type the peer MAC address for the access point that VigorAP 902 connects to.

After finishing this web page configuration, please click **OK** to save the settings.

II-3-2 Security

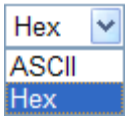
This page allows you to set security with different modes for SSID 1, 2, 3 and 4 respectively. After configuring the correct settings, please click **OK** to save and invoke it.

By clicking the **Security Settings**, a new web page will appear so that you could configure the settings.

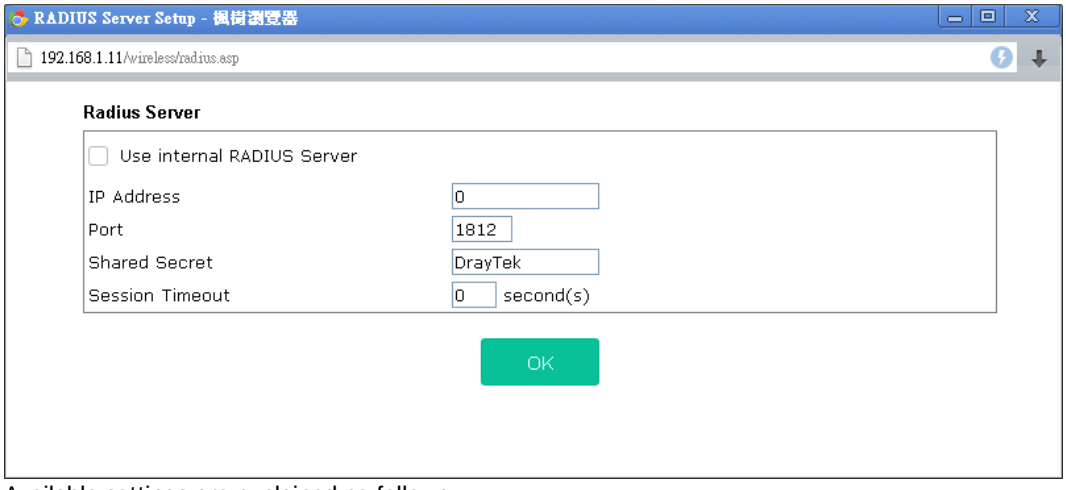


Available settings are explained as follows:

Item	Description
Mode	There are several modes provided for you to choose. **Disable** - The encryption mechanism is turned off. **WEP** - Accepts only WEP clients and the encryption key should be entered in WEP Key. **WPA/PSK or WPA2/PSK or Mixed (WPA+WPA2)/PSK -** Accepts only WPA clients and the encryption key should be entered in PSK. The WPA encrypts each frame transmitted from the radio using the key, which either PSK (Pre-Shared Key) entered manually in this field below or automatically negotiated via 802.1x authentication. **WEP/802.1x -** The built-in RADIUS client feature enables VigorAP 903 to assist the remote dial-in user or a wireless station and the RADIUS server in performing mutual authentication. It enables centralized remote access authentication for network management. The WPA encrypts each frame transmitted from the radio using the key,

	which either PSK (Pre-Shared Key) entered manually in this field below or automatically negotiated via 802.1x authentication. Select WPA, WPA2 or Auto as WPA mode. **WPA/802.1x -** The WPA encrypts each frame transmitted from the radio using the key, which either PSK (Pre-Shared Key) entered manually in this field below or automatically negotiated via 802.1x authentication. **WPA2/802.1x -** The WPA encrypts each frame transmitted from the radio using the key, which either PSK (Pre-Shared Key) entered manually in this field below or automatically negotiated via 802.1x authentication.
WPA Algorithms	Select TKIP, AES or TKIP/AES as the algorithm for WPA. Such feature is available for **WPA2/802.1x, WPA/802.1x, WPA/PSK or WPA2/PSK or Mixed (WPA+WPA2)/PSK** mode.
Pass Phrase	Type **8~63** ASCII characters, such as 012345678..(or 64 Hexadecimal digits leading by 0x, such as "0x321253abcde..."). Such feature is available for **WPA/PSK or WPA2/PSK or Mixed (WPA+WPA2)/PSK** mode.
Key Renewal Interval	WPA uses shared key for authentication to the network. However, normal network operations use a different encryption key that is randomly generated. This randomly generated key that is periodically replaced. Enter the renewal security time (seconds) in the column. Smaller interval leads to greater security but lower performance. Default is 3600 seconds. Set 0 to disable re-key. Such feature is available for **WPA2/802.1,WPA/802.1x, WPA/PSK or WPA2/PSK or Mixed (WPA+WPA2)/PSK** mode.
EAPOL Key Retry	EAPOL means Extensible Authentication Protocol over LAN. Click **Enable** to make sure that the key will be installed and used once in order to prevent key reinstallation attack.
Key 1 – Key 4	Four keys can be entered here, but only one key can be selected at a time. The format of WEP Key is restricted to 5 ASCII characters or 10 hexadecimal values in 64-bit encryption level, or restricted to 13 ASCII characters or 26 hexadecimal values in 128-bit encryption level. The allowed content is the ASCII characters from 33(!) to 126(~) except '#' and ','. Such feature is available for **WEP** mode. 
802.1x WEP	**Disable** - Disable the WEP Encryption. Data sent to the AP will not be encrypted. **Enable** - Enable the WEP Encryption. Such feature is available for **WEP/802.1x** mode.

Click the link of **RADIUS Server** to access into the following page for more settings.



Available settings are explained as follows:

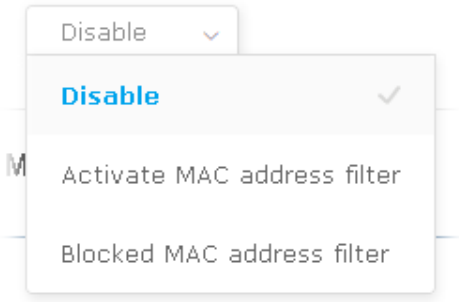
Item	Description
Use internal RADIUS Server	There is a RADIUS server built in VigorAP 903 which is used to authenticate the wireless client connecting to the access point. Check this box to use the internal RADIUS server for wireless security. Besides, if you want to use the external RADIUS server for authentication, do not check this box. Please refer to the section, **IV-1-1 RADIUS Server** to configure settings for internal server of VigorAP 903.
IP Address	Enter the IP address of external RADIUS server.
Port	The UDP port number that the external RADIUS server is using. The default value is 1812, based on RFC 2138.
Shared Secret	The external RADIUS server and client share a secret that is used to authenticate the messages sent between them. Both sides must be configured to use the same shared secret.
Session Timeout	Set the maximum time of service provided before re-authentication. Set to zero to perform another authentication immediately after the first authentication has successfully completed. (The unit is second.)

After finishing this web page configuration, please click **OK** to save the settings.

II-3-3 Access Control

For additional security of wireless access, the **Access Control** facility allows you to restrict the network access right by controlling the wireless LAN MAC address of client. Only the valid MAC address that has been configured can access the wireless LAN interface. By clicking the **Access Control**, a new web page will appear, as depicted below, so that you could edit the clients' MAC addresses to control their access rights (deny or allow).

Available settings are explained as follows:

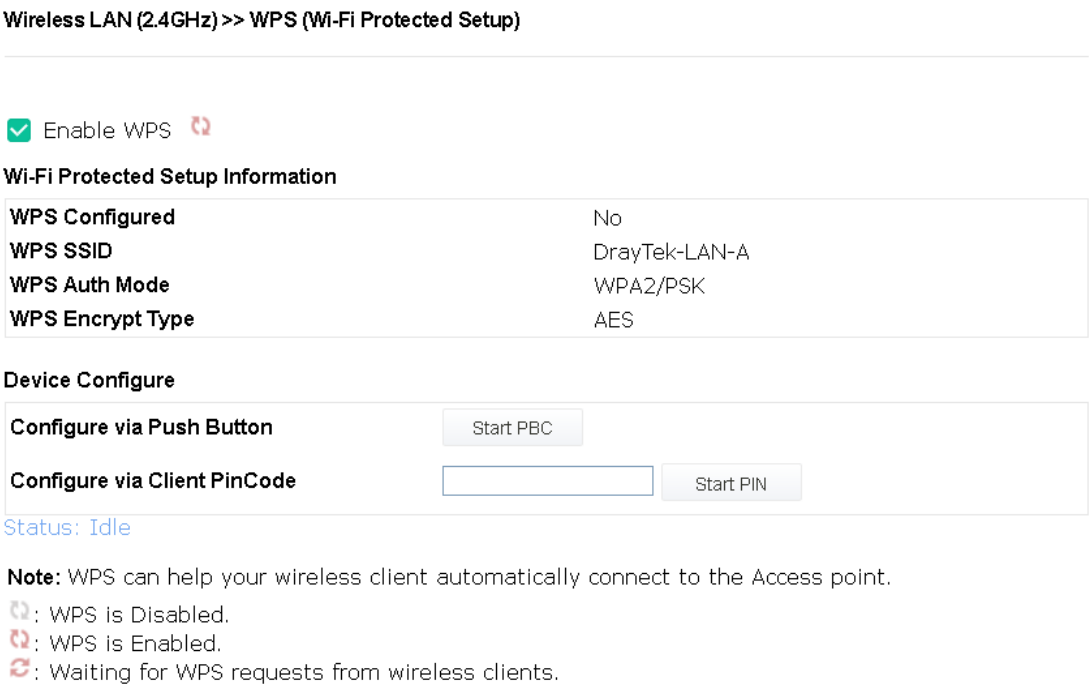
Item	Description
Policy	Select to enable any one of the following policy or disable the policy. Choose **Activate MAC address filter** to type in the MAC addresses for other clients in the network manually. Choose **Blocked MAC address filter,** so that all of the devices with the MAC addresses listed on the MAC Address Filter table will be blocked and cannot access into VigorAP 903. 
MAC Address Filter	Display all MAC addresses that are edited before.
Client's MAC Address	Manually enter the MAC address of wireless client.

Add	Add a new MAC address into the list.
Delete	Delete the selected MAC address in the list.
Edit	Edit the selected MAC address in the list.
Cancel	Give up the access control set up.
Backup	Click it to store the settings (MAC addresses on MAC Address Filter table) on this page as a file.
Restore	Click it to restore the settings (MAC addresses on MAC Address Filter table) from an existed file.

After finishing this web page configuration, please click **OK** to save the settings.

II-3-4 WPS

Open **Wireless LAN>>WPS** to configure the corresponding settings.



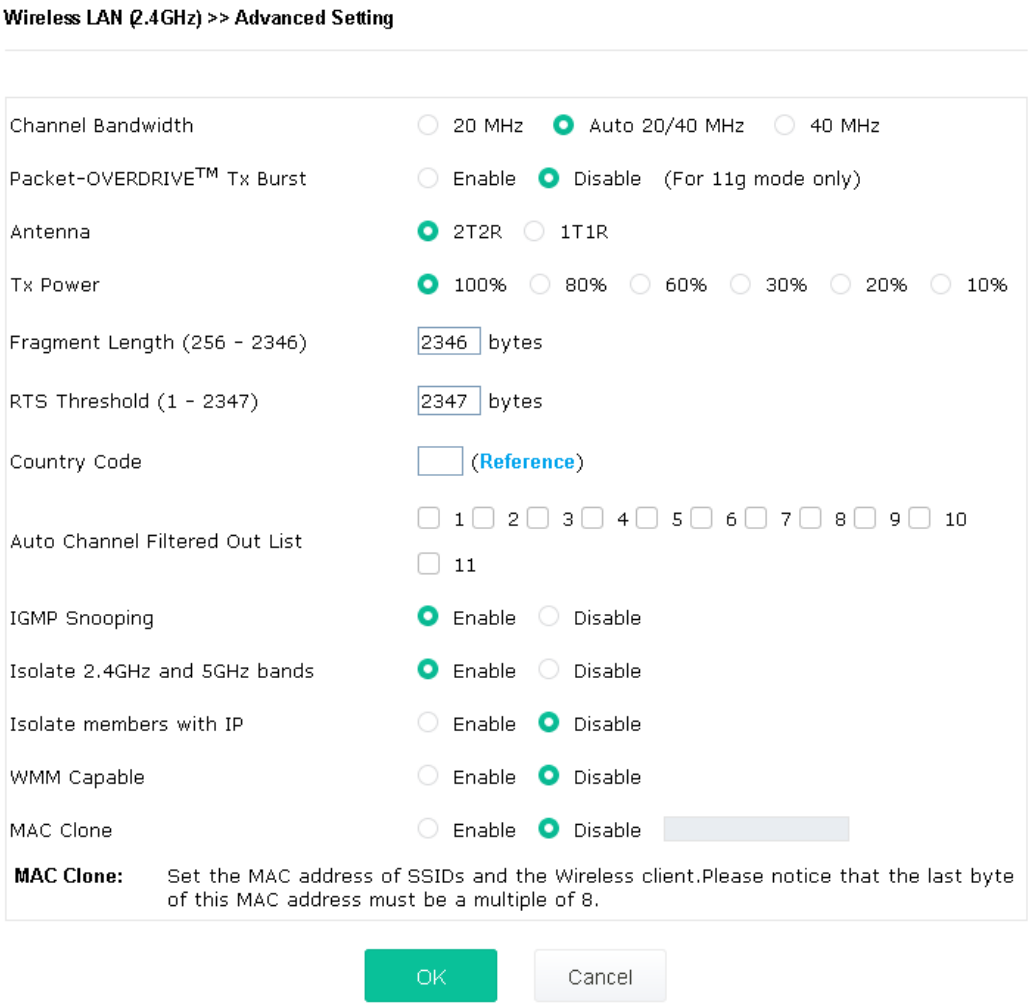
Available settings are explained as follows:

Item	Description
Enable WPS	Check this box to enable WPS setting.
WPS Configured	Display related system information for WPS. If the wireless security (encryption) function of VigorAP 903 is properly configured, you can see 'Yes' message here.
WPS SSID	Display current selected SSID.
WPS Auth Mode	Display current authentication mode of the VigorAP 903. Only WPA2/PSK and WPA/PSK support WPS.
WPS Encrypt Type	Display encryption mode (None, WEP, TKIP, AES, etc.) of VigorAP 903.
Configure via Push Button	Click **Start PBC** to invoke Push-Button style WPS setup procedure. VigorAP 903 will wait for WPS requests from wireless clients about two minutes. Both ACT and 2.4G WLAN LEDs on VigorAP 903 will blink quickly when WPS is in progress. It will return to normal condition after two minutes. (You need to setup WPS within two minutes)
Configure via Client	Type the PIN code specified in wireless client you wish to connect, and

PinCode	click **Start PIN** button. Both ACT and 2.4G WLAN LEDs on VigorAP 903 will blink quickly when WPS is in progress. It will return to normal condition after two minutes. (You need to setup WPS within two minutes).

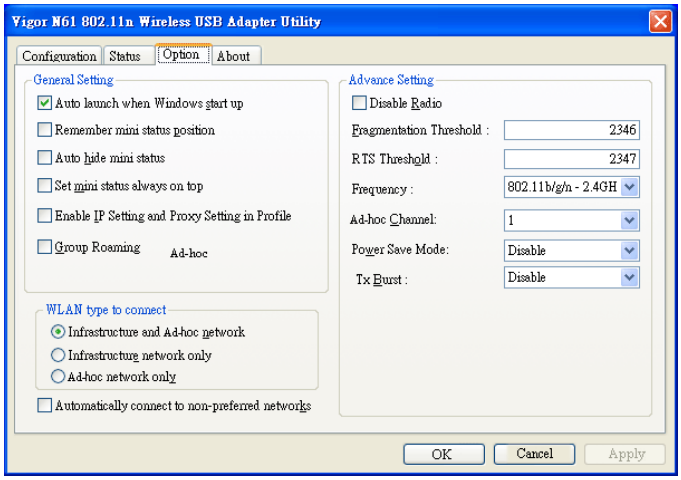
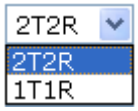
II-3-5 Advanced Setting

This page is to determine which algorithm will be selected for wireless transmission rate.



Available settings are explained as follows:

Item	Description
Channel Width	**20 MHz-** the device will use 20MHz for data transmission and receiving between the AP and the stations. **Auto 20/40 MHz–** the AP will scan for nearby wireless AP, and then use 20MHz if the number of AP is more than 10, or use 40MHz if it's not. **40 MHz-** the device will use 40MHz for data transmission and receiving between the AP and the stations.
Packet-OVERDRIVE	This feature can enhance the performance in data transmission about 40%* more (by checking **Tx Burst**). It is active only when both sides of Access Point and Station (in wireless client) invoke this function at the same time. That is, the wireless client must support this feature and invoke the function, too. Vigor N61 wireless adapter supports this function. Therefore, you can use and install it into your PC for matching with Packet-OVERDRIVE (refer to the following picture of Vigor N61 wireless utility window, choose **Enable**

	for **TxBURST** on the tab of **Option**). 
Antenna	VigorAP can be attached with two antennas to have good data transmission via wireless connection. However, if you have only one antenna attached, please choose 1T1R. 
Tx Power	The default setting is the maximum (100%). Lowering down the value may degrade range and throughput of wireless.
Fragment Length	Set the Fragment threshold of wireless radio. Do not modify default value if you don't know what it is, default value is 2346.
RTS Threshold	Minimize the collision (unit is bytes) between hidden stations to improve wireless performance. Set the RTS threshold of wireless radio. Do not modify default value if you don't know what it is, default value is 2347.
Country Code	VigorAP broadcasts country codes by following the 802.11d standard. However, some wireless stations will detect / scan the country code to prevent conflict occurred. If conflict is detected, wireless station will be warned and is unable to make network connection. Therefore, changing the country code to ensure successful network connection will be necessary for some clients.
Auto Channel Filtered Out List	The selected wireless channels will be discarded if **AutoSelect** is selected as **Channel** selection mode in **Wireless LAN>>General Setup**.
IGMP Snooping	Click **Enable** to enable IGMP Snooping. Multicast traffic will be forwarded to ports that have members of that group. Disabling IGMP snooping will make multicast traffic treated in the same manner as broadcast traffic.
Isolate 2.4GHz and 5GHz bands	The default setting is "Enable". It means that the wireless client using 2.4GHz band is unable to connect to the wireless client with 5GHz band, and vice versa. For WLAN 2.4GHz and 5GHz set with the same SSID name: • No matter such function is enabled or disabled, clients using WLAN 2.4GHz and 5GHz can communicate for each other if **Isolate Member** (in **Wireless LAN>>General Setup**) is NOT enabled for such SSID. • Yet, if the function of **Isolate Member** (in **Wireless LAN>>General Setup**) is enabled for such SSID, clients using WLAN 2.4GHz and 5GHz will be unable to communicate with each other.
Isolate members with	The default setting is "Disable".

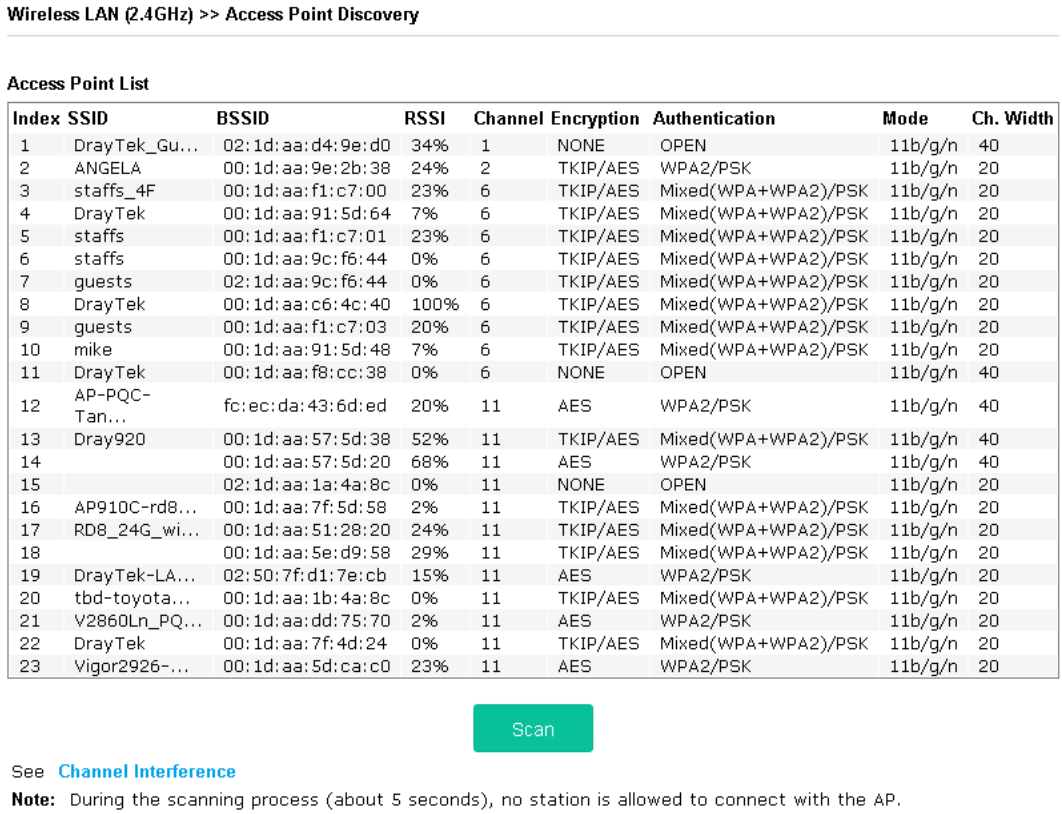
IP	If it is enabled, VigorAP will isolate different wireless clients according to their IP address(es).
WMM Capable	To apply WMM parameters for wireless data transmission, please click the **Enable** radio button.
MAC Clone	Click **Enable** and manually enter the MAC address of the device with SSID 1. The MAC address of other SSIDs will change based on this MAC address.

After finishing this web page configuration, please click **OK** to save the settings.

II-3-6 AP Discovery

VigorAP 903 can scan all regulatory channels and find working APs in the neighborhood. Based on the scanning result, users will know which channel is clean for usage. Also, it can be used to facilitate finding an AP for a WDS link. Notice that during the scanning process (about 5 seconds), no client is allowed to connect to VigorAP.

This page is used to scan the existence of the APs on the wireless LAN. Please click **Scan** to discover all the connected APs.



Wireless LAN (2.4GHz) >> Access Point Discovery

Access Point List

Index	SSID	BSSID	RSSI	Channel	Encryption	Authentication	Mode	Ch. Width
1	DrayTek_Gu...	02:1d:aa:d4:9e:d0	34%	1	NONE	OPEN	11b/g/n	40
2	ANGELA	00:1d:aa:9e:2b:38	24%	2	TKIP/AES	WPA2/PSK	11b/g/n	20
3	staffs_4F	00:1d:aa:f1:c7:00	23%	6	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
4	DrayTek	00:1d:aa:91:5d:64	7%	6	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
5	staffs	00:1d:aa:f1:c7:01	23%	6	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
6	staffs	00:1d:aa:9c:f6:44	0%	6	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
7	guests	02:1d:aa:9c:f6:44	0%	6	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
8	DrayTek	00:1d:aa:c6:4c:40	100%	6	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
9	guests	00:1d:aa:f1:c7:03	20%	6	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
10	mike	00:1d:aa:91:5d:48	7%	6	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
11	DrayTek	00:1d:aa:f8:cc:38	0%	6	NONE	OPEN	11b/g/n	40
12	AP-PQC-Tan...	fc:ec:da:43:6d:ed	20%	11	AES	WPA2/PSK	11b/g/n	40
13	Dray920	00:1d:aa:57:5d:38	52%	11	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	40
14		00:1d:aa:57:5d:20	68%	11	AES	WPA2/PSK	11b/g/n	40
15		02:1d:aa:1a:4a:8c	0%	11	NONE	OPEN	11b/g/n	20
16	AP910C-rd8...	00:1d:aa:7f:5d:58	2%	11	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
17	RD8_24G_wi...	00:1d:aa:51:28:20	24%	11	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
18		00:1d:aa:5e:d9:58	29%	11	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
19	DrayTek-LA...	02:50:7f:d1:7e:cb	15%	11	AES	WPA2/PSK	11b/g/n	20
20	tbd-toyota...	00:1d:aa:1b:4a:8c	0%	11	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
21	V2860Ln_PQ...	00:1d:aa:dd:75:70	2%	11	AES	WPA2/PSK	11b/g/n	20
22	DrayTek	00:1d:aa:7f:4d:24	0%	11	TKIP/AES	Mixed(WPA+WPA2)/PSK	11b/g/n	20
23	Vigor2926-...	00:1d:aa:5d:ca:c0	23%	11	AES	WPA2/PSK	11b/g/n	20

Scan

See Channel Interference

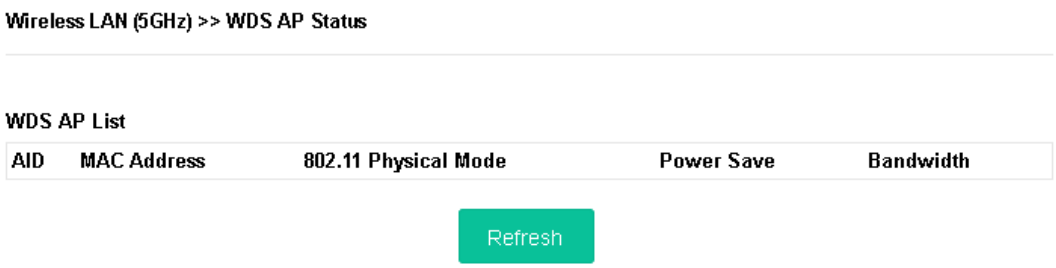
Note: During the scanning process (about 5 seconds), no station is allowed to connect with the AP.

Each item is explained as follows:

Item	Description
SSID	Display the SSID of the AP scanned by VigorAP 903.
BSSID	Display the MAC address of the AP scanned by VigorAP 903.
RSSI	Display the signal strength of the access point. RSSI is the abbreviation of Received Signal Strength Indication.
Channel	Display the wireless channel used for the AP that is scanned by VigorAP 903.
Encryption	Display the encryption mode for the scanned AP.
Authentication	Display the authentication type that the scanned AP applied.
Mode	Display the wireless connection mode that the scanned AP used.
Ch. Width	Display the channel width that the scanned AP used.
Scan	It is used to discover all the connected AP. The results will be shown on the box above this button

II-3-7 WDS AP Status

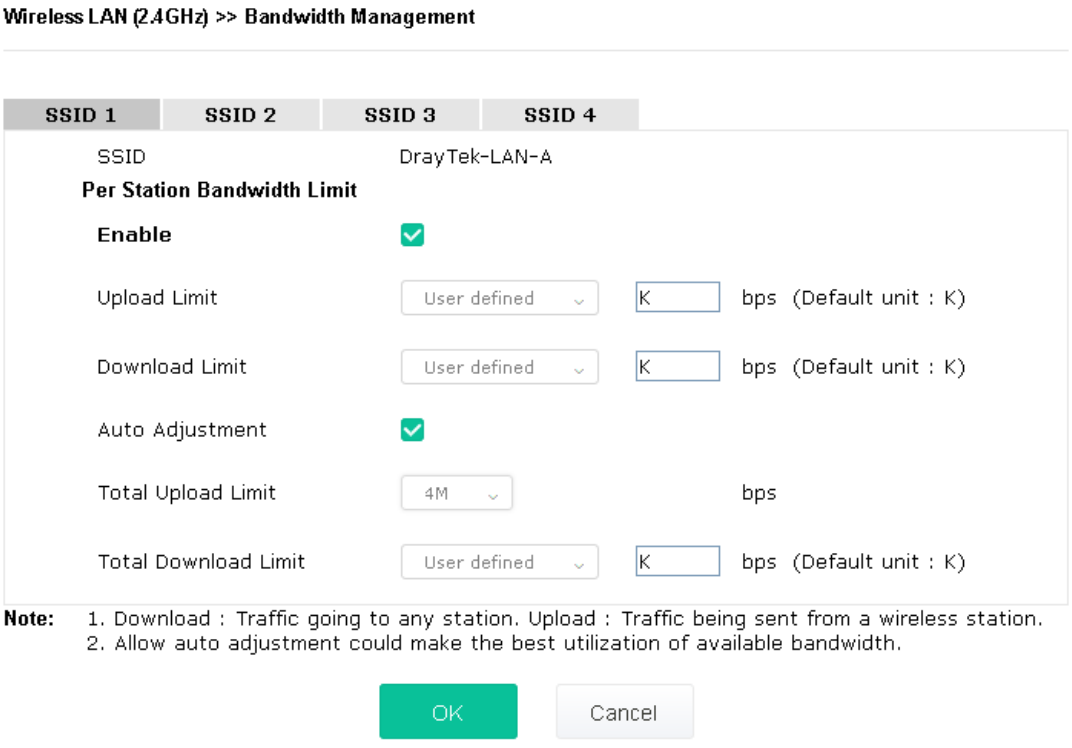
VigorAP 903 can display the status such as MAC address, physical mode, power save and bandwidth for the working AP connected with WDS. Click **Refresh** to get the newest information.



It is available for wireless LAN (5GHz) only.

II-3-8 Bandwidth Management

The downstream or upstream from FTP, HTTP or some P2P applications will occupy large of bandwidth and affect the applications for other programs. Please use Bandwidth Management to make the bandwidth usage more efficient.



Available settings are explained as follows:

Item	Description
SSID	Display the specific SSID name.
Enable	Check this box to enable the bandwidth management for clients.
Upload Limit	Define the maximum speed of the data uploading which will be used for the wireless stations connecting to Vigor device with the same SSID. Use the drop down list to choose the rate. If you choose **User defined**,

	you have to specify the rate manually.
Download Limit	Define the maximum speed of the data downloading which will be used for the wireless station connecting to Vigor device with the same SSID. Use the drop down list to choose the rate. If you choose **User defined**, you have to specify the rate manually.
Auto Adjustment	Check this box to have the bandwidth limit determined by the system automatically.
Total Upload Limit	When Auto Adjustment is checked, the value defined here will be treated as the total bandwidth shared by all of the wireless stations with the same SSID for data uploading.
Total Download Limit	When Auto Adjustment is checked, the value defined here will be treated as the total bandwidth shared by all of the wireless stations with the same SSID for data downloading.

After finishing this web page configuration, please click **OK** to save the settings.

II-3-9 Airtime Fairness

Airtime fairness is essential in wireless networks that must support critical enterprise applications.

Most of the applications are either symmetric or require more downlink than uplink capacity; telephony and email send the same amount of data in each direction, while video streaming and web surfing involve more traffic sent from access points to clients than the other way around. This is essential for ensuring predictable performance and quality-of-service, as well as allowing 802.11n and legacy clients to coexist on the same network. Without airtime fairness, offices using mixed mode networks risk having legacy clients slow down the entire network or letting the fastest client(s) crowd out other users.

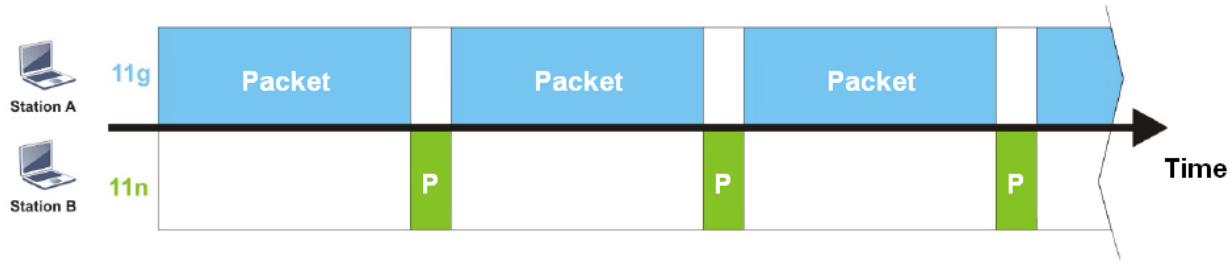
With airtime fairness, every client at a given quality-of-service level has equal access to the network's airtime.

The wireless channel can be accessed by only one wireless station at the same time.

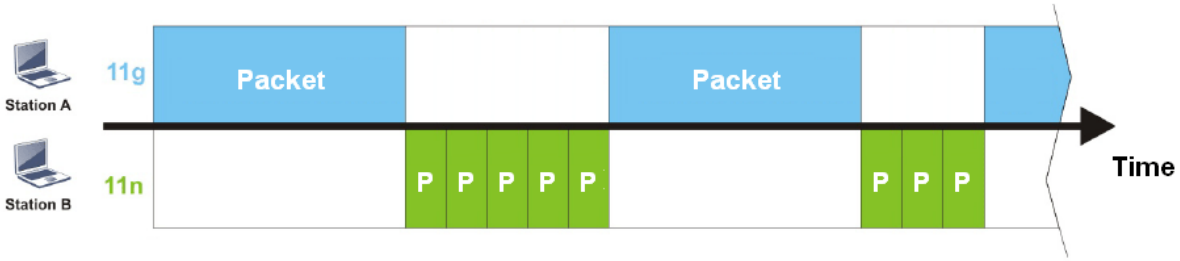
The principle behind the IEEE802.11 channel access mechanisms is that each station has ***equal probability*** to access the channel. When wireless stations have similar data rate, this principle leads to a fair result. In this case, stations get similar channel access time which is called airtime.

However, when stations have various data rate (e.g., 11g, 11n), the result is not fair. The slow stations (11g) work in their slow data rate and occupy too much airtime, whereas the fast stations (11n) become much slower.

Take the following figure as an example, both Station A(11g) and Station B(11n) transmit data packets through VigorAP 903. Although they have equal probability to access the wireless channel, Station B(11n) gets only a little airtime and waits too much because Station A(11g) spends longer time to send one packet. In other words, Station B(fast rate) is obstructed by Station A(slow rate).



To improve this problem, Airtime Fairness is added for VigorAP 903. Airtime Fairness function tries to assign *similar airtime* to each station (A/B) by controlling TX traffic. In the following figure, Station B(11n) has higher probability to send data packets than Station A(11g). By this way, Station B(fast rate) gets fair airtime and it's speed is not limited by Station A(slow rate).



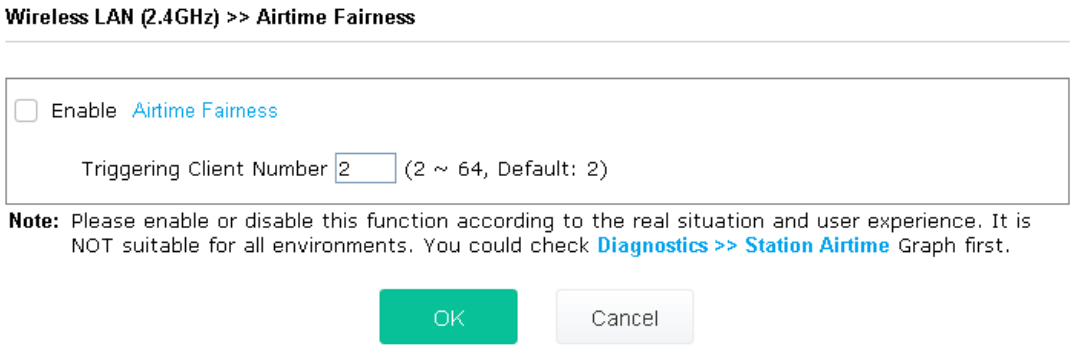
It is similar to automatic Bandwidth Limit. The dynamic bandwidth limit of each station depends on instant active station number and airtime assignment. Please note that Airtime Fairness of 2.4GHz and 5GHz are independent. But stations of different SSIDs function together, because they all use the same wireless channel. IN SPECIFIC ENVIRONMENTS, this function can reduce the bad influence of slow wireless devices and improve the overall wireless performance.

Suitable environment:

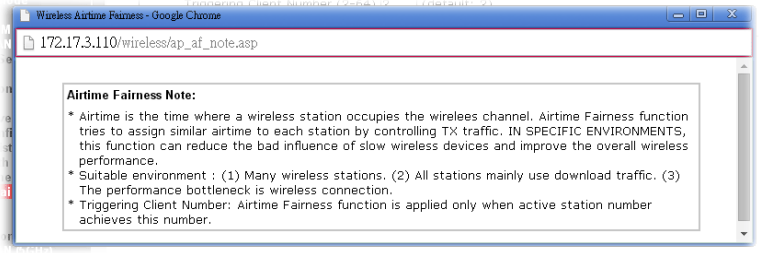
(1) Many wireless stations.

(2) All stations mainly use download traffic.

(3) The performance bottleneck is wireless connection.



Available settings are explained as follows:

Item	Description
Enable Airtime Fairness	Try to assign similar airtime to each wireless station by controlling TX traffic. **Airtime Fairness** – Click the link to display the following screen of airtime fairness note.  **Triggering Client Number –**Airtime Fairness function is applied only when active station number achieves this number.

After finishing this web page configuration, please click **OK** to save the settings.

Note:

Airtime Fairness function and Bandwidth Limit function should be mutually exclusive. So their webs have extra actions to ensure these two functions are not enabled simultaneously.

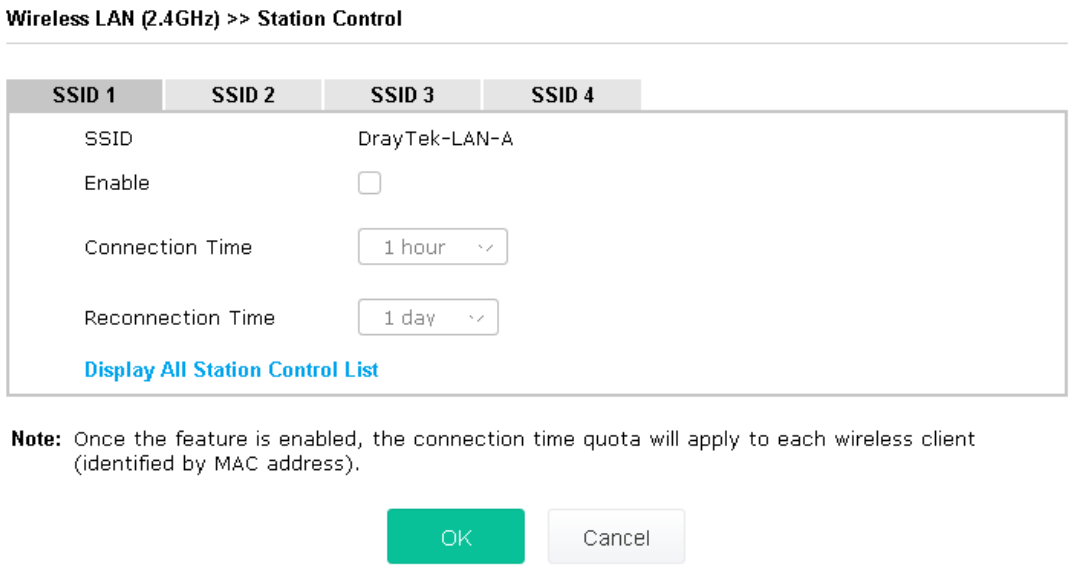
II-3-10 Station Control

Station Control is used to specify the duration for the wireless client to connect and reconnect VigorAP. If such function is not enabled, the wireless client can connect VigorAP until it shuts down.

Such feature is especially useful for free Wi-Fi service. For example, a coffee shop offers free Wi-Fi service for its guests for one hour every day. Then, the connection time can be set as “1 hour” and reconnection time can be set as “1 day”. Thus, the guest can finish his job within one hour and will not occupy the wireless network for a long time.

Note:

Up to 300 Wireless Station records are supported by VigorAP.



Available settings are explained as follows:

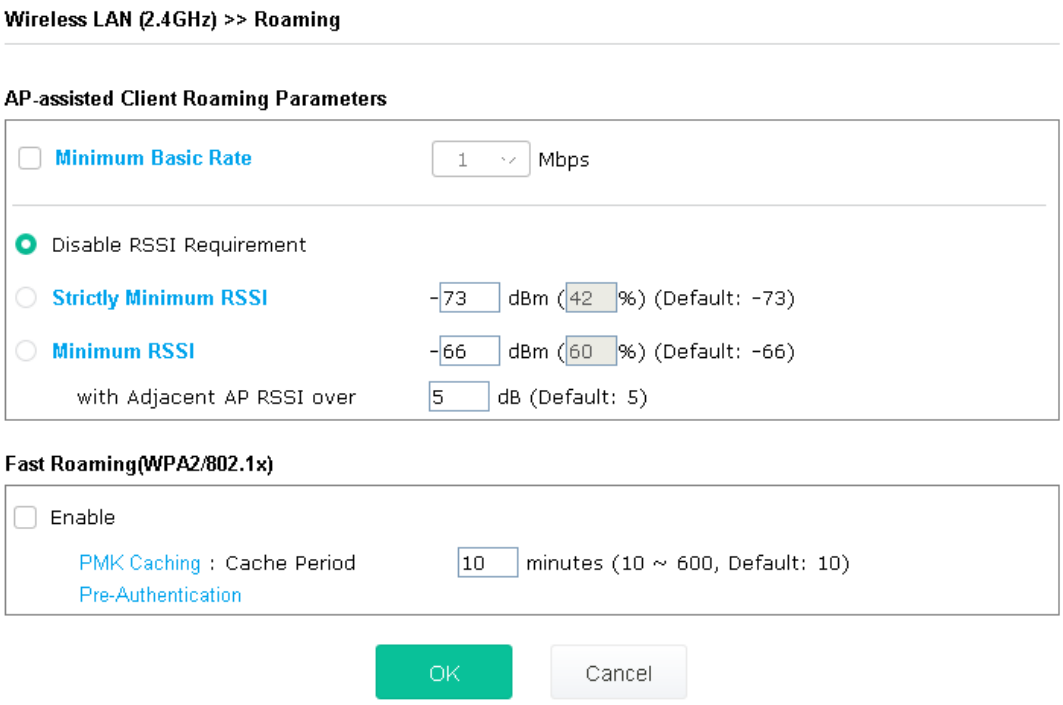
Item	Description
SSID	Display the SSID that the wireless station will use it to connect with Vigor router.
Enable	Check the box to enable the station control function.
Connection Time / Reconnection Time	Use the drop down list to choose the duration for the wireless client connecting /reconnecting to Vigor device. Or, type the duration manually when you choose **User defined**.
Display All Station Control List	All the wireless stations connecting to Vigor router by using such SSID will be listed on Station Control List.

After finishing all the settings here, please click **OK** to save the configuration.

II-3-11 Roaming

The network signal for a single wireless access point might be limited by its coverage range. Therefore, if you want to expand the wireless network in a large exhibition with a quick method, you can install multiple access points with enabling the Roaming feature for each AP to reach the purpose of expanding wireless signals seamlessly.

These access points connecting for each other shall be verified by pre-authentication. This page allows you to enable the roaming feature and the pre-authentication.



Available settings are explained as follows:

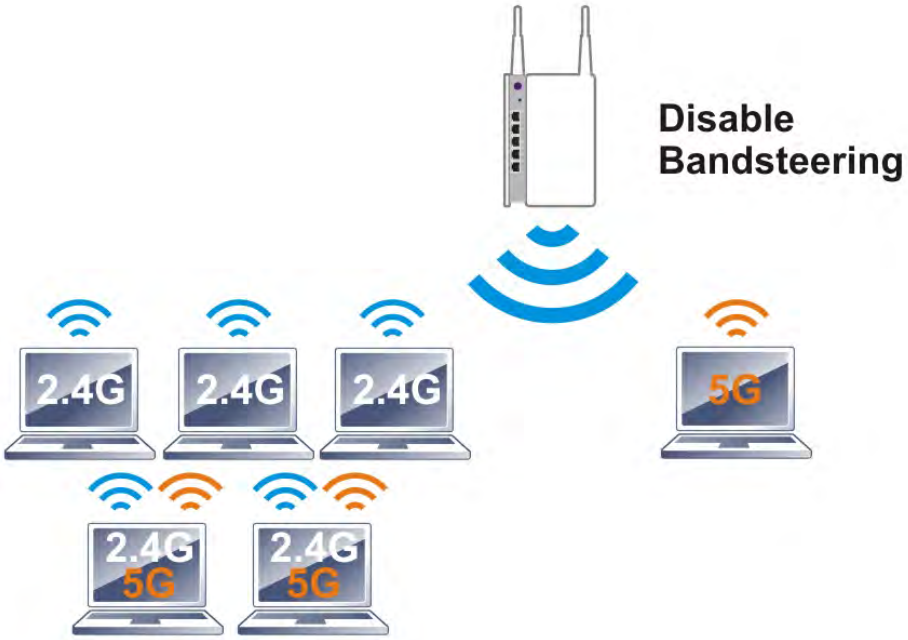
Item	Description
AP-assisted Client Roaming Parameters	When the link rate of wireless station is too low or the signal received by the wireless station is too worse, VigorAP 903 will automatically detect (based on the link rate and RSSI requirement) and cut off the network connection for that wireless station to assist it to connect another Wireless AP to get better signal. **Minimum Basic Rate –** Check the box to use the drop down list to specify a basic rate (**Mbps**). When the link rate of the wireless station is below such value, VigorAP 903 will terminate the network connection for that wireless station. **Disable RSSI Requirement -** If it is selected, VigorAP will not terminate the network connection based on RSSI. **Strictly Minimum RSSI -** VigorAP uses RSSI (received signal strength indicator) to decide to terminate the network connection of wireless station. When the signal strength is below the value (**dBm**) set here, VigorAP 903 will terminate the network connection for that wireless station. **Minimum RSSI -** When the signal strength of the wireless station is below the value (**dBm**) set here and adjacent AP (must be DrayTek AP and support such feature too) with higher signal strength value (defined in the field of **With Adjacent AP RSSI over**) is detected by VigorAP 903, VigorAP 903 will terminate the network connection for that wireless station. Later, the wireless station can connect to the adjacent AP (with better RSSI).

	• **With Adjacent AP RSSI over –** Specify a value as a threshold.
Fast Roaming (WPA2/802.1x)	**Enable –** Check the box to enable fast roaming configuration. **PMK Caching -** Set the expire time of WPA2 PMK (Pairwise master key) cache. PMK Cache manages the list from the BSSIDs in the associated SSID with which it has pre-authenticated. Such feature is available for **WPA2/802.1** mode. **Pre-Authentication -** Enables a station to authenticate to multiple APs for roaming securer and faster. With the pre-authentication procedure defined in IEEE 802.11i specification, the pre-four-way-handshake can reduce handoff delay perceivable by a mobile node. It makes roaming faster and more secure. (Only valid in WPA2) **Enable** - Enable IEEE 802.1X Pre-Authentication. **Disable** - Disable IEEE 802.1X Pre-Authentication.

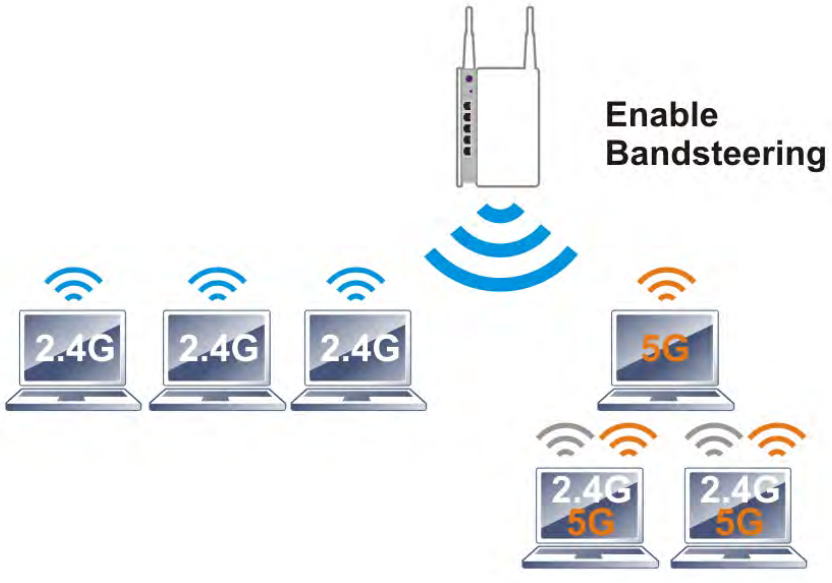
After finishing this web page configuration, please click **OK** to save the settings.

II-3-12 Band Steering

Band Steering detects if the wireless clients are capable of 5GHz operation, and steers them to that frequency. It helps to leave 2.4GHz band available for legacy clients, and improves users experience by reducing channel utilization.



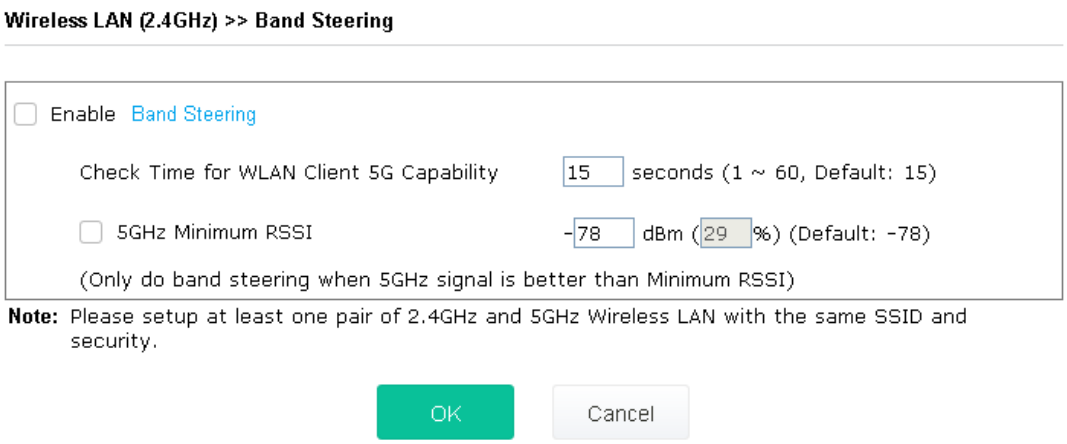
If dual-band is detected, the AP will let the wireless client connect to less congested wireless LAN, such as 5GHz to prevent from network congestion.



Note:

To make Band Steering work successfully, SSID and security on 2.4GHz also MUST be broadcasted on 5GHz.

Open **Wireless LAN (2.4GHz)>>Band Steering** to get the following web page:

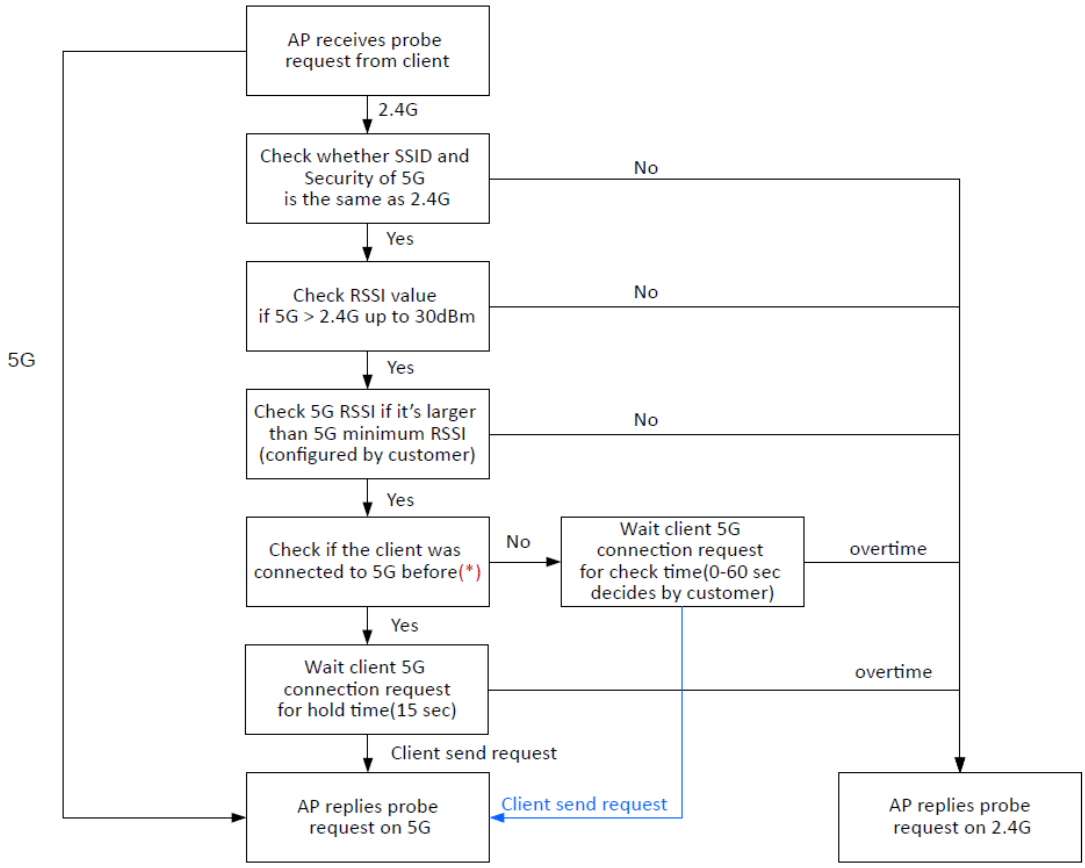


Available settings are explained as follows:

Item	Description
Enable Band Steering	If it is enabled, VigorAP will detect if the wireless client is capable of dual-band or not within the time limit. **Check Time**.... – If the wireless station does not have the capability of 5GHz network connection, the system shall wait and check for several seconds (15 seconds, in default) to make the 2.4GHz network connection. Specify the time limit for VigorAP to detect the wireless client. **5GHz Minimum RSSI** – The wireless station has the capability of 5GHz network connection, yet the signal performance might not be satisfied. Therefore, when the signal strength is below the value set here while the wireless station connecting to VigorAP 903, VigorAP will allow the client to connect to 2.4GHz network.

After finishing this web page configuration, please click **OK** to save the settings.

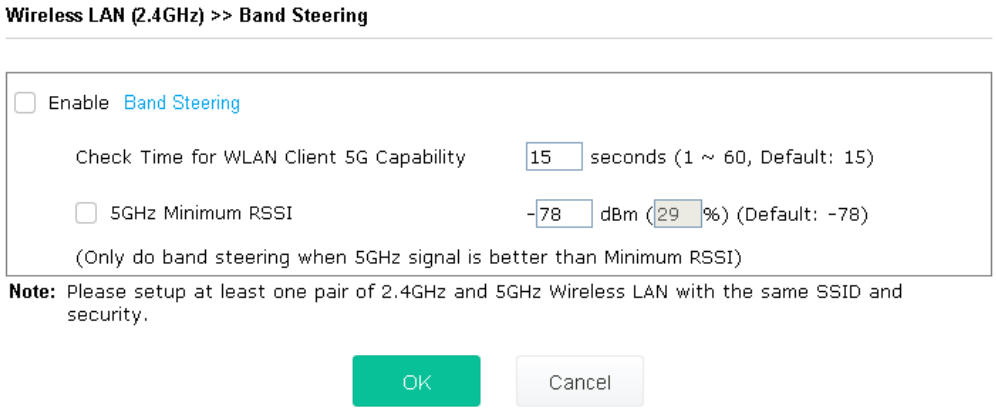
Below shows how Band Steering works.



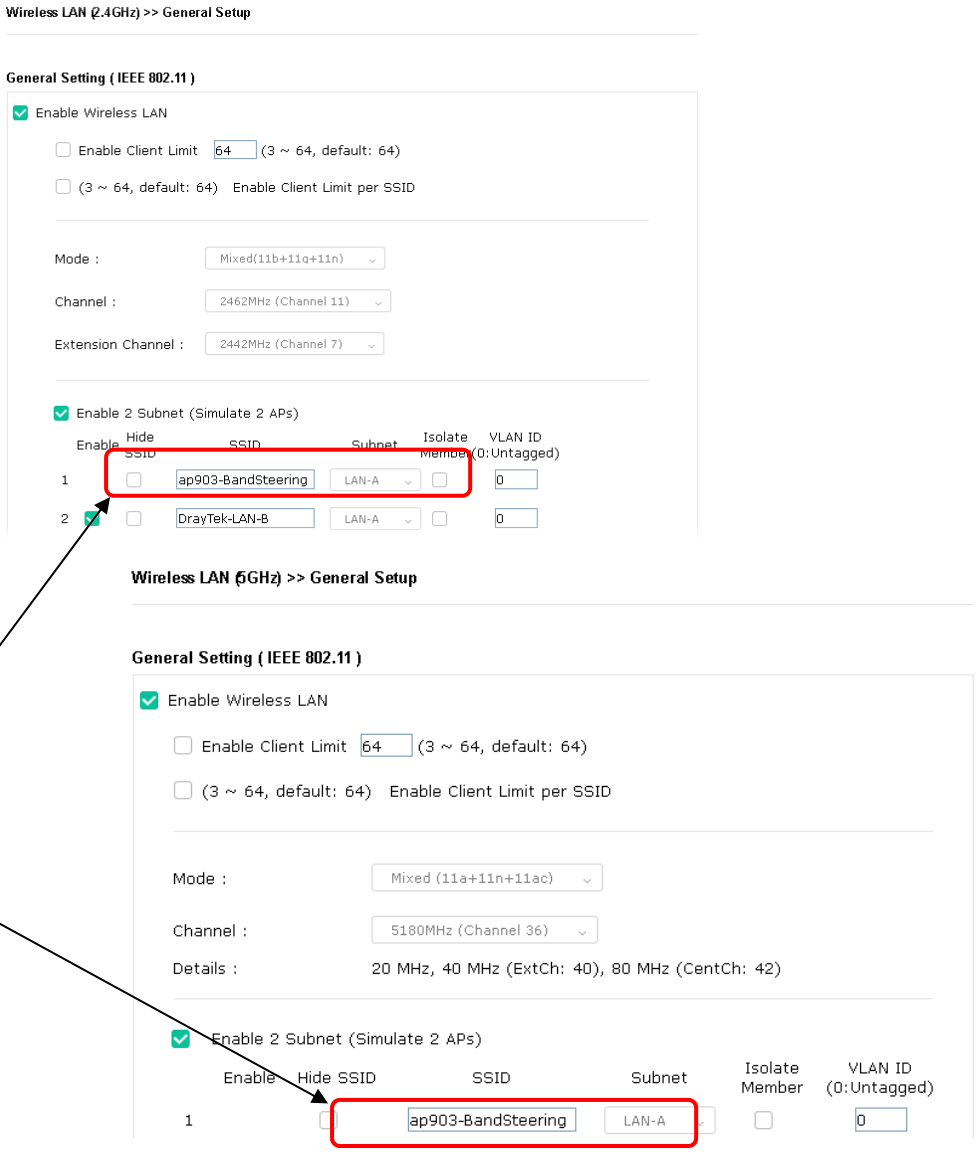
* AP will clear the 5G history station list every 2.5 mins.

How to Use Band Steering?

1. Open **Wireless LAN(2.4GHz)>>Band Steering**.
2. Check the box of **Enable Band Steering** and use the default value (15) for check time setting.



3. Click **OK** to save the settings.
4. Open **Wireless LAN (2.4GHz)>>General Setup** and **Wireless LAN (5GHz)>> General Setup**. Configure SSID as *ap903-BandSteerin*g for both pages. Click **OK** to save the settings.



Same value for 2.4GHz and 5GHz

5. Open **Wireless LAN (2.4GHz) > >Security** and **Wireless LAN (5GHz) > >Security.** Configure Security as *12345678* for both pages. Click **OK** to save the settings.

Same value for 2.4GHz and 5GHz

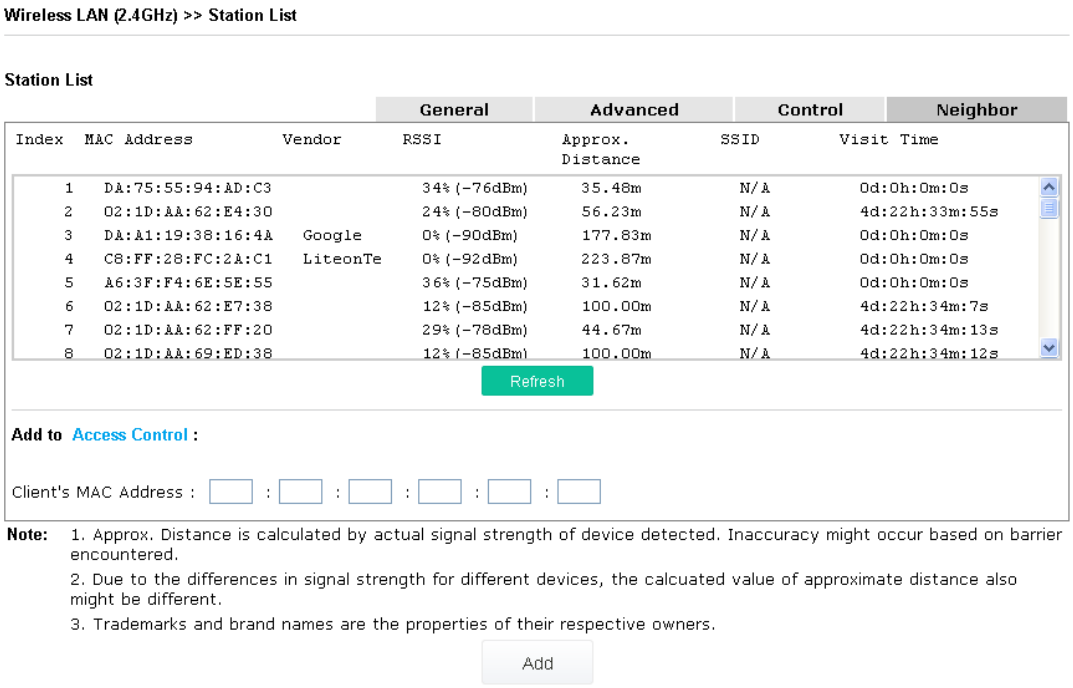
6. Now, VigorAP 903 will let the wireless clients connect to less congested wireless LAN, such as 5GHz to prevent from network congestion.

II-3-13 Station List

Station List provides the knowledge of connecting wireless clients now along with its status code. Each tab (general, advanced, control, neighbor) will display different status information (including MAC address, Vendor, SSID, Auth, Encrypt, Tx/Rx Rate, Hostname, RSSI, Link Speed, BW, PSM, WMM, PHMd, MCS, Connection Time, Reconnection Time, Approx. Distance, Visit Time, and so on).

General

Display general information (e.g., MAC Address, SSID, Auth, Encrypt, TX/RX Rate) for the station.



Available settings are explained as follows:

Item	Description
MAC Address	Display the MAC Address for the connecting client.
Hostname	Display the host name of the connecting client.
SSID	Display the SSID that the wireless client connects to.
Auth	Display the authentication that the wireless client uses for connection with such AP.
Encrypt	Display the encryption mode used by the wireless client.
Tx Rate/Rx Rate	Display the transmission /receiving rate for packets.
Refresh	Click this button to refresh the status of station list.
Add to Access Control	**Client's MAC Address** - For additional security of wireless access, the Access Control facility allows you to restrict the network access right by controlling the wireless LAN MAC address of client. Only the valid MAC address that has been configured can access the wireless LAN interface.
Add	Click this button to add current typed MAC address into **Access Contro**l.

Advanced

Display more information (e.g., AID, PSM, WMM, RSSI PhMd, BW, MCS, Rate) for the station.

Control

Display connection and reconnection time of the wireless stations.

Neighbor

Display more information for the neighboring wireless stations.

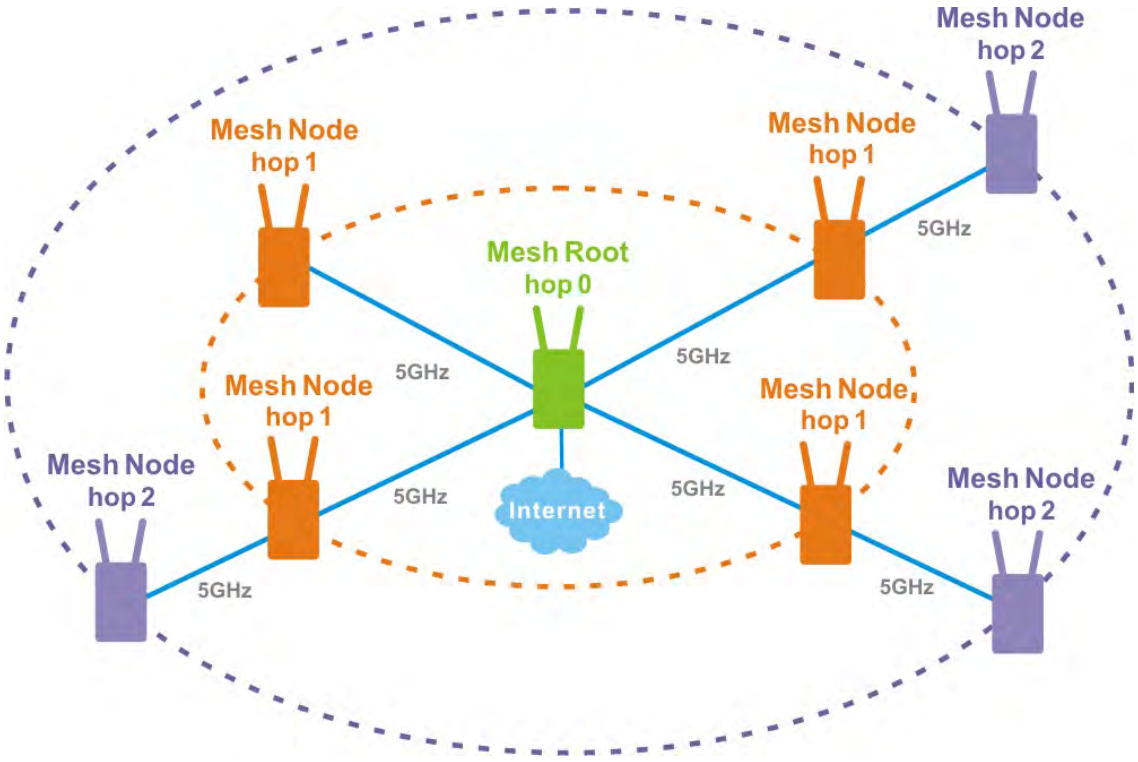
II-4 Mesh Settings for Mesh Mode

When you choose **Mesh** as the operation mode, the Mesh menu with the settings of Mesh Setup, Mesh Status, Mesh Discovery and Configuration Sync will be shown on the screen.

Please note that, within VigorMesh network,

- the total number allowed for mesh nodes is 8 (including the mesh root)
- the maximum number of hop is 3

Refer to the following figure:



For the mesh group set within VigorMesh network,

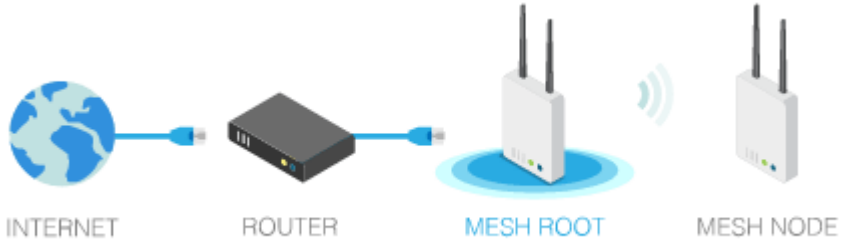
- It must be composed by “1” Mesh Root and “0~7” mesh nodes
- (Roaming) Normally members in a mesh group use the same Wireless SSID/security
- (Add) Only the mesh root can add a new mesh node into the mesh group
- (Recover) A disconnected mesh node will automatically try to connect to another connected mesh node of the same group

Mesh Root and Mesh Node

Mesh Root indicates that VigorAP would be other AP's uplink connection. As a Mesh Root, VigorAP must connect to a gateway with Ethernet cable first to have an internet connection.

As a Mesh Node, VigorAP can connect to the mesh root or mesh node within the same mesh group via wireless network or physical connection with an Ethernet cable.

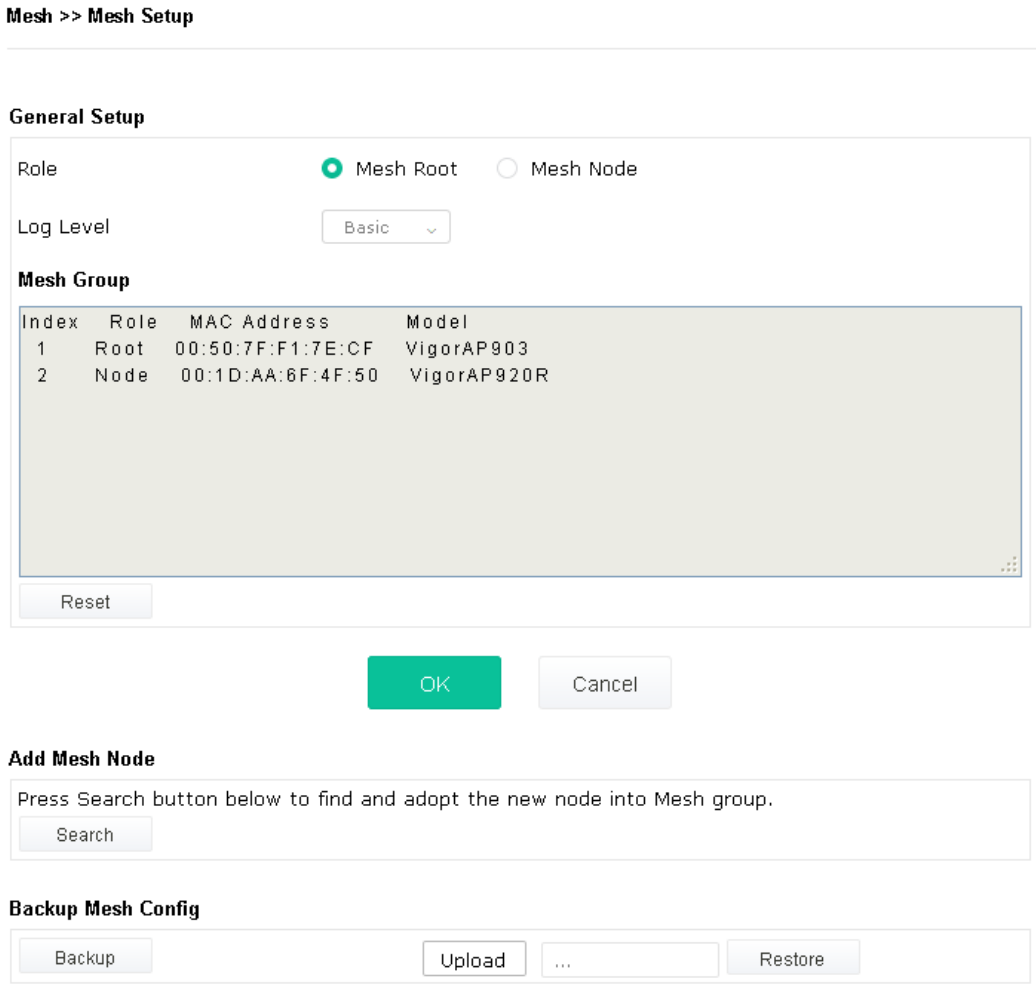
The following figure shows how VigorAP runs as MESH ROOT:



The following figure shows how VigorAP runs as MESH NODE:

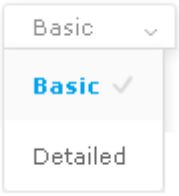
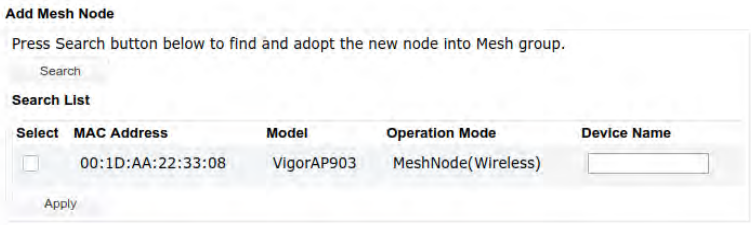
II-4-1 Mesh Setup

Such page can determine the role of the VigorAP connecting to the computer physically. For a mesh root, you can search and specify mesh nodes as members under current mesh group.



Available settings are explained as follows:

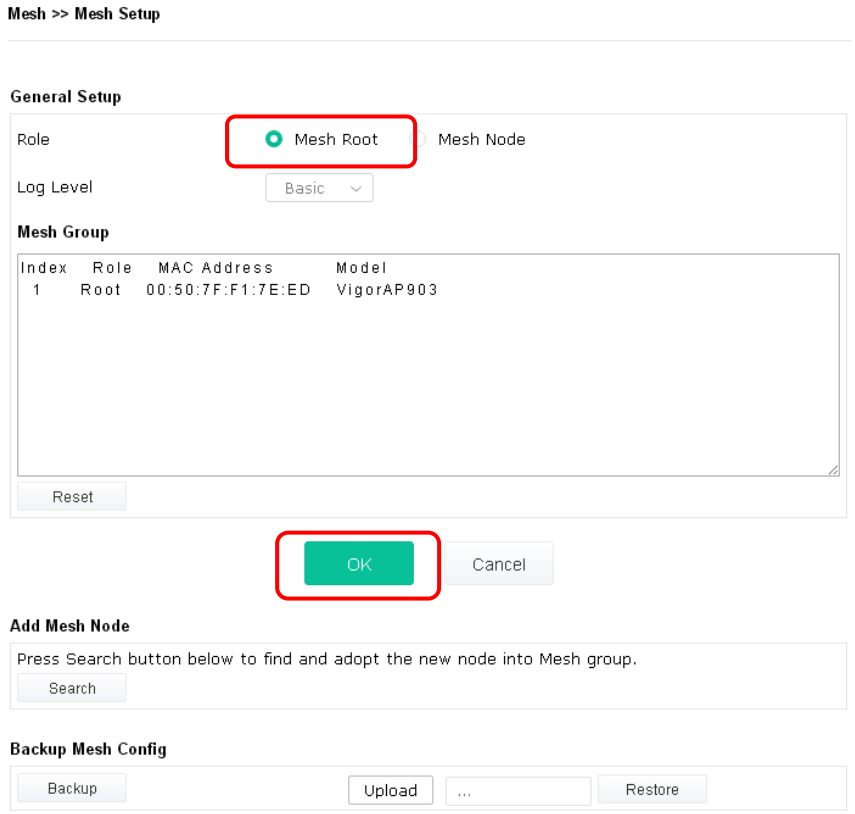
Item	Description
Role	**Mesh Root –** When VigorAP is connected to a Vigor router with a physical Ethernet cable, it can be set as mesh root to deliver the wireless signals to a mesh node AP. **Mesh Node –** As a mesh node, such VigorAP can pass the wireless connection signal to other mesh node or a remote device (PC, CPE, mobile phone). In addition, VigorAP can be searched by mesh root AP and join the mesh group of the root AP. The configuration set for mesh root can be applied to mesh node.
When Mesh Root is selected	**Log Level –** Choose **Basic** or **Detailed**. Related information will be shown on the **Diagnostics>>System Log.**

	
When Mesh Node is selected	**Wired Uplink –** Check the box if such VigorAP connects to an uplinked mesh root or an uplinked mesh node with an Ethernet cable. **Wireless Uplink Band** – Choose a wireless band for connecting with an uplinked mesh root or an uplinked mesh node. **Log Level –** Choose **Basic** or **Detailed**. Related information will be shown on the **Diagnostics> >System Log.**
Mesh Group	When such VigorAP is set as mesh root or is added to a mesh group, the basic information including role, MAC address, and model name of the AP will be shown in this area. Up to 8 entries (one mesh root and seven mesh nodes) will be shown on this field.
Reset	Click it to clear the Mesh Group information.
Add Mesh Node	Click **Search** to find out available mesh node on the network.  Check the one you want and click **Apply**. The selected AP will be added onto current mesh root.
Backup Mesh Config	**Backup** – Click the button to save the configuration as a file. **Upload / Restore** – Click the Upload button to specify a configuration file. Then click Restore to apply the configuration. When the MAC address of such VigorAP does not appear under the mesh group, the restore operation will not succeed and the error message, ”Device MAC is not in mesh group list”, will be shown instead.

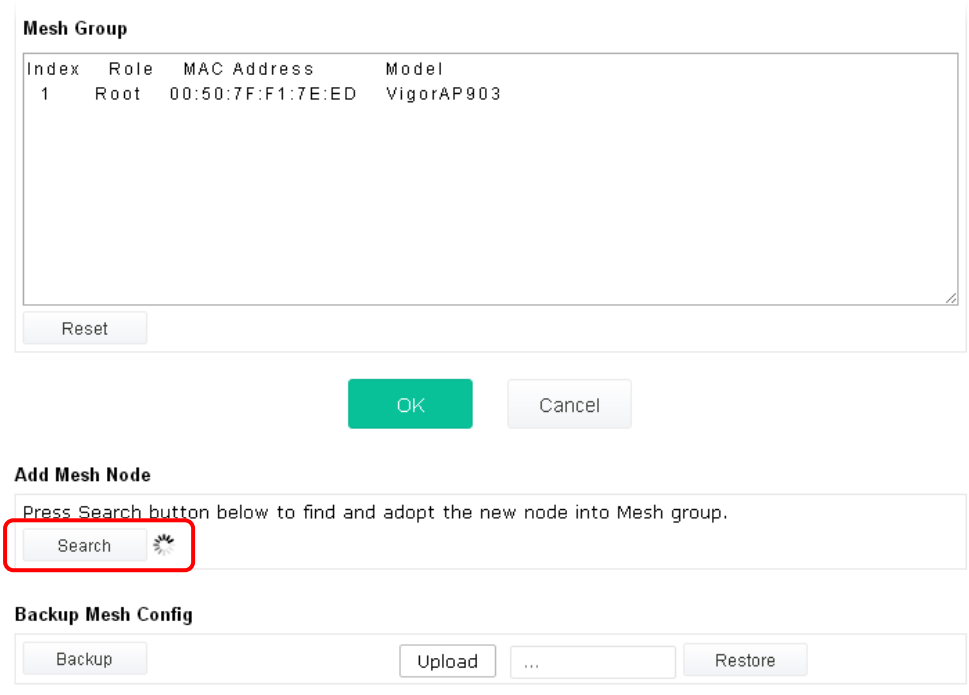
How to set up a mesh group?

The following steps will guide you how to setup a Mesh Group (with mesh root and mesh node) from **Mesh >> Mesh Setup**.

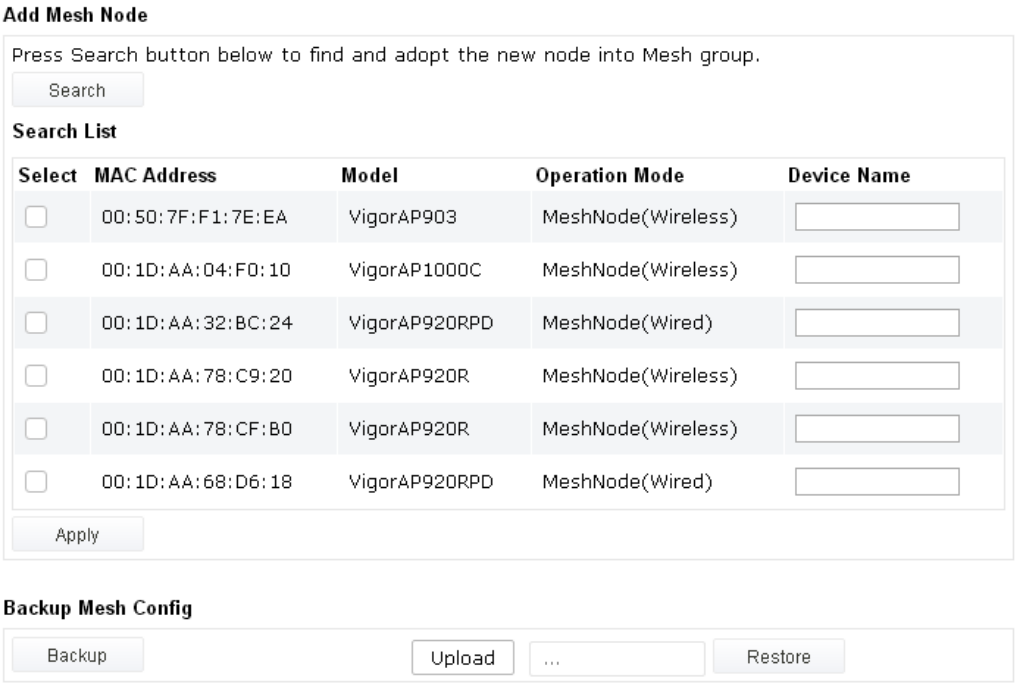
1. Open **Mesh>>Mesh Setup**. Click **Mesh Root** and click **OK** for the VigorAP connected to PC with Ethernet cable. At first, a Mesh Group is with only Mesh Root.



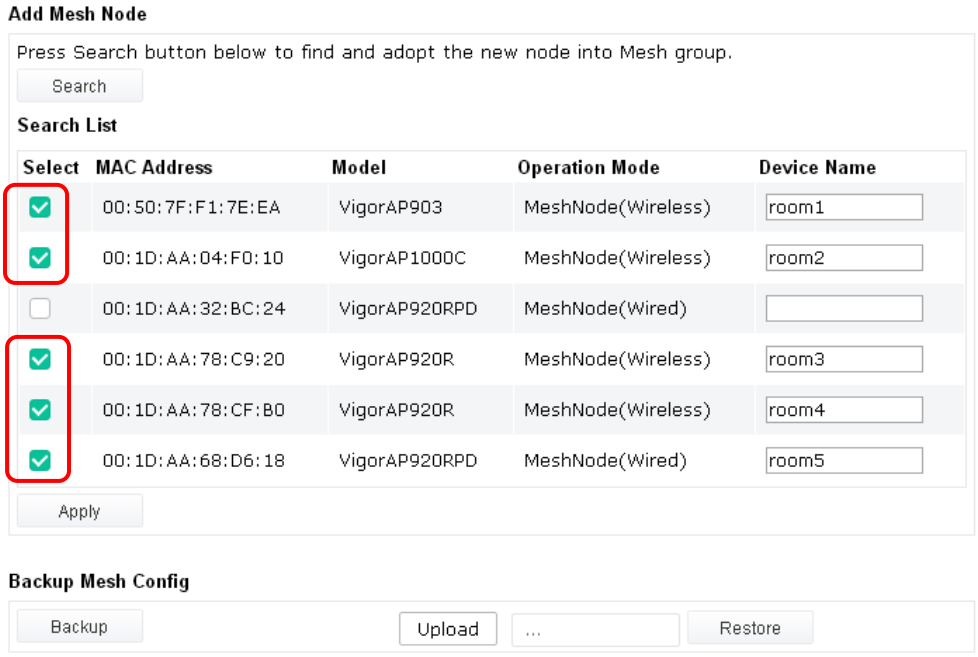
2. Click the **Search** button in the field of **Add Mesh Node**.



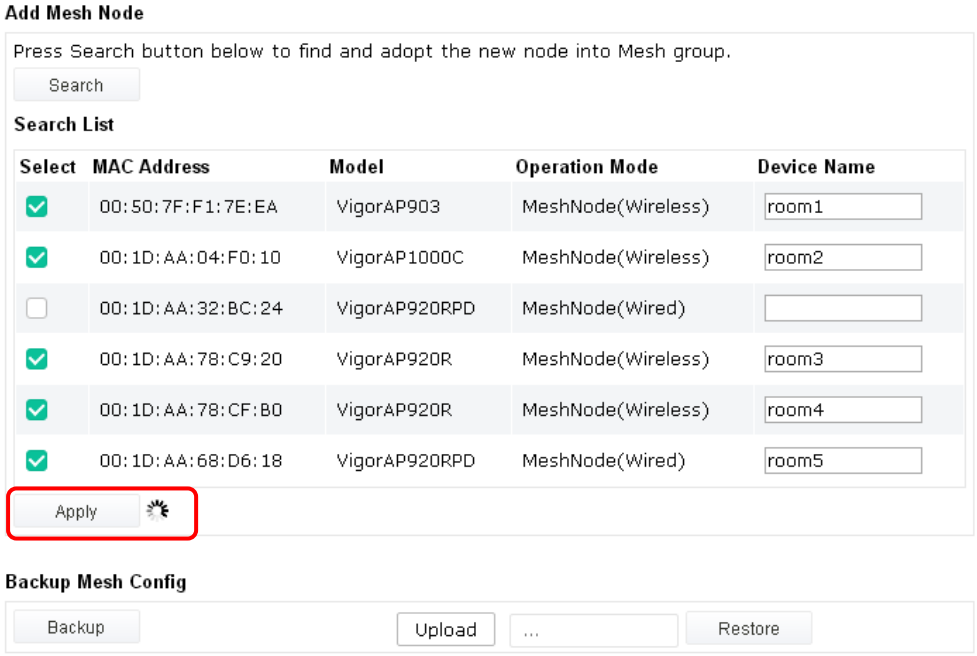
3. Wait until the searching result appears.



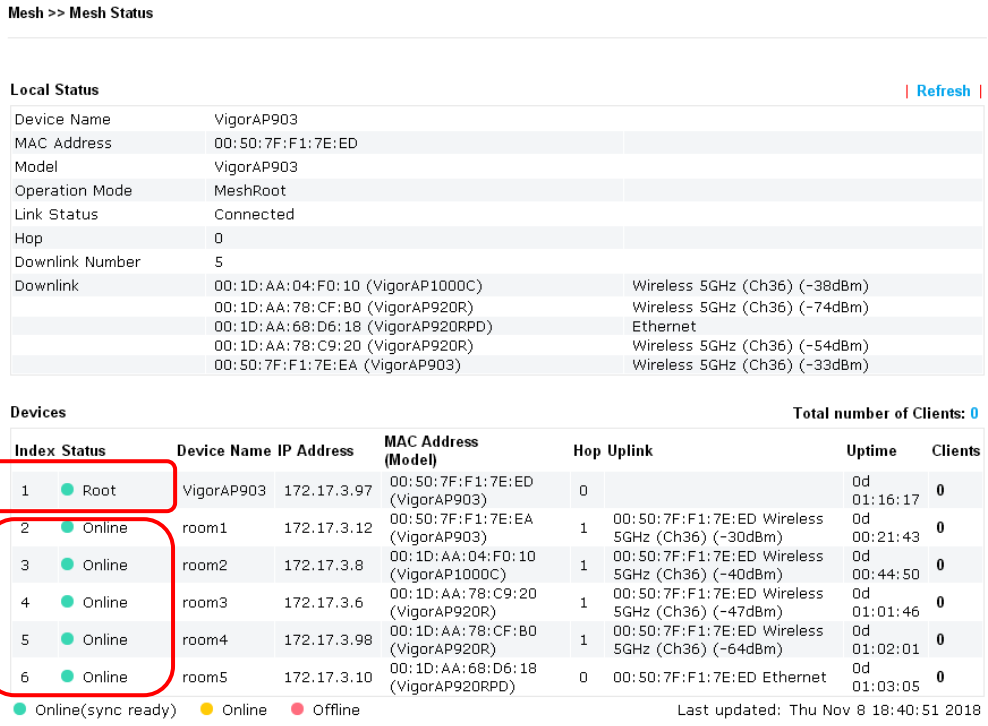
4. Choose the device(s) you want to add to the Mesh Group as mesh node(s) and define the **Device Name** for each node. In this example, five devices are specified as mesh nodes.



5. Click the **Apply** button and wait for it to finish the procedure.

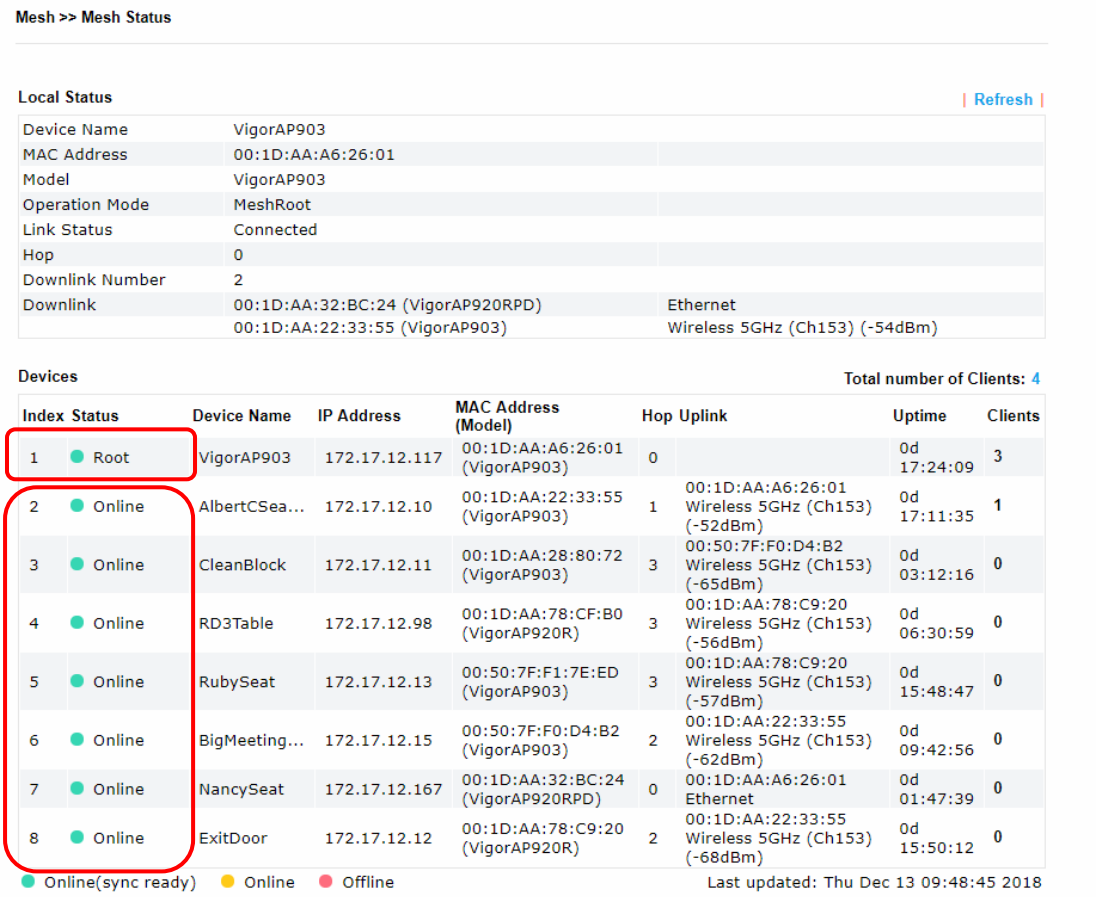


6. After finishing the mesh network configuration, refer to **Mesh>>Mesh Status** for viewing the result. A mesh root with 5 mesh nodes is online.



II-4-2 Mesh Status

This page shows that one Mesh Group can contain up to 8 devices. In the following figure, the 7th Device with hop 0 is one special Ethernet Backhaul. It means this node will use Ethernet cable to join the mesh group while others use the wireless link.



Mesh >> Mesh Status

Local Status | Refresh |

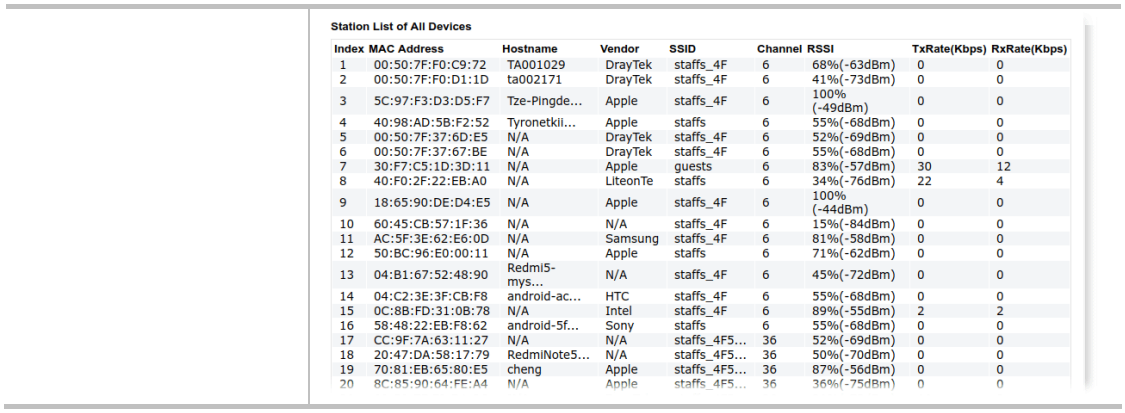
Device Name	VigorAP903	
MAC Address	00:1D:AA:A6:26:01	
Model	VigorAP903	
Operation Mode	MeshRoot	
Link Status	Connected	
Hop	0	
Downlink Number	2	
Downlink	00:1D:AA:32:BC:24 (VigorAP920RPD)	Ethernet
	00:1D:AA:22:33:55 (VigorAP903)	Wireless 5GHz (Ch153) (-54dBm)

Devices Total number of Clients: 4

Index	Status	Device Name	IP Address	MAC Address (Model)	Hop	Uplink	Uptime	Clients
1	Root	VigorAP903	172.17.12.117	00:1D:AA:A6:26:01 (VigorAP903)	0		0d 17:24:09	3
2	Online	AlbertCSea...	172.17.12.10	00:1D:AA:22:33:55 (VigorAP903)	1	00:1D:AA:A6:26:01 Wireless 5GHz (Ch153) (-52dBm)	0d 17:11:35	1
3	Online	CleanBlock	172.17.12.11	00:1D:AA:28:80:72 (VigorAP903)	3	00:50:7F:F0:D4:B2 Wireless 5GHz (Ch153) (-65dBm)	0d 03:12:16	0
4	Online	RD3Table	172.17.12.98	00:1D:AA:78:CF:B0 (VigorAP920R)	3	00:1D:AA:78:C9:20 Wireless 5GHz (Ch153) (-56dBm)	0d 06:30:59	0
5	Online	RubySeat	172.17.12.13	00:50:7F:F1:7E:ED (VigorAP903)	3	00:1D:AA:78:C9:20 Wireless 5GHz (Ch153) (-57dBm)	0d 15:48:47	0
6	Online	BigMeeting...	172.17.12.15	00:50:7F:F0:D4:B2 (VigorAP903)	2	00:1D:AA:22:33:55 Wireless 5GHz (Ch153) (-62dBm)	0d 09:42:56	0
7	Online	NancySeat	172.17.12.167	00:1D:AA:32:BC:24 (VigorAP920RPD)	0	00:1D:AA:A6:26:01 Ethernet	0d 01:47:39	0
8	Online	ExitDoor	172.17.12.12	00:1D:AA:78:C9:20 (VigorAP920R)	2	00:1D:AA:22:33:55 Wireless 5GHz (Ch153) (-68dBm)	0d 15:50:12	0

Online(sync ready) Online Offline Last updated: Thu Dec 13 09:48:45 2018

Item	Description
Local Status	Display general information for such VigorAP.
Devices	Display detailed information for this VigorAP (as mesh root) and mesh node(s) in the group. **Index** – Display the number of the device within a mesh group. **Status** – Display the role of the device within a mesh group. **Device Name** – Display the name of the device (for identification). **IP Address** – Display the IP address of the device. **MAC Address** – Display the MAC address of the device. **Hop** – Display the level of the devices within a mesh group. “0” means the access point is connected to a device by using Ethernet cable (wired). “1” to “3” means the level of the access point within a mesh group and it connects to other access point via wireless link. **Uplink** – Display the MAC address of the device that the AP connects to.
Total number of Clients	Display the station list of all mesh devices.

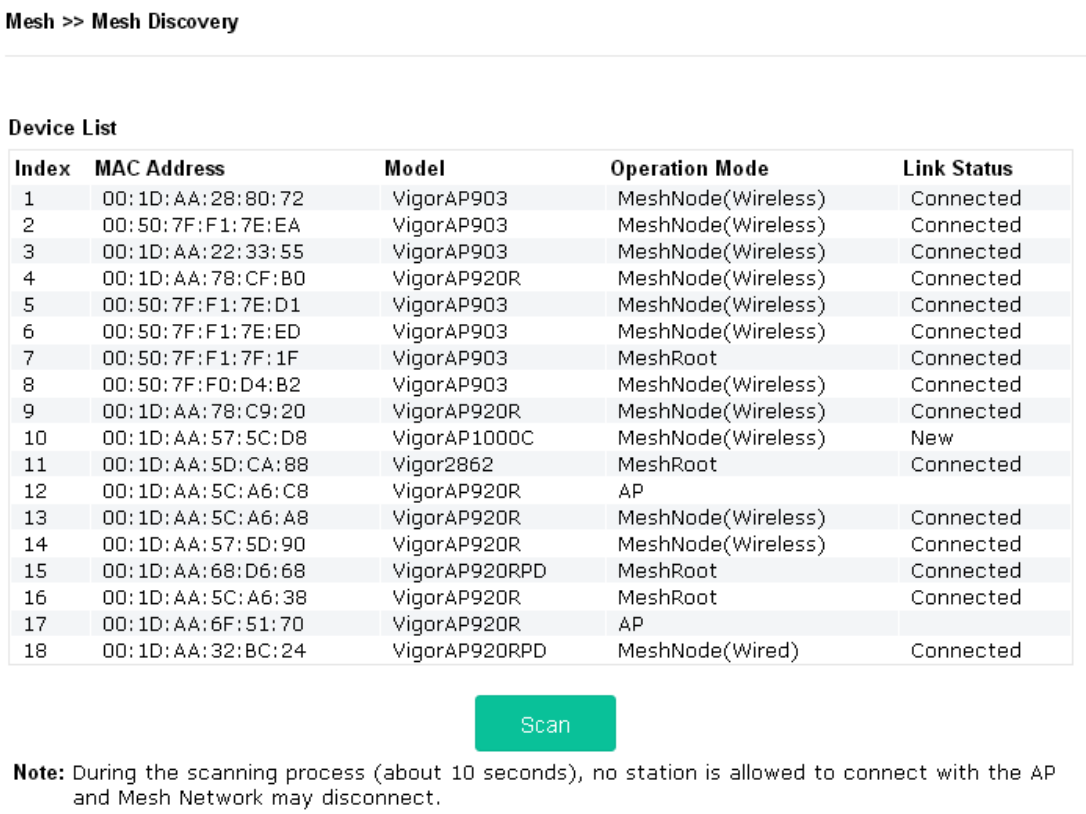


Station List of All Devices

Index	MAC Address	Hostname	Vendor	SSID	Channel	RSSI	TxRate(Kbps)	RxRate(Kbps)
1	00:50:7F:F0:C9:72	TA001029	DrayTek	staffs_4F	6	68%(-63dBm)	0	0
2	00:50:7F:F0:D1:1D	ta002171	DrayTek	staffs_4F	6	41%(-73dBm)	0	0
3	5C:97:F3:D3:D5:F7	Tze-Pingde...	Apple	staffs_4F	6	100% (-49dBm)	0	0
4	40:98:AD:5B:F2:52	Tyronetkii...	Apple	staffs	6	55%(-68dBm)	0	0
5	00:50:7F:37:6D:E5	N/A	DrayTek	staffs_4F	6	52%(-69dBm)	0	0
6	00:50:7F:37:67:BE	N/A	DrayTek	staffs_4F	6	55%(-68dBm)	0	0
7	30:F7:C5:1D:3D:11	N/A	Apple	guests	6	83%(-57dBm)	30	12
8	40:F0:2F:22:EB:A0	N/A	LiteonTe	staffs	6	34%(-76dBm)	22	4
9	18:65:90:DE:D4:E5	N/A	Apple	staffs_4F	6	100% (-44dBm)	0	0
10	60:45:CB:57:1F:36	N/A	N/A	staffs_4F	6	15%(-84dBm)	0	0
11	AC:5F:3E:62:E6:0D	N/A	Samsung	staffs_4F	6	81%(-58dBm)	0	0
12	50:BC:96:E0:00:11	N/A	Apple	staffs	6	71%(-62dBm)	0	0
13	04:B1:67:52:48:90	Redmi5-mys...	N/A	staffs_4F	6	45%(-72dBm)	0	0
14	04:C2:3E:3F:CB:F8	android-ac...	HTC	staffs_4F	6	55%(-68dBm)	0	0
15	0C:8B:FD:31:0B:78	N/A	Intel	staffs_4F	6	89%(-55dBm)	2	2
16	58:48:22:EB:F8:62	android-5f...	Sony	staffs	6	55%(-68dBm)	0	0
17	CC:9F:7A:63:11:27	N/A	N/A	staffs_4F5...	36	52%(-69dBm)	0	0
18	20:47:DA:58:17:79	RedmiNote5...	N/A	staffs_4F5...	36	50%(-70dBm)	0	0
19	70:81:EB:65:80:E5	cheng	Apple	staffs_4F5...	36	87%(-56dBm)	0	0
20	8C:85:90:64:FE:A4	N/A	Apple	staffs_4F5...	36	36%(-75dBm)	0	0

II-4-3 Mesh Discovery

Before a Mesh Node is connected, it is unable to check the device status from Mesh Root. This page can help to discover all Mesh devices around and offer the Link Status and Operation Mode of each Mesh device.



Mesh >> Mesh Discovery

Device List

Index	MAC Address	Model	Operation Mode	Link Status
1	00:1D:AA:28:80:72	VigorAP903	MeshNode(Wireless)	Connected
2	00:50:7F:F1:7E:EA	VigorAP903	MeshNode(Wireless)	Connected
3	00:1D:AA:22:33:55	VigorAP903	MeshNode(Wireless)	Connected
4	00:1D:AA:78:CF:B0	VigorAP920R	MeshNode(Wireless)	Connected
5	00:50:7F:F1:7E:D1	VigorAP903	MeshNode(Wireless)	Connected
6	00:50:7F:F1:7E:ED	VigorAP903	MeshNode(Wireless)	Connected
7	00:50:7F:F1:7F:1F	VigorAP903	MeshRoot	Connected
8	00:50:7F:F0:D4:B2	VigorAP903	MeshNode(Wireless)	Connected
9	00:1D:AA:78:C9:20	VigorAP920R	MeshNode(Wireless)	Connected
10	00:1D:AA:57:5C:D8	VigorAP1000C	MeshNode(Wireless)	New
11	00:1D:AA:5D:CA:88	Vigor2862	MeshRoot	Connected
12	00:1D:AA:5C:A6:C8	VigorAP920R	AP	
13	00:1D:AA:5C:A6:A8	VigorAP920R	MeshNode(Wireless)	Connected
14	00:1D:AA:57:5D:90	VigorAP920R	MeshNode(Wireless)	Connected
15	00:1D:AA:68:D6:68	VigorAP920RPD	MeshRoot	Connected
16	00:1D:AA:5C:A6:38	VigorAP920R	MeshRoot	Connected
17	00:1D:AA:6F:51:70	VigorAP920R	AP	
18	00:1D:AA:32:BC:24	VigorAP920RPD	MeshNode(Wired)	Connected

Scan

Note: During the scanning process (about 10 seconds), no station is allowed to connect with the AP and Mesh Network may disconnect.

For obtaining the list of devices around this VigorAP, click **Scan**. Later, surrounding VigorAP device(s) will be displayed on this page.

II-4-4 Configuration Sync

If you add one Mesh Node in a mesh group, the Mesh Root will send the basic configuration to the device. This page could help you to change the Mesh Root settings and deliver the new configuration of the Mesh Root to all "connected" Mesh Nodes.

Mesh >> Configuration Sync

System Maintenance

Index	Name	Value
1	X_00507F_System.Management.SkipQuickStartWizard	Enable
2	X_00507F_System.TR069Setting.CPEEnable	1
3	ManagementServer.URL	http://192.168.105.141:8080/ACSServer/services/ACSServlet
4	ManagementServer.Username	acs
5	ManagementServer.Password	*****
6	ManagementServer.ConnectionRequestUsername	vigor
7	ManagementServer.ConnectionRequestPassword	*****
8	X_00507F_System.AdminmodePassword.Admin	admin
9	X_00507F_System.AdminmodePassword.Password	*****

Wireless LAN (2.4GHz)

Index	Name	Value
1	X_00507F_WirelessLAN_AP.General.EnableWLAN	1
2	X_00507F_WirelessLAN_AP.General.SSID.1.ESSID	DrayTek-LAN-A
3	X_00507F_WirelessLAN_AP.General.SSID.1.Enable	1
4	X_00507F_WirelessLAN_AP.Security.1.WPAPSK	*****
5	X_00507F_WirelessLAN_AP.Security.1.Mode	WPA2/PSK
6	X_00507F_WirelessLAN_AP.Security.1.WPAEncMode	AES
7	X_00507F_WirelessLAN_AP.Security.1.KeyRenewalInterval	3600
8	X_00507F_WirelessLAN_AP.General.SSID.2.ESSID	DrayTek-LAN-B
9	X_00507F_WirelessLAN_AP.General.SSID.2.Enable	1
10	X_00507F_WirelessLAN_AP.Security.2.WPAPSK	*****
11	X_00507F_WirelessLAN_AP.Security.2.Mode	WPA2/PSK
12	X_00507F_WirelessLAN_AP.Security.2.WPAEncMode	AES
13	X_00507F_WirelessLAN_AP.Security.2.KeyRenewalInterval	3600
14	X_00507F_WirelessLAN_AP.StationControl.2.Enable	0
15	X_00507F_WirelessLAN_AP.StationControl.2.ConnectTime	0_days,1_hours,0_mins
16	X_00507F_WirelessLAN_AP.StationControl.2.ReconnectTime	1_days,0_hours,0_mins
17	X_00507F_WirelessLAN_AP.BandwidthManagement.SSID.2.Enable	0
18	X_00507F_WirelessLAN_AP.BandwidthManagement.SSID.2.UploadLimit	K
19	X_00507F_WirelessLAN_AP.BandwidthManagement.SSID.2.DownloadLimit	K
20	X_00507F_WirelessLAN_AP.General.SSID.3.ESSID	
21	X_00507F_WirelessLAN_AP.General.SSID.3.Enable	0
22	X_00507F_WirelessLAN_AP.Security.3.WPAPSK	*****
23	X_00507F_WirelessLAN_AP.Security.3.Mode	WPA2/PSK
24	X_00507F_WirelessLAN_AP.Security.3.WPAEncMode	AES
25	X_00507F_WirelessLAN_AP.Security.3.KeyRenewalInterval	3600
26	X_00507F_WirelessLAN_AP.General.SSID.4.ESSID	
27	X_00507F_WirelessLAN_AP.General.SSID.4.Enable	0
28	X_00507F_WirelessLAN_AP.Security.4.WPAPSK	*****
29	X_00507F_WirelessLAN_AP.Security.4.Mode	WPA2/PSK
30	X_00507F_WirelessLAN_AP.Security.4.WPAEncMode	AES
31	X_00507F_WirelessLAN_AP.Security.4.KeyRenewalInterval	3600

Wireless LAN (5GHz)

Index	Name	Value
1	X_00507F_WirelessLAN_5G_AP.General.EnableWLAN	1
2	X_00507F_WirelessLAN_5G_AP.General.SSID.1.ESSID	DrayTek-LAN-A
3	X_00507F_WirelessLAN_5G_AP.General.SSID.1.Enable	1
4	X_00507F_WirelessLAN_5G_AP.Security.1.WPAPSK	*****
5	X_00507F_WirelessLAN_5G_AP.Security.1.Mode	WPA2/PSK
6	X_00507F_WirelessLAN_5G_AP.Security.1.WPAEncMode	AES
7	X_00507F_WirelessLAN_5G_AP.Security.1.KeyRenewalInterval	3600
8	X_00507F_WirelessLAN_5G_AP.General.SSID.2.ESSID	DrayTek-LAN-B
9	X_00507F_WirelessLAN_5G_AP.General.SSID.2.Enable	1
10	X_00507F_WirelessLAN_5G_AP.Security.2.WPAPSK	*****
11	X_00507F_WirelessLAN_5G_AP.Security.2.Mode	WPA2/PSK
12	X_00507F_WirelessLAN_5G_AP.Security.2.WPAEncMode	AES
13	X_00507F_WirelessLAN_5G_AP.Security.2.KeyRenewalInterval	3600
14	X_00507F_WirelessLAN_5G_AP.StationControl.2.Enable	0
15	X_00507F_WirelessLAN_5G_AP.StationControl.2.ConnectTime	0_days,1_hours,0_mins
16	X_00507F_WirelessLAN_5G_AP.StationControl.2.ReconnectTime	1_days,0_hours,0_mins
17	X_00507F_WirelessLAN_5G_AP.BandwidthManagement.SSID.2.Enable	0
18	X_00507F_WirelessLAN_5G_AP.BandwidthManagement.SSID.2.UploadLimit	K
19	X_00507F_WirelessLAN_5G_AP.BandwidthManagement.SSID.2.DownloadLimit	K
20	X_00507F_WirelessLAN_5G_AP.General.SSID.3.ESSID	
21	X_00507F_WirelessLAN_5G_AP.General.SSID.3.Enable	0
22	X_00507F_WirelessLAN_5G_AP.Security.3.WPAPSK	*****
23	X_00507F_WirelessLAN_5G_AP.Security.3.Mode	WPA2/PSK
24	X_00507F_WirelessLAN_5G_AP.Security.3.WPAEncMode	AES
25	X_00507F_WirelessLAN_5G_AP.Security.3.KeyRenewalInterval	3600
26	X_00507F_WirelessLAN_5G_AP.General.SSID.4.ESSID	
27	X_00507F_WirelessLAN_5G_AP.General.SSID.4.Enable	0
28	X_00507F_WirelessLAN_5G_AP.Security.4.WPAPSK	*****
29	X_00507F_WirelessLAN_5G_AP.Security.4.Mode	WPA2/PSK
30	X_00507F_WirelessLAN_5G_AP.Security.4.WPAEncMode	AES
31	X_00507F_WirelessLAN_5G_AP.Security.4.KeyRenewalInterval	3600

Note: 1. Please wait for about 5 ~ 10 secs to load TR-069 parameters.
2. Mesh Root can apply above TR-069 parameters to Mesh Nodes.
3. Apply button enable when any node is online and ready to sync(Mesh Status).

Apply

Available settings are explained as follows:

Item	Description
System Maintenance / Wireless LAN (2.4Hz) / Wireless LAN (5GHz)	Check the item(s) you want to make configuration sync. **Apply** – Click it to apply the settings configured by such AP to all connected mesh node. **Note that this button is available only when such AP is in mesh root mode.**

Tips for Mesh Network Setup

- Set up TWO mesh devices with uplink RSSI larger than -65dBm.
- Upgrade the firmware version of Mesh devices through Mesh link, starting from the mesh device with less hop number. For example, upgrade the firmware from the root, hop1 Mesh Node then hop2 Mesh Node, and so on.
- VigorMesh network supports up to 3 hops of mesh devices. However, it is suggested to connect the mesh group with less than or equals to 2 hops.

  For your reference, we make a real mesh environment test and get the following record. (Use VigorAP APP to do internet speed test with different hops mesh node.)

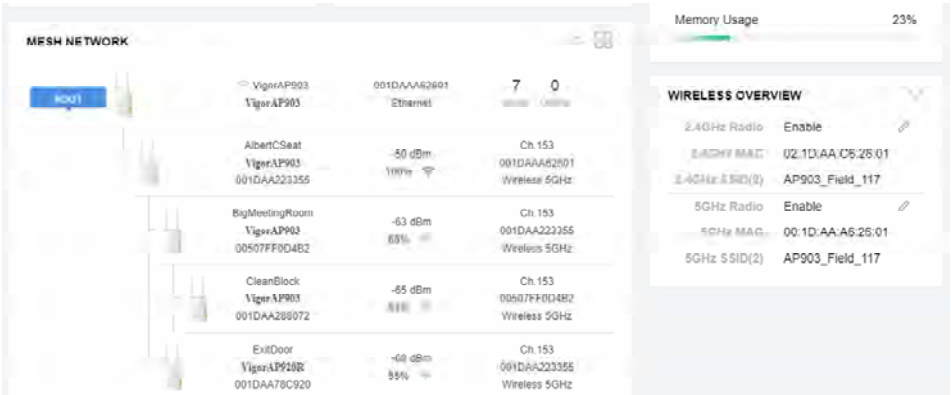
  Internet Download Speed (for root and hop1 ~ hop3):

  iPad connects to Root : 80Mbps

  iPad connects to hop1 Node : 49Mbps (Uplink RSSI : -55dBm)

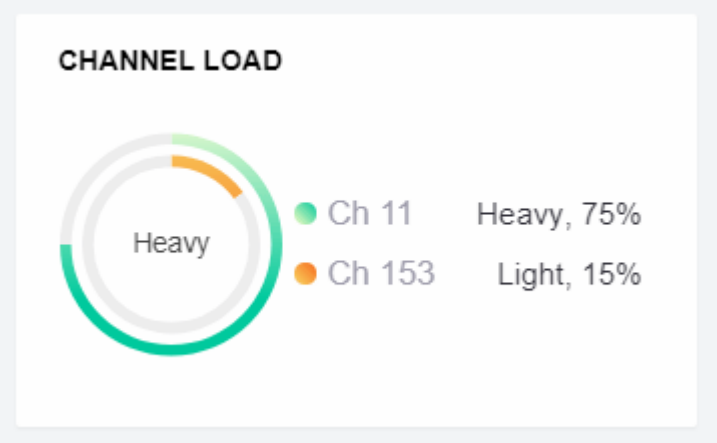
  iPad connects to hop2 Node : 41Mbps (Uplink RSSI : hop2 -64dBm / hop1 -55dBm)

  iPad connects to hop3 Node : 26Mbps (Uplink RSSI : hop3 -62dBm / hop2 -68dBm / hop1 -55dBm)
- It is not suggested to use a wireless Mesh Node with Ethernet cable connected to a Mesh Root.
- If resetting a Mesh Root,
  - All "connected" Mesh Nodes will be informed to reset.
  - Group List and Group Key will be reset, too.
  - For those Mesh Nodes unable to reset, reset them manually. Reset the Group List by web or factory default.
- If resetting a Mesh Node,
  - Group List and Group Key will be cleared.
  - Link Status will become "New".
- Mesh network status also can be viewed and checked through the dashboard by clicking MESH NETWORK.

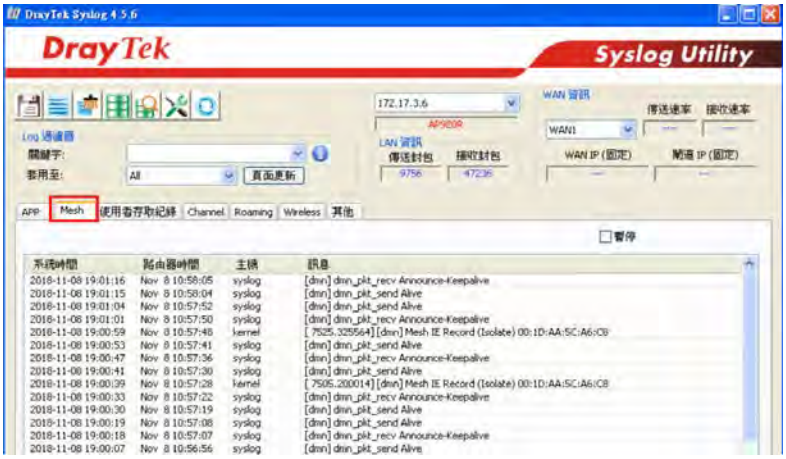


- If Mesh Search / Apply / Discover is worked too fast or is done with empty result, your request may be rejected. Please try again.
- Troubleshooting:
  - Check the firmware version. Please make sure all APs within the mesh group are in the newest firmware version.

- Check the OP (operation) Mode. Make sure new Mesh Node doesn't accidentally get DHCP IP and becomes AP mode.
- Check the country code and channels. For example, it is impossible for connecting a VigorAP 903 Mesh Root with 5G channel 36 to VigorAP920R Wireless Mesh Node in EU country code.
- Check the channel load. Make sure it is not over 70%.



- Collect some Mesh logs and send the result to DrayTek for analyzing.



II-5 Universal Repeater Settings for Range Extender Mode

When you choose **Range Extender** as the operation mode, the Wireless LAN menu items (for 2.4GHz and 5GHz) will include General Setup, Security, Access Control, WPS, Advanced Setting, AP Discovery, WDS AP Status, Universal Repeater, Bandwidth Management, Airtime Fairness, Station Control, Roaming, Band Steering and Station List.

This section will introduce settings for Universal Repeater only.

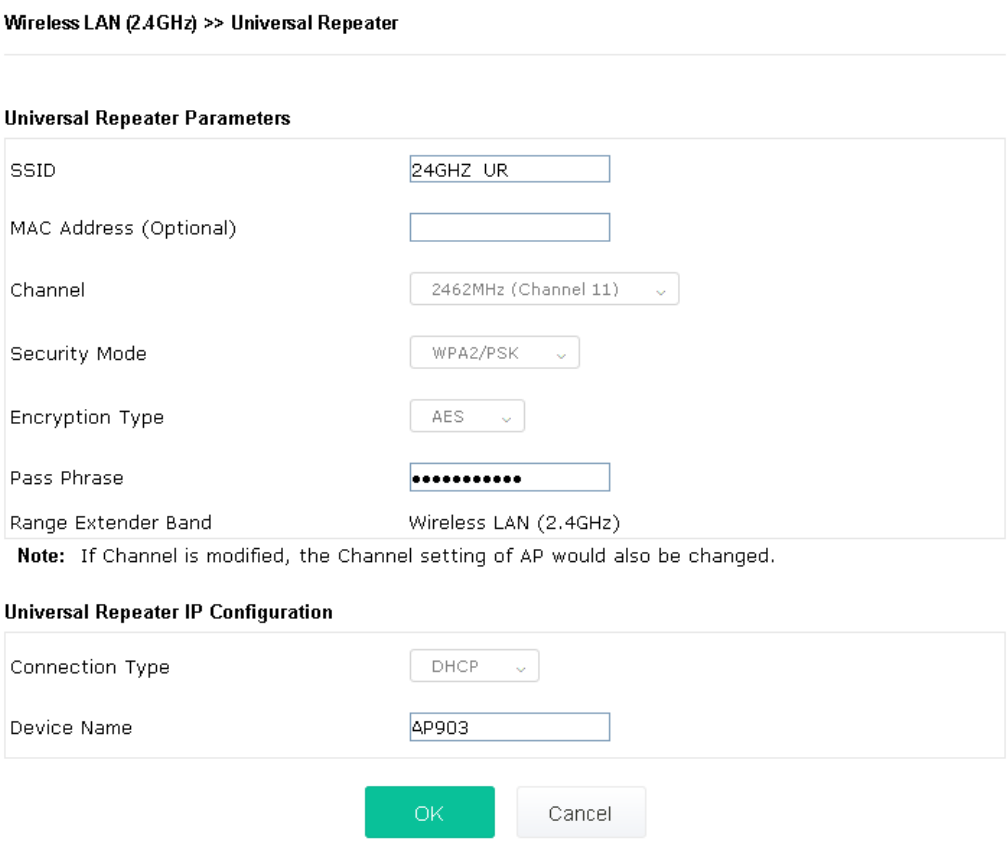
For other wireless setting items (e.g., General Setup, Security, WPS, and etc.), please refer to II-3.

The following figure shows how VigorAP runs as Range Extender:

The access point can act as a wireless repeater; it can be Station and AP at the same time. It can use Station function to connect to a root AP and use AP function to serve all wireless stations within its coverage.

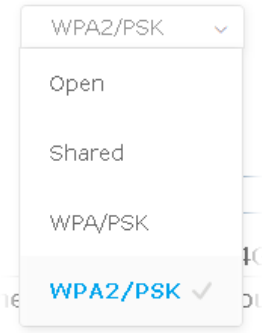
Note:

While using **Universal Repeater** mode, the access point will demodulate the received signal. Please check if this signal is noise for the operating network, then have the signal modulated and amplified again. The output power of this mode is the same as that of AP mode.



Available settings are explained as follows:

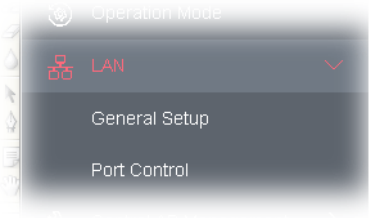
Item	Description
SSID	Display the SSID defined for Range Extender operation mode in Quick Start Wizard. Change the name of SSID whenever you want.
MAC Address (Optional)	Type the MAC address of access point that VigorAP 903 wants to connect to.
Channel	Means the channel of frequency of the wireless LAN. You may switch channel if the selected channel is under serious interference. If you have no idea of choosing the frequency, please select **AutoSelect** to let system determine for you.
Security Mode	There are several modes provided for you to choose. Each mode will bring up different parameters (e.g., WEP keys, Pass Phrase) for you to configure.

	
Encryption Type for Open/Shared	This option is available when Open/Shared is selected as Security Mode. Choose **None** to disable the WEP Encryption. Data sent to the AP will not be encrypted. To enable WEP encryption for data transmission, please choose **WEP**. **WEP Keys** - Four keys can be entered here, but only one key can be selected at a time. The format of WEP Key is restricted to 5 ASCII characters or 10 hexadecimal values in 64-bit encryption level, or restricted to 13 ASCII characters or 26 hexadecimal values in 128-bit encryption level. The allowed content is the ASCII characters from 33(!) to 126(~) except '#' and ','.
Encryption Type for WPA/PSK and WPA2/PSK	This option is available when WPA/PSK or WPA2/PSK is selected as **Security Mode**. Select **TKIP** or **AES** as the algorithm for WPA.
Pass Phrase	Type **8~63** ASCII characters, such as 012345678 (or 64 Hexadecimal digits leading by 0x, such as "0x321253abcde...").
Connection Type	Choose DHCP or Static IP as the connection mode. **DHCP** – The wireless station will be assigned with an IP from VigorAP. **Static IP** – The wireless station shall specify a static IP for connecting to Internet via VigorAP.
Device Name	This setting is available when **DHCP** is selected as **Connection Type**. Type a name for the VigorAP as identification. Simply use the default name.
IP Address	This setting is available when **Static IP** is selected as **Connection Type**. Type an IP address with the same network segment of the LAN IP setting of VigorAP. Such IP shall be different with any IP address in LAN.
Subnet Mask	This setting is available when **Static IP** is selected as **Connection Type**. Type the subnet mask setting which shall be the same as the one configured in LAN for VigorAP.
Default Gateway	This setting is available when **Static IP** is selected as **Connection Type**. Type the gateway setting which shall be the same as the default gateway configured in LAN for VigorAP.

After finishing this web page configuration, please click **OK** to save the settings.

II-6 LAN

Local Area Network (LAN) is a group of subnets regulated and ruled by modem.

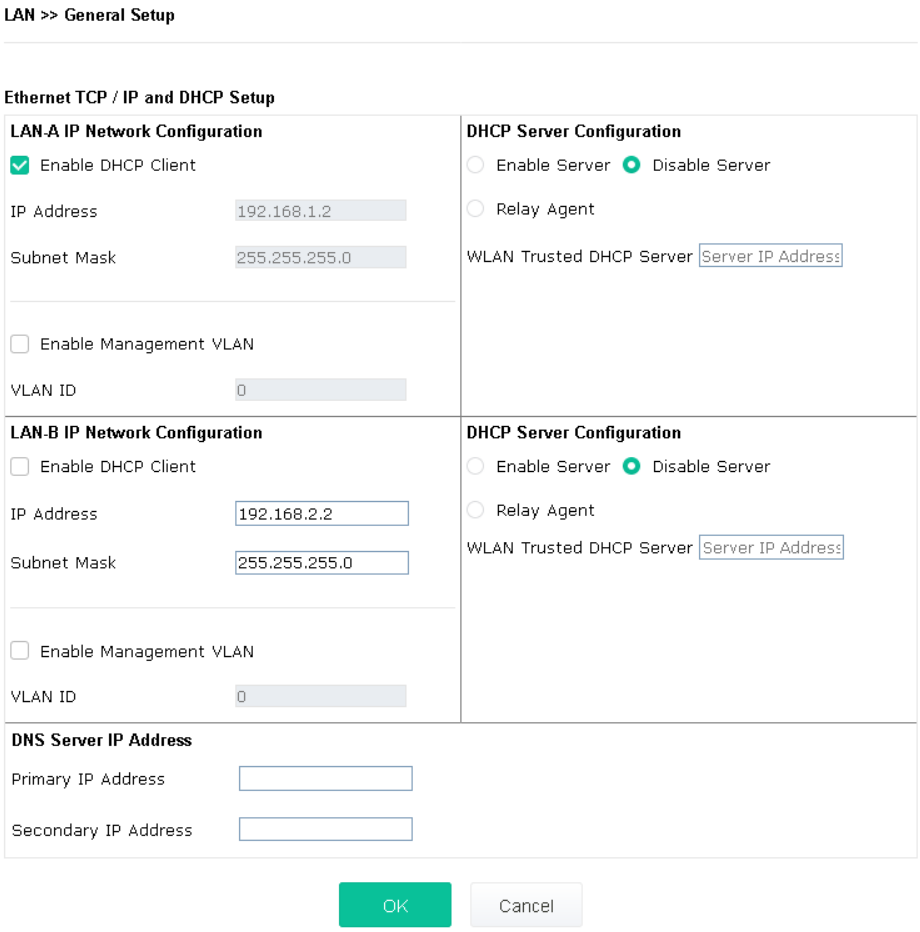


II-6-1 General Setup

Click **LAN** to open the LAN settings page and choose **General Setup**.

Note:

Such page will be changed according to the Operation Mode selected. The following screen is obtained by choosing AP as the operation mode.



Available settings are explained as follows:

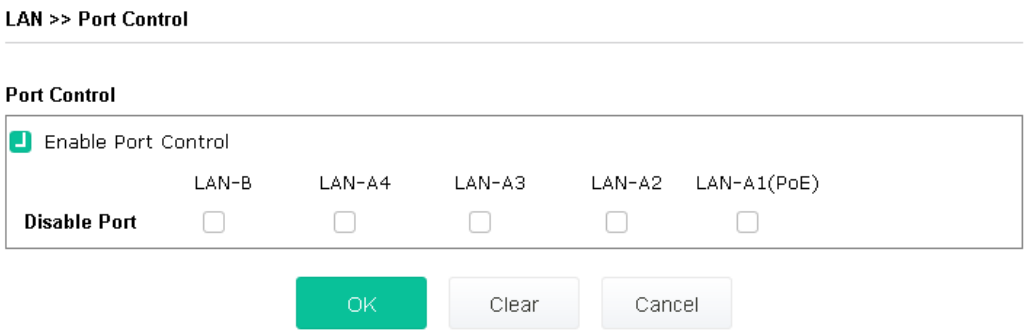
Item	Description
LAN-A IP Network Configuration	**Enable DHCP Client** – When it is enabled, VigorAP 903 will be treated as a client and can be managed / controlled by AP Management server offered by Vigor router (e.g., Vigor2860). **IP Address** – Type in private IP address for connecting to a local private network (Default: 192.168.1.2). **Subnet Mask** – Type in an address code that determines the size of the network. (Default: 255.255.255.0/ 24) **Default Gateway** – In general, it is not really necessary to specify a gateway for VigorAP 903. However, if it is required, simply type an IP address as the gateway for VigorAP 903. It will be convenient for the access point to acquire more service (e.g., accessing NTP server) from Vigor router. **Enable Management VLAN** – VigorAP 903 supports tag-based VLAN for wireless clients accessing Vigor device. Only the clients with the specified VLAN ID can access into VigorAP 903. ● **VLAN ID** – Type the number as VLAN ID tagged on the transmitted packet. “0” means no VALN tag.
LAN-B IP Network Configuration	**IP Address** – Type in private IP address for connecting to a local private network (Default: 192.168.2.2). **Subnet Mask** – Type in an address code that determines the size of the network. (Default: 255.255.255.0/ 24) **Enable Management VLAN** – VigorAP 903 supports tag-based VLAN for wireless clients accessing Vigor device. Only the clients with the specified VLAN ID can access into VigorAP 903. ● **VLAN ID** – Type the number as VLAN ID tagged on the transmitted packet. “0” means no VALN tag.
DHCP Server Configuration	DHCP stands for Dynamic Host Configuration Protocol. DHCP server can automatically dispatch related IP settings to any local user configured as a DHCP client. **Enable Server -** Enable Server lets the modem assign IP address to every host in the LAN. ● **Start IP Address -** Enter a value of the IP address pool for the DHCP server to start with when issuing IP addresses. If the 1st IP address of your modem is 192.168.1.2, the starting IP address must be 192.168.1.3 or greater, but smaller than 192.168.1.254. ● **End IP Address -** Enter a value of the IP address pool for the DHCP server to end with when issuing IP addresses. ● **Subnet Mask -** Type in an address code that determines the size of the network. (Default: 255.255.255.0/ 24) ● **Default Gateway -** Enter a value of the gateway IP address for the DHCP server. ● **Lease Time** - It allows you to set the leased time for the specified PC. ● **Primary DNS Server -** You must specify a DNS server IP address here because your ISP should provide you with usually more than one DNS Server. If your ISP does not provide it, the modem will automatically apply default DNS Server IP address: 194.109.6.66 to this field. ● **Secondary DNS Server -** You can specify secondary DNS server IP address here because your ISP often provides you more than one DNS Server. If your ISP does not provide it, the modem will automatically apply default secondary DNS Server IP address: 194.98.0.1 to this field. **Relay Agent -** Specify which subnet that DHCP server is located the relay

	agent should redirect the DHCP request to. • **DHCP Relay Agent -** It is available when Enable Relay Agent is selected. Set the IP address of the DHCP server you are going to use so the Relay Agent can help to forward the DHCP request to the DHCP server. **Disable Server -** Disable Server lets you manually or use other DHCP server to assign IP address to every host in the LAN. • **WLAN Trusted DHCP Server –**There is no right for such VigorAP to assign IP address for wireless LAN user. However, you can specify another valid DHCP server on other VigorAP to make the wireless LAN client obtaining the IP address from the designated DHCP server. Specify a DHCP server in such field. All the IP addresses of the devices on LAN of VigorAP will be assigned via such specified server. It is used to avoid IP assignment interference due to multiple DHCP servers in one LAN.
DNS Server IP Address	**Primary DNS Server -** You must specify a DNS server IP address here because your ISP should provide you with usually more than one DNS Server. If your ISP does not provide it, the modem will automatically apply default DNS Server IP address: 194.109.6.66 to this field. **Secondary DNS Server -** You can specify secondary DNS server IP address here because your ISP often provides you more than one DNS Server. If your ISP does not provide it, the modem will automatically apply default secondary DNS Server IP address: 194.98.0.1 to this field.

After finishing this web page configuration, please click **OK** to save the settings.

II-6-2 Port Control

To avoid wrong connection due to the insertion of unsuitable Ethernet cable, the function of physical LAN ports can be disabled via web configuration.



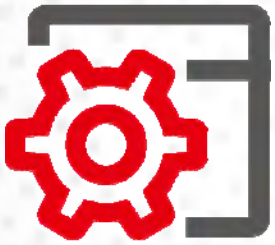
Available settings are explained as follows:

Item	Description
Enable Port Control	Check it to enable the port control. If it is enabled, you are allowed to disable the function of physical LAN port by checking the corresponding check box.
Disable Port	Choose and check the LAN port.

After finishing this web page configuration, please click **OK** to save the settings.

This page is left blank.

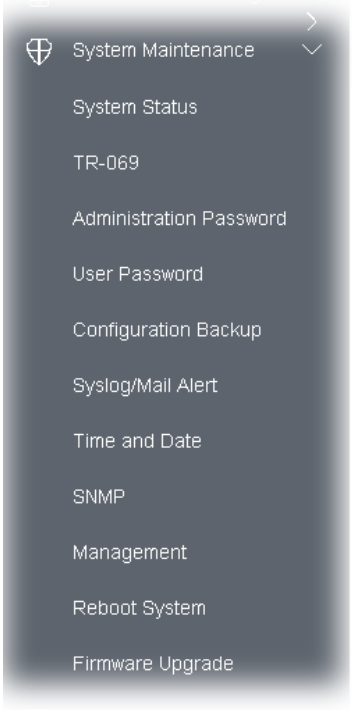
Chapter III Management



III-1 System Maintenance

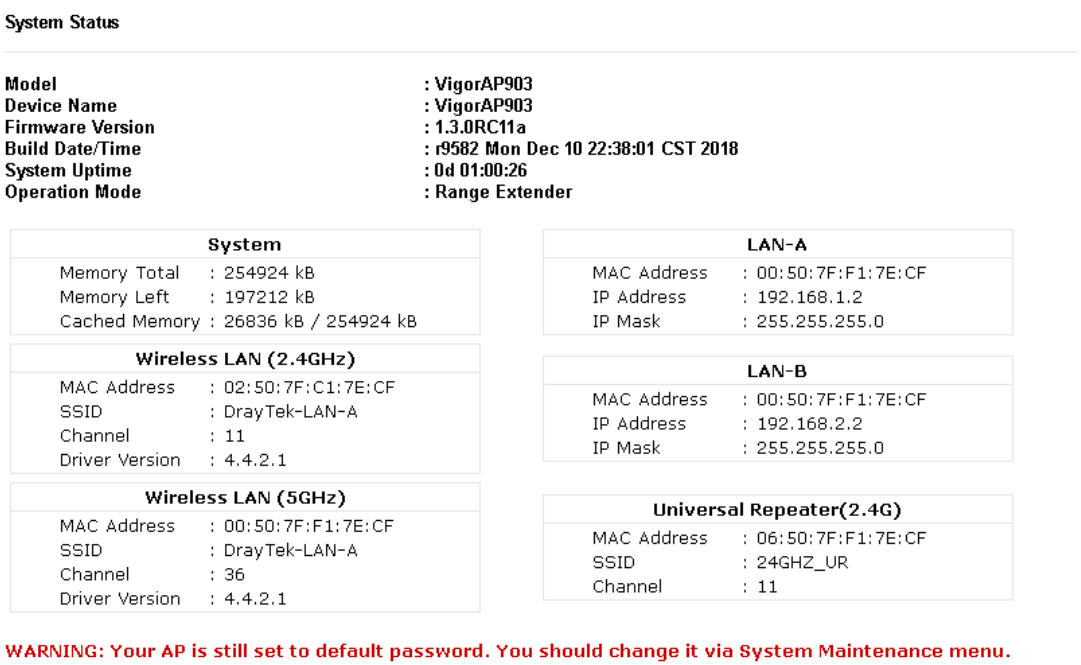
For the system setup, there are several items that you have to know the way of configuration: Status, TR-069, Administrator Password, Configuration Backup, Syslog/Mail Alert, Time and Date, SNMP, Management, Reboot System, and Firmware Upgrade.

Below shows the menu items for System Maintenance.



III-1-1 System Status

The **System Status** provides basic network settings of Vigor modem. It includes LAN and WAN interface information. Also, you could get the current running firmware version or firmware related information from this presentation.

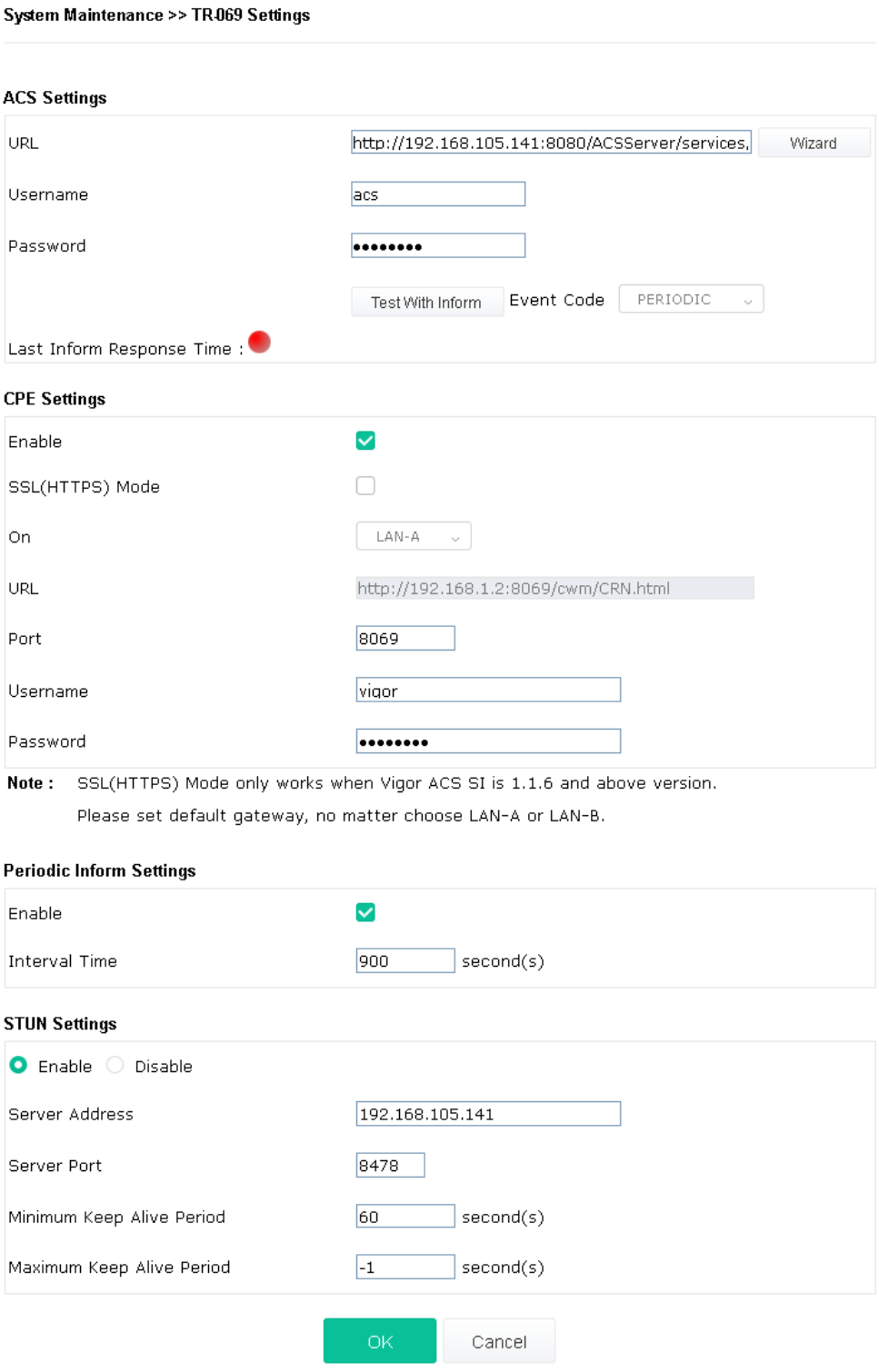


Each item is explained as follows:

Item	Description
Model /Device Name	Display the model name of the modem.
Firmware Version	Display the firmware version of the modem.
Build Date/Time	Display the date and time of the current firmware build.
System Uptime	Display the period that such device connects to Internet.
Operation Mode	Display the operation mode that the device used.
System	
Memory total	Display the total memory of your system.
Memory left	Display the remaining memory of your system.
LAN-A/LAN-B	
MAC Address	Display the MAC address of the LAN Interface.
IP Address	Display the IP address of the LAN interface.
IP Mask	Display the subnet mask address of the LAN interface.
Wireless LAN (2.4GHz/5GHz)	
MAC Address	Display the MAC address of the WAN Interface.
SSID	Display the SSID of the device.
Channel	Display the channel that the station used for connecting with such device.

III-1-2 TR-069

This device supports TR-069 standard. It is very convenient for an administrator to manage a TR-069 device (Vigor router, AP and etc.) through VigorACS (Auto Configuration Server).



Available settings are explained as follows:

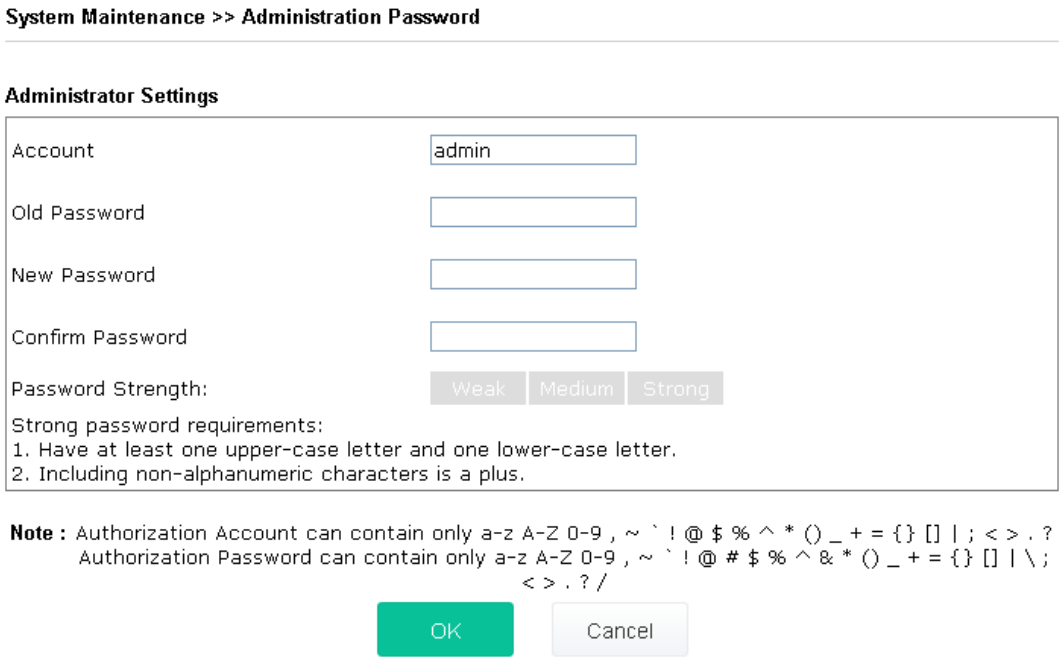
Item	Description
ACS Settings	**Wizard** – Click it to enter the IP address of VigorACS server host, port number and the handler. **URL/Username/Password –** Such data must be typed according to the

	ACS (Auto Configuration Server) you want to link. Please refer to Auto Configuration Server user's manual for detailed information. **Test With Inform** – Click it to send a message based on the event code selection to test if such CPE is able to communicate with VigorACS SI server. **Event Cod**e – Use the drop down menu to specify an event to perform the test. **Last Inform Response Time** – Display the time that VigorACS server made a response while receiving Inform message from CPE last time.
CPE Settings	Such information is useful for Auto Configuration Server (ACS). **Enable**– Check the box to allow the CPE Client to connect with Auto Configuration Server. **SSL(HTTPS) Mode** - Check the box to allow the CPE client to connect with ACS through SSL. **On** – Choose the interface (LAN-A or LAN-B) for VigorAP 903 connecting to ACS server. **Port** – Sometimes, port conflict might be occurred. To solve such problem, you might change port number for CPE. **Username/Password –** Type the username and password that VigorACS can use to access into such CPE.
Periodic Inform Settings	The default setting is **Enable**. Please set interval time or schedule time for the AP to send notification to VigorACS server. **Interval Time** – Type the value for the interval time setting. The unit is "second".
STUN Settings	The default is **Disable**. If you click **Enable**, please type the relational settings listed below: **Server Address –** Type the IP address of the STUN server. **Server Port –** Type the port number of the STUN server. **Minimum Keep Alive Period –** If STUN is enabled, the CPE must send binding request to the server for the purpose of maintaining the binding in the Gateway. Please type a number as the minimum period. The default setting is "60 seconds". **Maximum Keep Alive Period –** If STUN is enabled, the CPE must send binding request to the server for the purpose of maintaining the binding in the Gateway. Please type a number as the maximum period. A value of "-1" indicates that no maximum period is specified.

After finishing this web page configuration, please click **OK** to save the settings.

III-1-3 Administrator Password

This page allows you to set new password for accessing into web user interface of VigorAP.



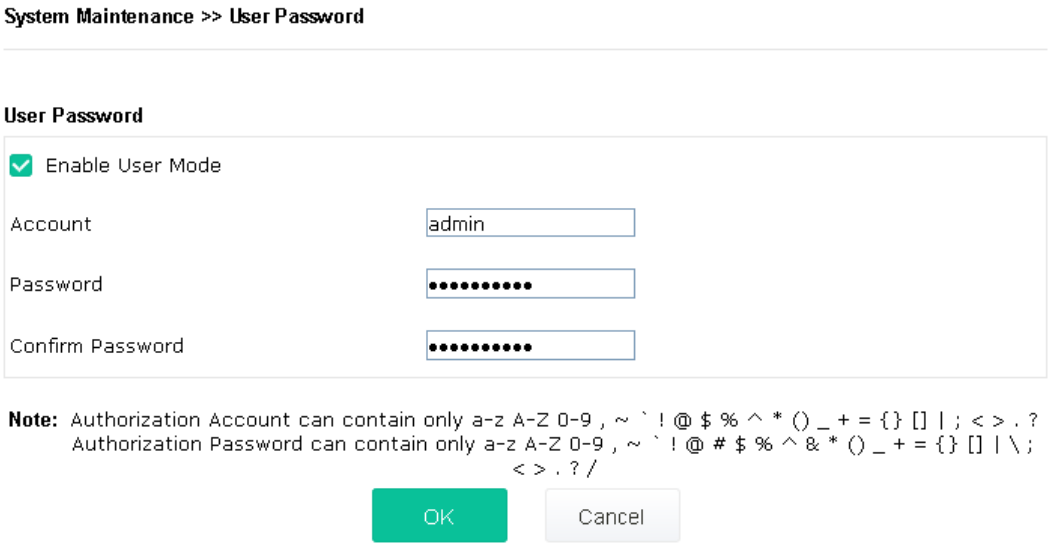
Available settings are explained as follows:

Item	Description
Account	Enter the name for accessing into web user Interface.
Old Password	Enter the old password for accessing into the web user interface.
New Password	Enter in new password in this filed.
Confirm Password	Enter the new password again for confirmation.
Password Strength	The system will display the password strength (represented with the word of weak, medium or strong) of the password specified above.

When you click **OK**, the login window will appear. Please use the new password to access into the web user interface again.

III-1-4 User Password

This page allows you to set new account and password for accessing the web pages under User Mode.



Available settings are explained as follows:

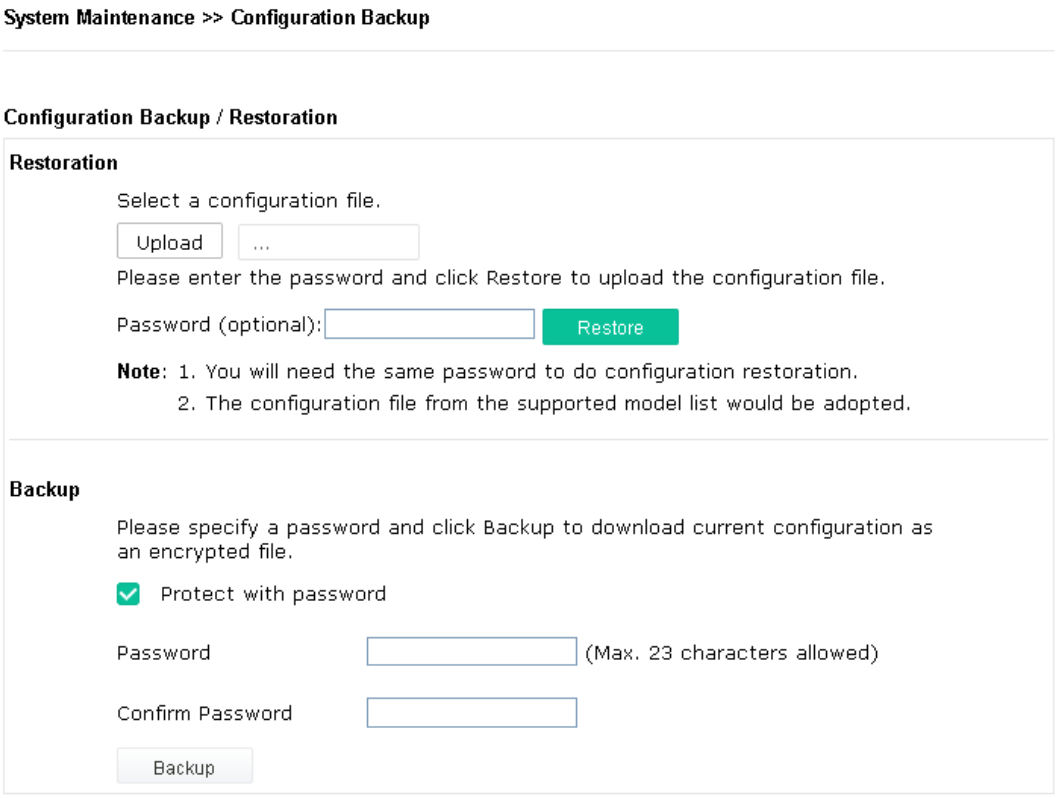
Item	Description
Enable User Mode	After checking this box, you can access into the web user interface with the password typed here for simple web configuration. The settings on simple web user interface will be different with full web user interface accessed by using the administrator password.
Account	Enter a user name.
Password	Enter in new password in this field. The length of the password is limited to 31 characters.
Confirm Password	Enter the new password again.

Click **OK** to save the settings**.**

Settings to be configured in User Mode will be less than settings in Admin Mode. Only basic configuration settings will be available in User Mode.

III-1-5 Configuration Backup

Such function can be used to backup/restore the VigorAP 903 settings.

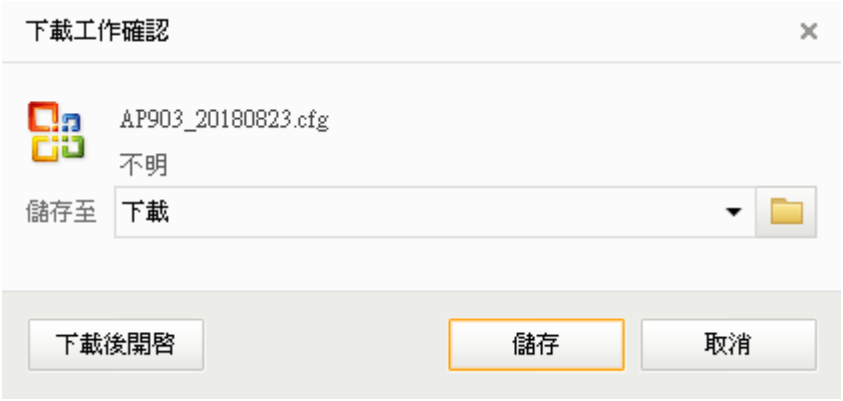


Available settings are explained as follows:

Item	Description
Restoration	**Upload** - Click it to specify a file to be restored. **Password (optional)** – Enter a password for configuration restoration. **Restore** – Click it to restore the configuration file to VigorAP.
Backup	Perform the configuration backup of this device. **Protect with password-** For the sake of security, the configuration file for the access point can be encrypted. **Password** – Type several characters as the password for encrypting the configuration file. **Confirm Password** – Type the password again for confirmation. **Backup** – Click it to backup the configuration file.

Follow the steps below to backup your configuration.

1. Go to **System Maintenance** >> **Configuration Backup**.
2. If required, check the box of Protect with password and enter the password.
3. Click **Backup** to get into the following dialog.



4. Click **Save**, the configuration will download automatically to your computer as a file named **config.cfg**.

The above example is using **Windows** platform for demonstrating examples. The **Mac** or **Linux** platform will appear different windows, but the backup function is still available.

Note:

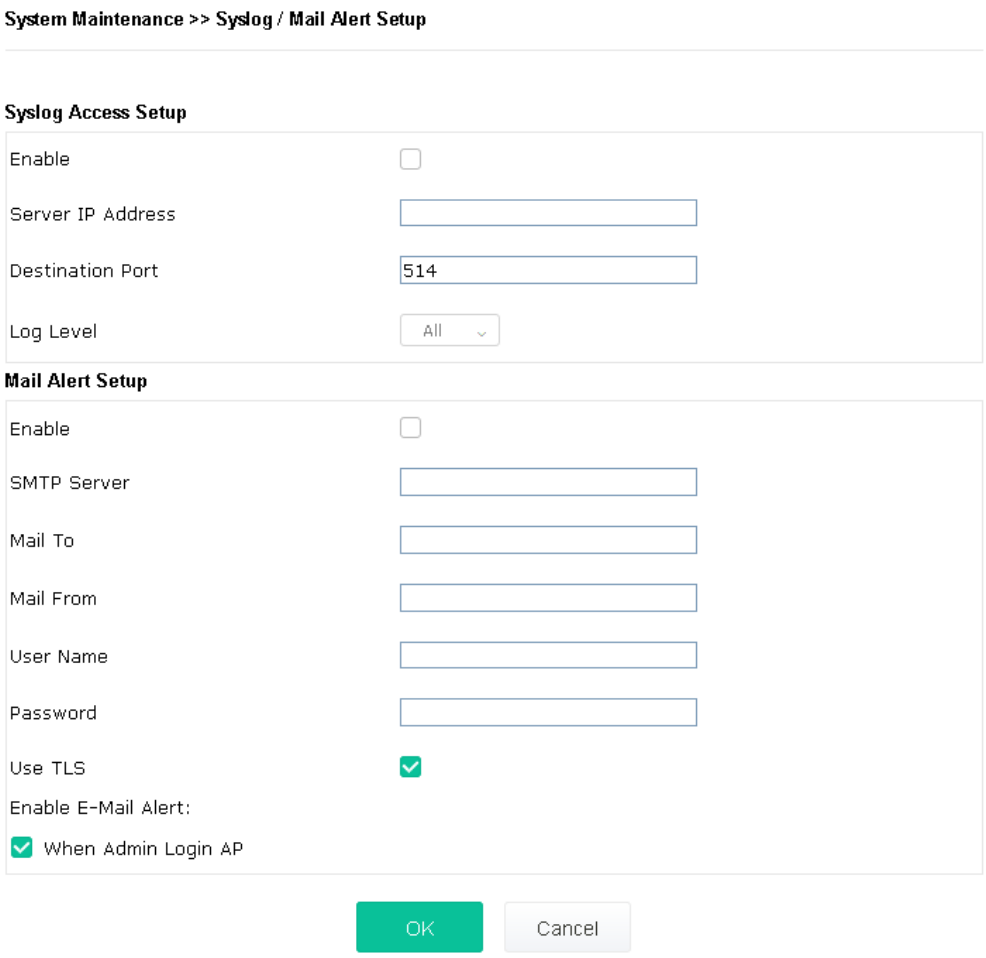
Backup for Certification must be done independently. The Configuration Backup does not include information of Certificate.

Follow the steps below to restore your configuration.

1. Go to **System Maintenance** >> **Configuration Backup**.
2. Click **Upload** to choose the correct configuration file for uploading to the AP.
3. Click **Restore** and wait for few seconds.

III-1-6 Syslog/Mail Alert

SysLog function is provided for users to monitor AP. There is no bother to directly get into the Web user interface of the AP or borrow debug equipments.



Available settings are explained as follows:

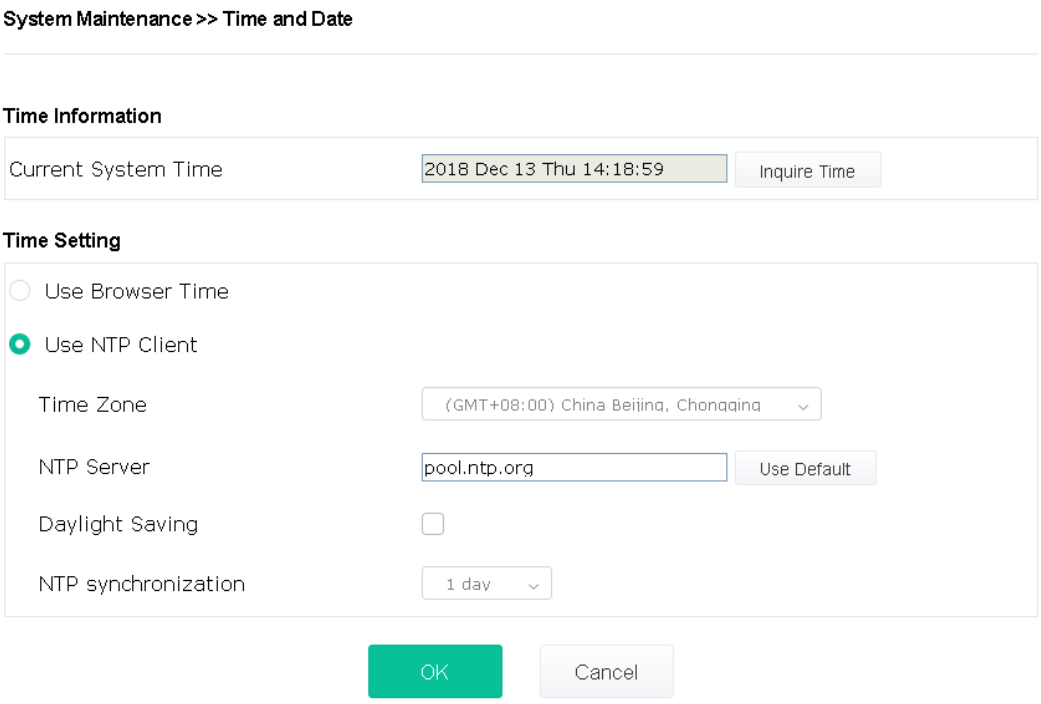
Item	Description
Syslog Access Setup	**Enable** - Check **Enable** to activate function of Syslog. **Server IP Address** -The IP address of the Syslog server. **Destination Port** -Assign a port for the Syslog protocol. The default setting is 514. **Log Level** - Specify which level of the severity of the event will be recorded by Syslog.
Mail Alert Setup	**Enable** - Check **Enable** to activate function of mail alert. **SMTP Server -** The IP address of the SMTP server. **Mail To -** Assign a mail address for sending mails out. **Mail From -** Assign a path for receiving the mail from outside. **User Name -** Type the user name for authentication. **Password -** Type the password for authentication. **Use TLS** – Check this box to encrypt alert mail. However, if the SMTP server specified here does not support TLS protocol, the alert mail with encrypted data will not be received by the receiver.

	Enable E-Mail Alert - VigorAP will send an e-mail out when a user accesses into the user interface by using web or telnet. **When Admin Login AP** – Enable/disable the function. When it is enabled, VigorAP will send out an e-mail to the recipient defined above when a user tries to access into VigorAP by entering login username and password.

Click **OK** to save the settings**.**

III-1-7 Time and Date

It allows you to specify where the time of VigorAP should be inquired from.



Available parameters are explained as follows:

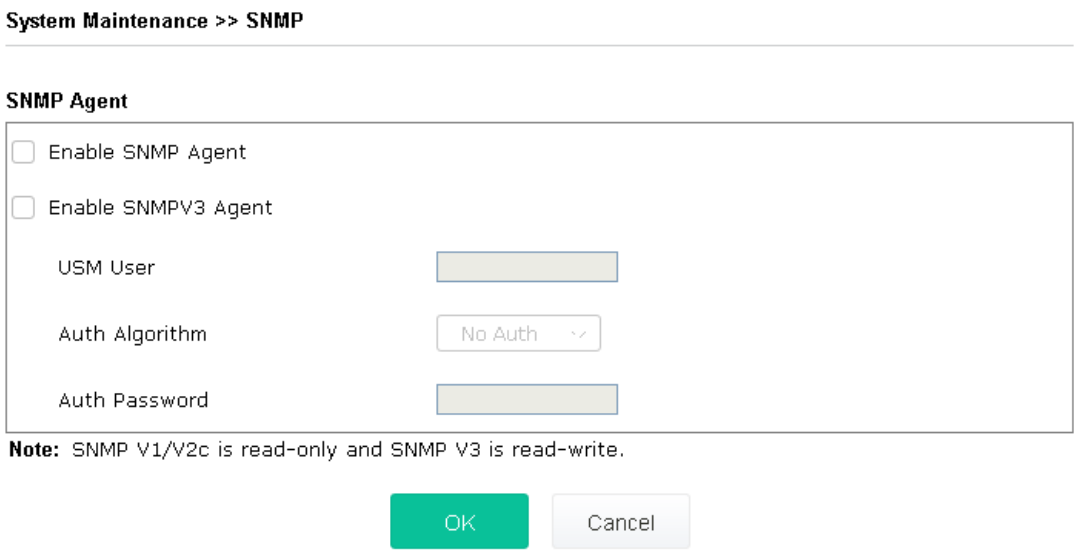
Item	Description
Current System Time	Click **Inquire Time** to get the current time.
Use Browser Time	Select this option to use the browser time from the remote administrator PC host as router's system time.
Use NTP Client	Select to inquire time information from Time Server on the Internet using assigned protocol.
Time Zone	Select a time protocol.
NTP Server	Type the IP address of the time server. **Use Default** – Click it to choose the default NTP server.
Daylight Saving	Check the box to enable the daylight saving. Such feature is available for certain area.
NTP synchronization	Select a time interval for updating from the NTP server.

Click **OK** to save these settings.

III-1-8 SNMP

This page allows you to configure settings for SNMP and SNMPV3 services.

The SNMPv3 is **more secure than** SNMP through the authentication method (support e.g., MD5) for the management needs.



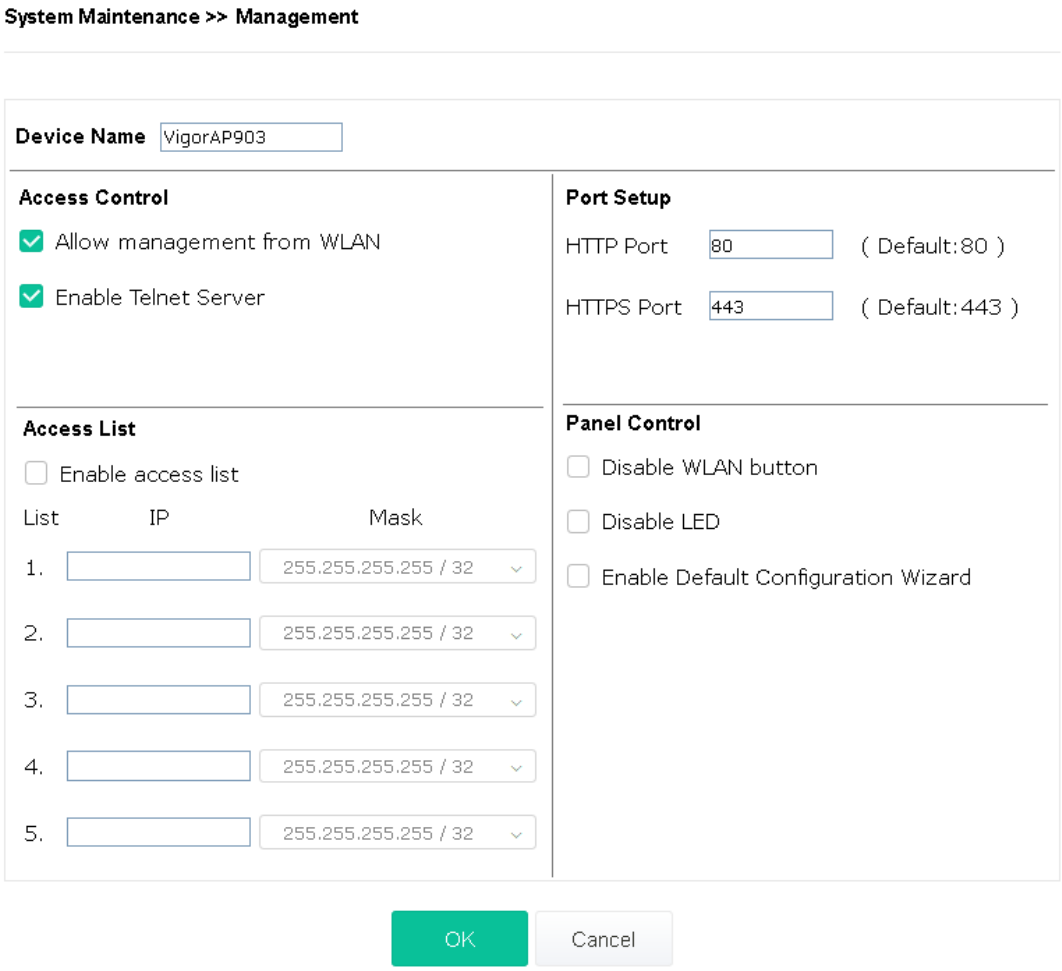
Available settings are explained as follows:

Item	Description
Enable SNMP Agent	Check it to enable this function.
Enable SNMPV3 Agent	Check it to enable this function.
USM User	USM means user-based security mode. Type a username which will be used for authentication. The maximum length of the text is limited to 23 characters.
Auth Algorithm	Choose one of the encryption methods listed below as the authentication algorithm.
Auth Password	Type a password for authentication. The maximum length of the text is limited to 23 characters.

Click **OK** to save these settings.

III-1-9 Management

This page allows you to specify the port number for HTTP and HTTPS server.



Available parameters are explained as follows:

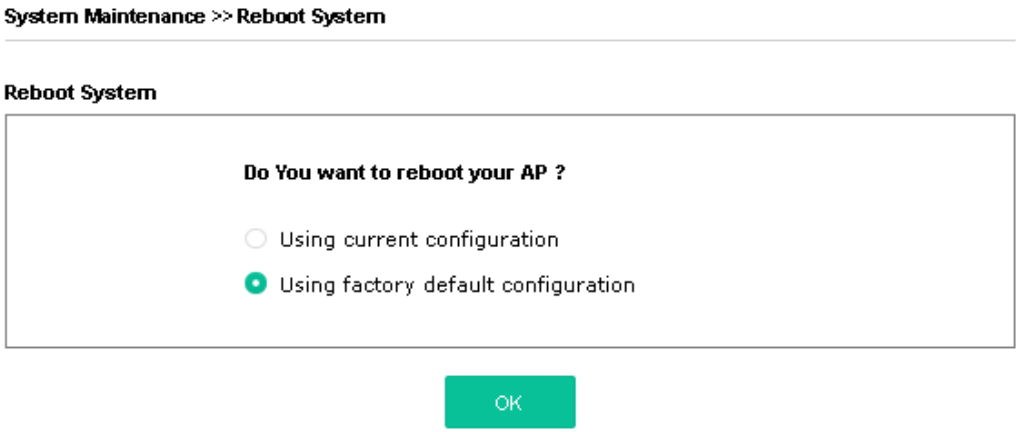
Item	Description
Device Name	The default setting is VigorAP 903. Change the name if required.
Access Control	**Allow management from WLAN** - Enable the checkbox to allow system administrators to login from wireless LAN. **Enable Telnet Server**– The administrator / user can access into the command line interface of VigorAP remotely for configuring settings.
Access List	**Enable access list** – Check the box to specify that the system administrator can only login from a specific host or network defined in the list. A maximum of five IPs/subnet masks is allowed.
Port Setup	**HTTP port / HTTPS port** -Specify user-defined port numbers for the HTTP and HTTPS servers.
Panel Control	**Disable WLAN button** - The default function of WLAN button is enabled. To disable the ability of the Wireless button to control WLAN and WPS functions, check this box. Disabling the wireless button only prevents it from being used to control WLAN functions. **Disable LED** - The LEDs blink always since VigorAP is powered on. Some people might not like that. Therefore the function of LED is allowed to be disabled to make people feeling comfortable and undisturbed. After checking it, all the LEDs on VigorAP will light off immediately after clicking OK.

	Enable Default Configuration Wizard – Default setting is enabled. When it is enabled, you will be guided into **Quick Start Wizard** whenever clicking the DrayTek logo on the top of the web user interface. Such function will be disabled if you have configured Operation Mode, WLAN>>General Setup, WLAN>>Bandwidth Management, WLAN>>Station Control or System Maintenance>>Administration Password.

Click **OK** to save these settings.

III-1-10 Reboot System

The web user interface may be used to restart your modem. Click **Reboot System** from **System Maintenance** to open the following page.



If you want to reboot the modem using the current configuration, check **Using current configuration** and click **OK**. To reset the modem settings to default values, check **Using factory default configuration** and click **OK**. The modem will take 5 seconds to reboot the system.

Note:

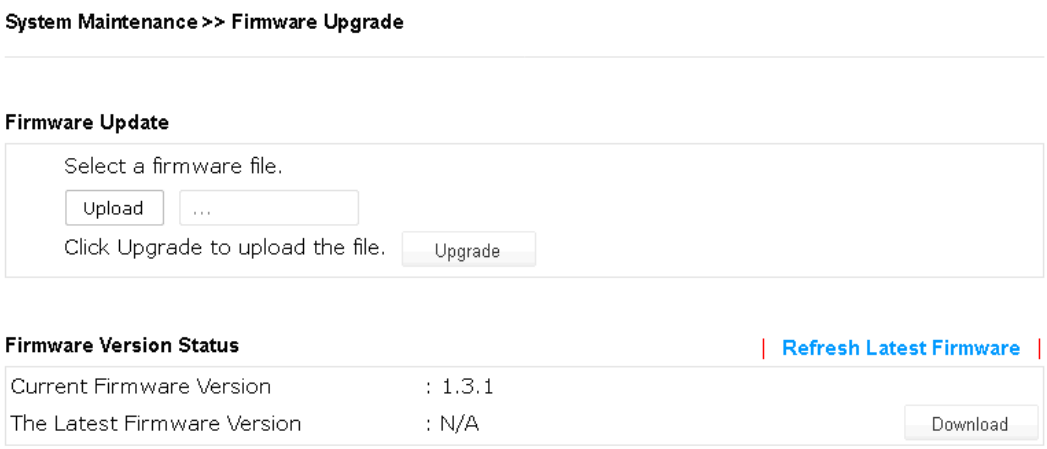
When the system pops up Reboot System web page after configuring the web settings, please click **OK** to reboot your device for ensuring normal operation and preventing unexpected errors of the modem in the future.

III-1-11 Firmware Upgrade

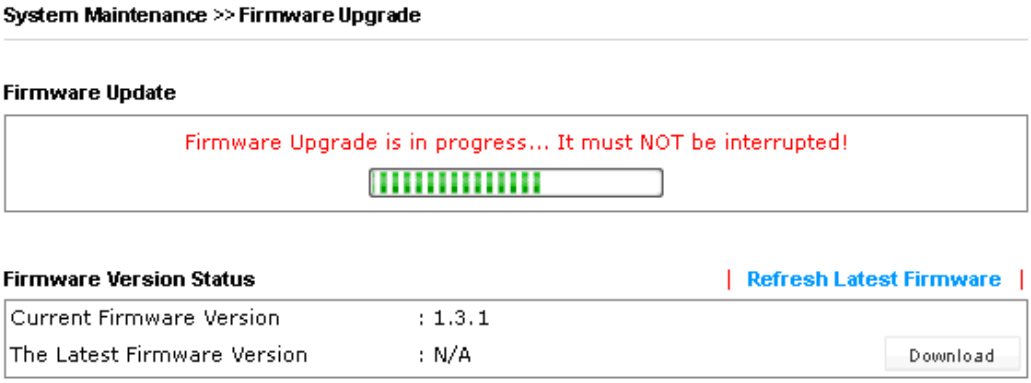
Before upgrading your modem firmware, you need to install the Modem Tools. The **Firmware Upgrade Utility** is included in the tools. The following web page will guide you to upgrade firmware by using an example. Note that this example is running over Windows OS (Operating System).

Download the newest firmware from DrayTek's web site or FTP site. The DrayTek web site is www.draytek.com (or local DrayTek's web site) and FTP site is ftp.draytek.com.

Click **System Maintenance>> Firmware Upgrade** to launch the Firmware Upgrade Utility.

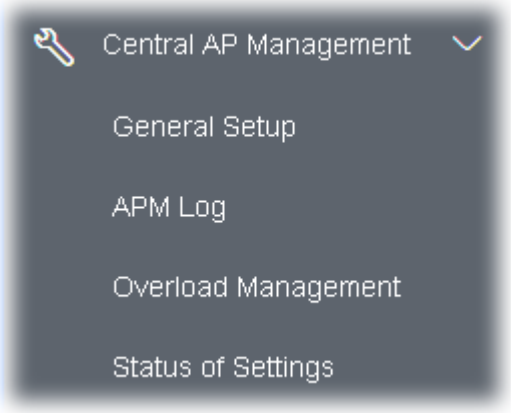


Click **Download** to locate the newest firmware from your hard disk and click **Upgrade**.

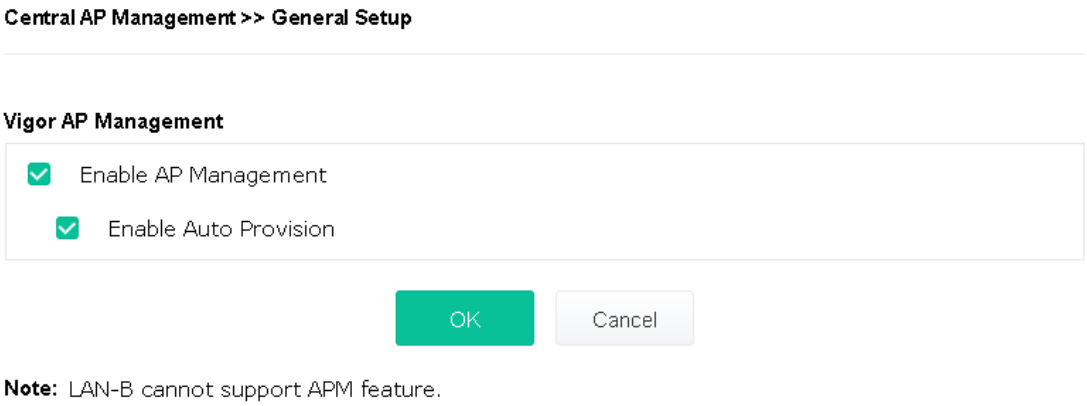


III-2 Central AP Management

Such menu allows you to configure VigorAP device to be managed by Vigor router.



III-2-1 General Setup



Available settings are explained as follows:

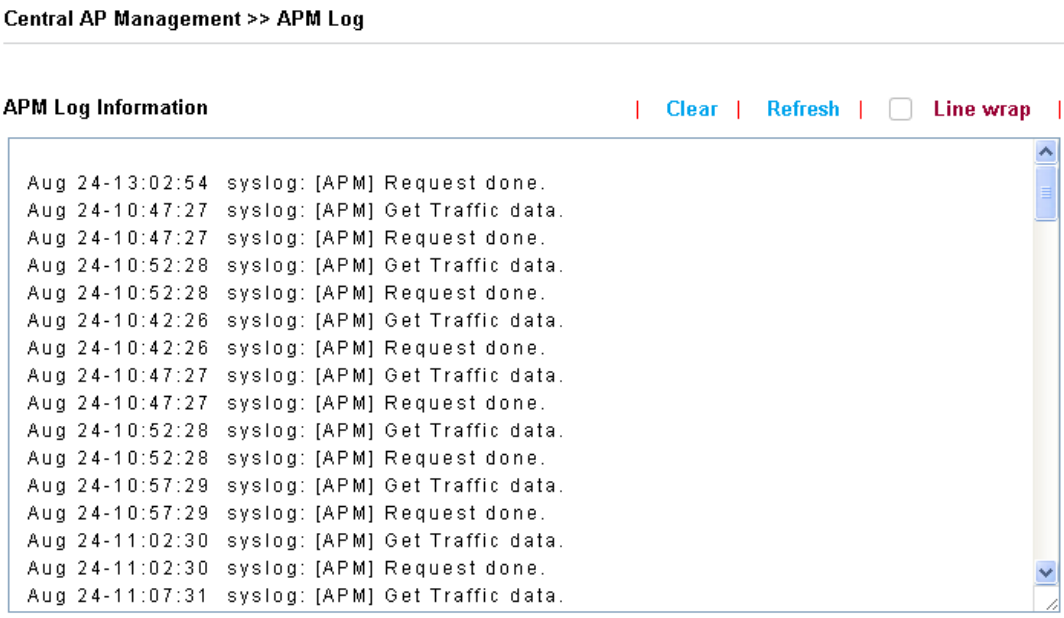
Item	Description
Enable AP Management	Check the box to enable the function of AP Management (APM).
Enable Auto Provision	VigorAP 903 can be controlled under Central AP Management in Vigor2860 series. When both Vigor2860 series and VigorAP 903 have such feature enabled, once VigorAP 903 is registered to Vigor2860 series, the **WLAN profile** pre-configured on Vigor2860 series will be applied to VigorAP 903 immediately. Thus, it is not necessary to configure VigorAP 903 separately.

Click **OK** to save these settings.

III-2-2 APM Log

This page will display log information related to wireless stations connected to VigorAP 903 and central AP management.

Such information also will be delivered to Vigor router (e.g., Vigor2860 or Vigor2925 series) and be shown on **Central AP Management>>Event Log** of Vigor router.

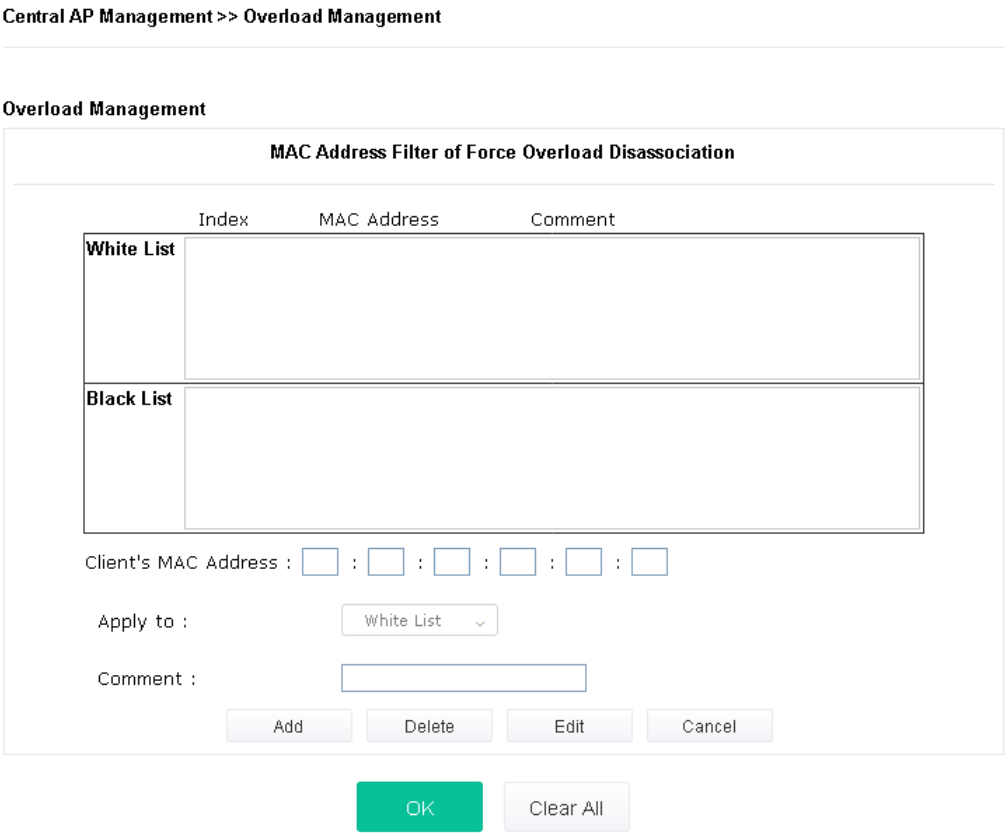


III-2-3 Overload Management

Load Balance can help to distribute the traffic for all of the access points (e.g., VigorAP 903) registered to Vigor router. Thus, the bandwidth will not be occupied by certain access points.

However, traffic overload might be occurred if too many wireless stations connected to VigorAP 903 for data incoming and outgoing. Therefore, “Force Overload Disassociation” is required to terminate the network connection of the client’s station to release network traffic. When the function of “Force Overload Disassociation” in web user interface of Vigor router (e.g., Vigor2860 or Vigor2925 series) is enabled, wireless clients specified in **black list** of such web page will be disassociated to solve the problem of traffic overload.

The following web page is used to configure white list and black list for wireless stations.



Note: When force overload disassociation is enabled, clients in black list will be disassociated first. Clients in white list will not be disassociated.

Available settings are explained as follows:

Item	Description
White List/Black List	Display the information (such as index number, MAC address and comment) for all of the members in White List/Black List. Wireless stations listed in Black List will be forcefully disconnected first when traffic overload occurs and “Force Overload Disassociation” is enabled.
Client’s MAC Address	Specify the MAC Address of the remote/local client.
Apply to	**White List** – MAC address listed inside Client’s MAC Address will be categorized as one of members in White List. **Black List** - MAC address listed inside Client’s MAC Address will be categorized as one of members in Black List.
Comment	Type a brief description for the specified client’s MAC address.

Add	Add a new MAC address into the White List/Black List.
Delete	Delete the selected MAC address in the White List/Black List.
Edit	Edit the selected MAC address in the White List/Black List.
Cancel	Give up the configuration.

Click **OK** to save these settings.

III-2-4 Status of Settings

Load Balance can help to distribute the traffic for all of the access points (e.g., VigorAP 903s) registered to Vigor 2860 or Vigor2925 series. This web page displays the settings related to Load Balance for VigorAP 903. In which, By Station Number, By Traffic and Force Overload Disassociation indicate settings configured in Vigor 2860 or Vigor2925 series.

Central AP Management >> Status of Settings

Function Name	Status	Value
Load Balance		
Station Number Threshold	✗	
Max WLAN(2.4GHz) Station Number		64
Max WLAN(5GHz) Station Number		64
Traffic Threshold	✗	
Upload Limit		None bps
Download Limit		None bps
Force Overload Disassociation	✗	
Disassociate By		None
RSSI Threshold		-50 dBm
Rogue AP Detection		
Rogue AP Detection	✗	

"X" means the function is not enabled or VigorAP 903 has not registered to any Vigor router yet.

Below shows a setting example for Load Balance settings configured in Vigor 2860 or Vigor2925 series.

Central AP Management >> Load Balance

Enable: ☑

Mode: ☑ By Station Number
(Overload Detected By) Maximum Station Number:
Wireless LAN (2.4GHz) 64 (3-64)
Wireless LAN (5GHz) 64 (3-64)

☑ By Traffic
Upload Limit 256K 0K bps (Default unit: K)
Download Limit 512K 0K bps (Default unit: K)

Force Overload Disassociation: None

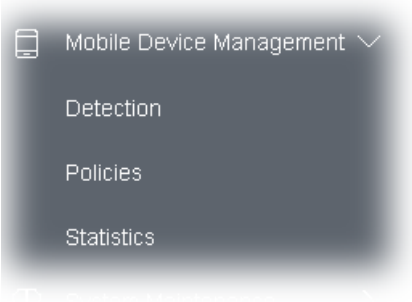
Note: The maximum station number of Wireless LAN (2.4GHz) will be applied to both Wireless LAN (2.4GHz) and Wireless LAN (5GHz) if the firmware version of AP900 is less than or equal to 1.1.4.1.

OK Cancel

III-3 Mobile Device Management

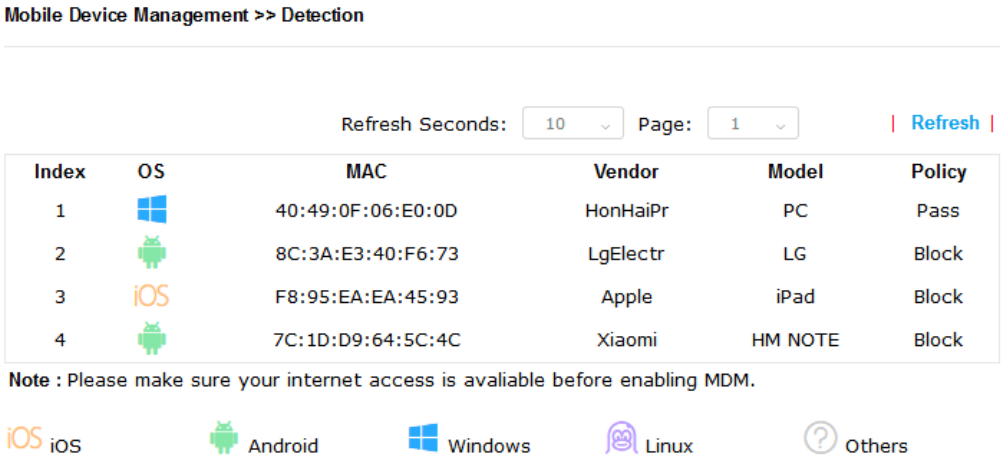
Such feature can control / manage the mobile devices accessing the wireless network of VigorAP. VigorAP offers wireless LAN service for mobile device(s), PC users, MAC users or other users according to the policy selected.

Below shows the menu items for Mobile Device Management (MDM).



III-3-1 Detection

Such page displays mobile device(s) detected by VigorAP Detected device(s) with Policy – **Pass** can access into the wireless LAN offered by VigorAP. Detected device(s) with Policy – **Block** are not allowed to access into Internet via VigorAP's WLAN.



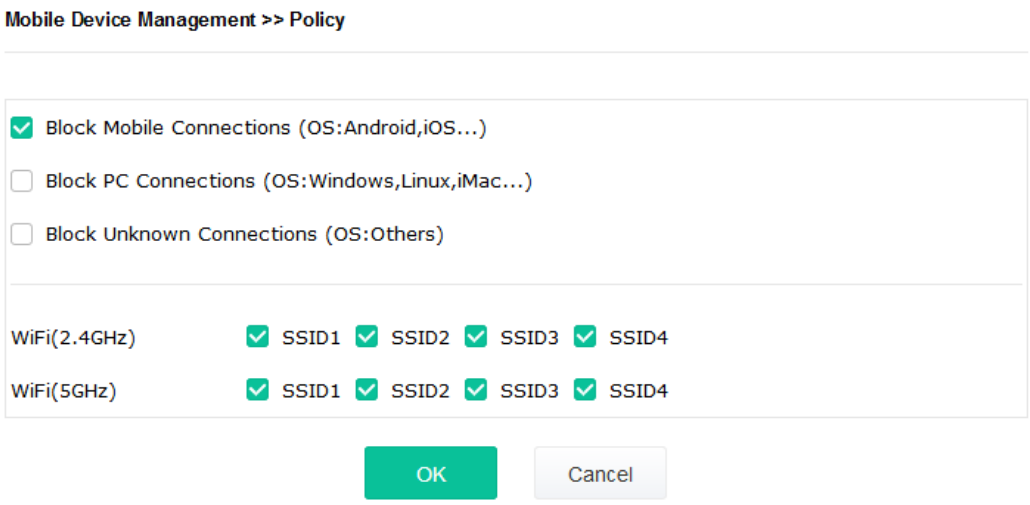
Once you check/uncheck the box of **Enable Mobile Device Management** and click **OK**, VigorAP will reboot automatically to activate MDM.

At present, OS (for mobile device) categories supported by VigorAP include:

- Windows
- Linux
- iOS
- Andorid
- WindowsPhone
- BlackBerry
- Symbian

III-3-2 Policies

Such page determines which devices (mobile, PC, MAC or others) allowed to make network connections via VigorAP or blocked by VigorAP.



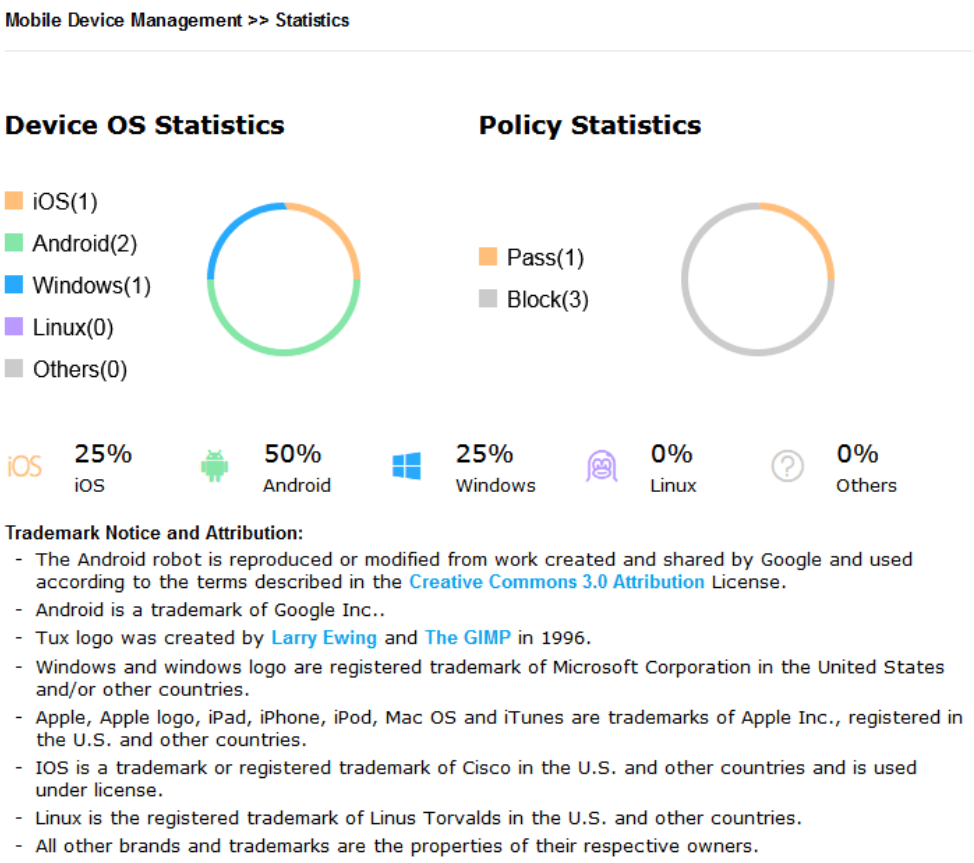
Each item is explained as follows:

Item	Description
Block Mobile Connections	All of mobile devices will be blocked and not allowed to access into Internet via VigorAP.
Block PC Connections	All of network connections based on PC, MAC or Linux platform will be blocked and terminated.
Block Unknown Connections	Only the unknown network connections (unable to be recognized by Vigor router) will be blocked and terminated.
WiFi(2.4GHz)	Specify the SSID(s) to apply such policy.
WiFi(5GHz)	Specify the SSID(s) to apply such policy.

After finished the policy selection, click **OK**. VigorAP will *reboot* to activate the new policy automatically.

III-3-3 Statistics

The number of detected devices and the number of device(s) passed/blocked according to the policy specified in **Mobile Device Management>>Policy** can be illustrated as doughnut chart.



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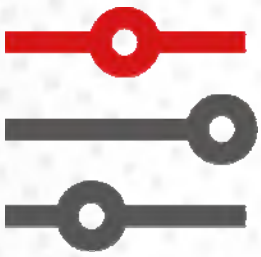
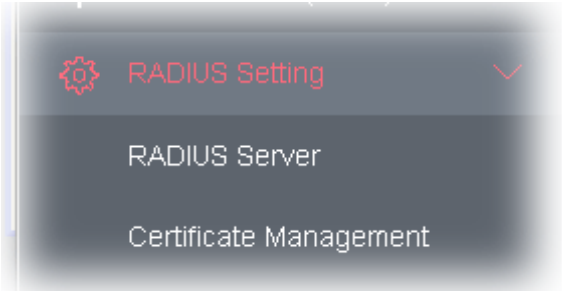
Chapter IV Others

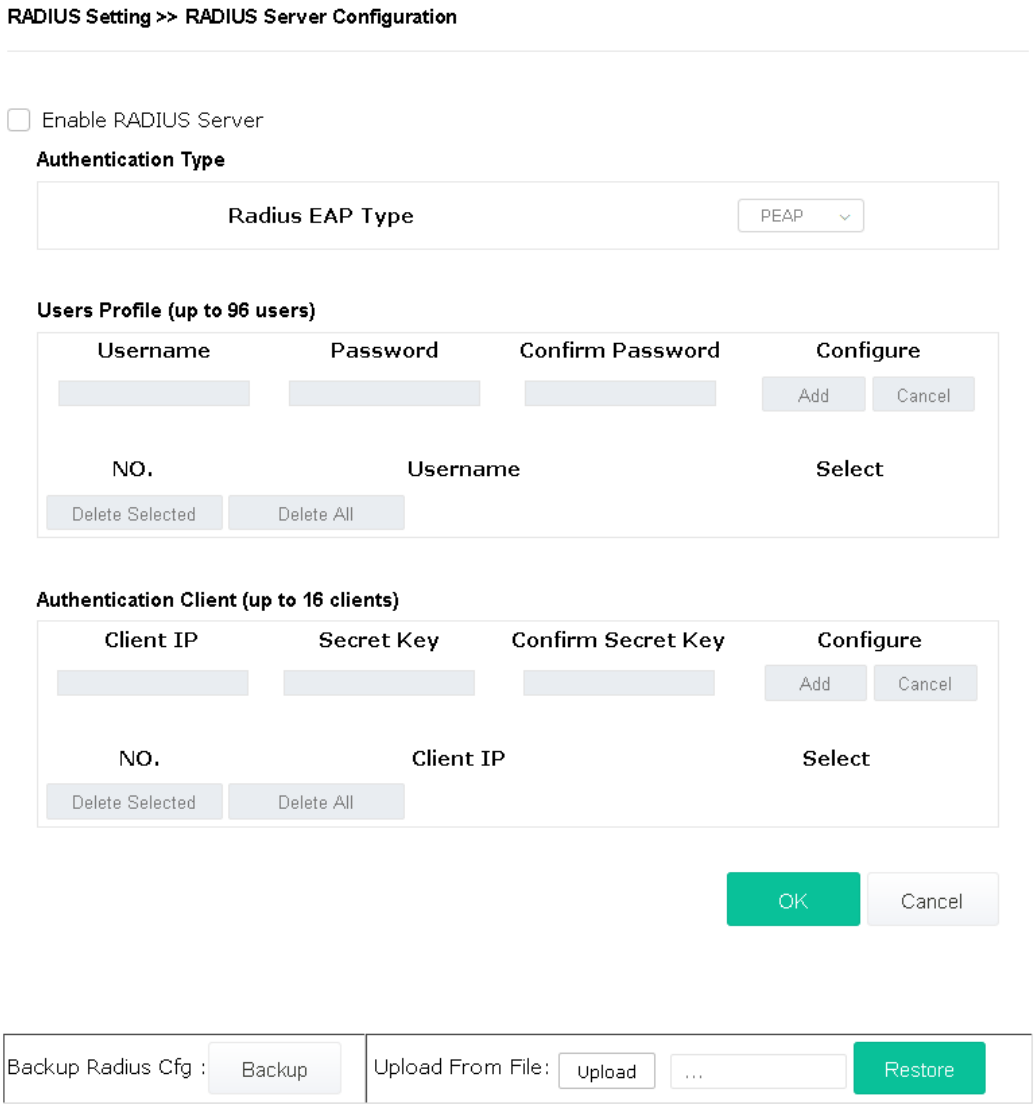


IV-1 RADIUS Setting



IV-1-1 RADIUS Server

VigorAP 903 offers a built-in RADIUS server to authenticate the wireless client that tries to connect to VigorAP 903. The AP can accept the wireless connection authentication requested by wireless clients.



Available settings are explained as follows:

Item	Description
Enable RADIUS Server	Check it to enable the internal RADIUS server.
Authentication Type	Let the user to choose the authentication method for RADIUS server. **Radius EAP Type** – There are two types, PEAP and EAP TLS, offered for selection. If EAP TLS is selected, a certificate must be installed or must be ensured to be trusted.
Users Profile	**Username** – Type a new name for the user profile. **Password** – Type a new password for such new user profile. **Confirm Password** – Retype the password to confirm it. **Configure** • **Add** – Make a new user profile with the name and password specified on the left boxes. • **Cancel** – Clear current settings for user profile. **Delete Selected** – Delete the selected user profile (s). **Delete All** – Delete all of the user profiles.
Authentication Client	This internal RADIUS server of VigorAP 903 can be treated as the external RADIUS server for other users. Specify the client IP and secret key to make the wireless client choosing VigorAP 903 as its external RADUIS server. **Client IP** – Type the IP address for the user to be authenticated by VigorAP 903 when the user tries to use VigorAP 903 as the external RADIUS server. **Secret Key** – Type the password for the user to be authenticated by VigorAP 903 while the user tries to use VigorAP 903 as the external RADIUS server. **Confirm Secret Key** – Type the password again for confirmation. **Configure** • **Add** – Make a new client with IP and secret key specified on the left boxes. • **Cancel** – Clear current settings for the client. **Delete Selected** – Delete the selected client(s). **Delete All** – Delete all of the clients.
Backup	Click it to store the settings (RADIUS configuration) on this page as a file.
Restore	Click it to restore the settings (RADIUS configuration) from an existed file.

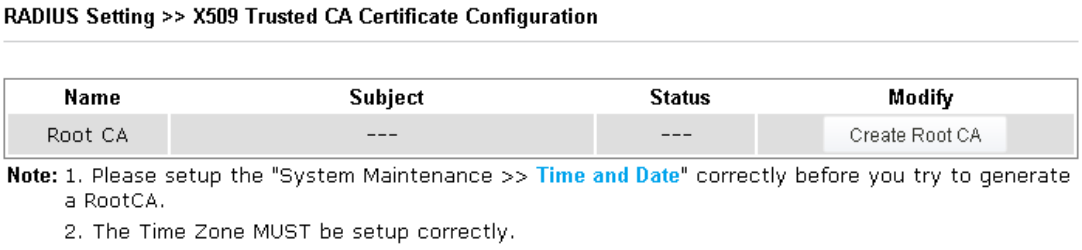
After finishing this web page configuration, please click **OK** to save the settings.

IV-1-2 Certificate Management

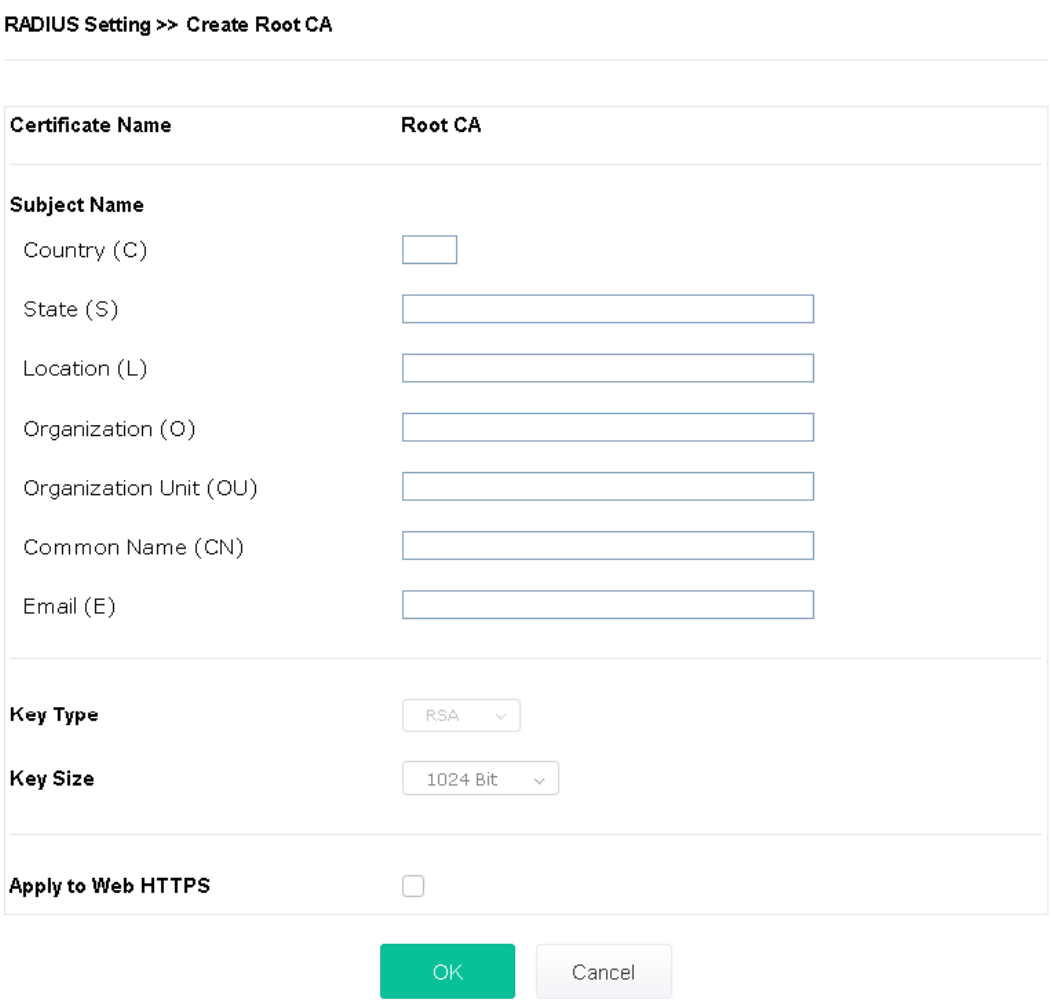
When the local client and remote server are required to make certificate authentication (e.g., Radius EAP-TLS authentication) for wireless connection and avoiding the attack of MITM, a trusted root certificate authority (Root CA) will be used to authenticate the digital certificates offered by both ends.

However, the procedure of applying digital certificate from a trusted root certificate authority is complicated and time-consuming. Therefore, Vigor AP offers a mechanism which allows you to generate root CA to save time and provide convenience for general user. Later, such root CA generated by DrayTek server can perform the issuing of local certificate.

Root CA can be deleted but not edited. If you want to modify the settings for a Root CA, please delete the one and create another one by clicking Create Root CA.



Click **Create Root CA** to open the following page. Type or choose all the information that the window request such as subject name, key type, key size and so on.



Available settings are explained as follows:

Item	Description
Subject Name	Type the required information for creating a root CA. Country (C) – Type the country code (two characters) in this box. State (S)/ Location (L)/ Organization (O)/ Organization Unit (OU) /Common Name (CN) - Type the name or information for the root CA with length less than 32 characters. Email (E) – Type the email address for the root CA with length less than 32 characters.
Key Type	At present, only RSA (an encryption algorithm) is supported by such device.
Key Size	To determine the size of a key to be authenticated, use the drop down list

	to specify the one you need.
Apply to Web HTTPS	VigorAP needs a certificate to access into Internet via Web HTTPS. Check this box to use the user-defined root CA certificate which will substitute for the original certificate applied by web HTTPS.

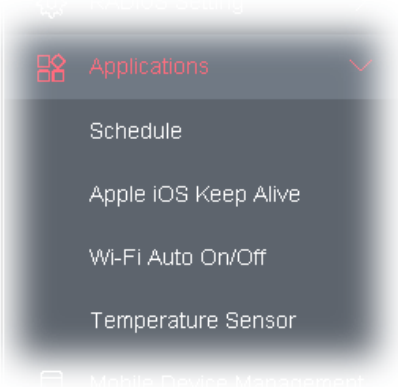
Note:

"Common Name" must be configured with rotuer's WAN IP or domain name.

After finishing this web page configuration, please click **OK** to save the settings. A new root CA will be generated.

IV-2 Applications

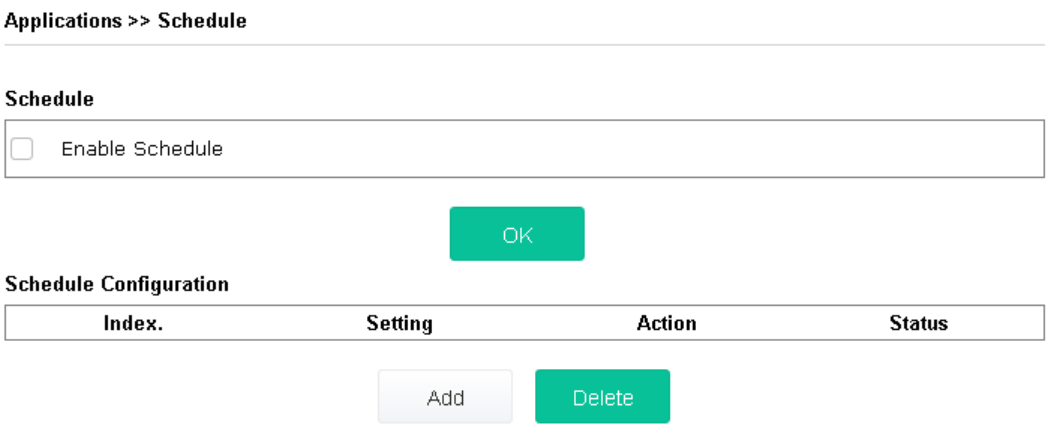
Below shows the menu items for Applications.



IV-2-1 Schedule

The VigorAP has a built-in clock which can update itself manually or automatically by means of Network Time Protocols (NTP). As a result, you can not only schedule the AP to dialup to the Internet at a specified time, but also restrict Internet access to certain hours so that users can connect to the Internet only during certain hours, say, business hours. The schedule is also applicable to other functions.

You have to set your time before set schedule. In **System Maintenance>> Time and Date** menu, press **Inquire Time** button to set the VigorAP's clock to current time of your PC. The clock will reset once if you power down or reset the AP. There is another way to set up time. You can inquiry an NTP server (a time server) on the Internet to synchronize the AP's clock. This method can only be applied when the WAN connection has been built up.



Available settings are explained as follows:

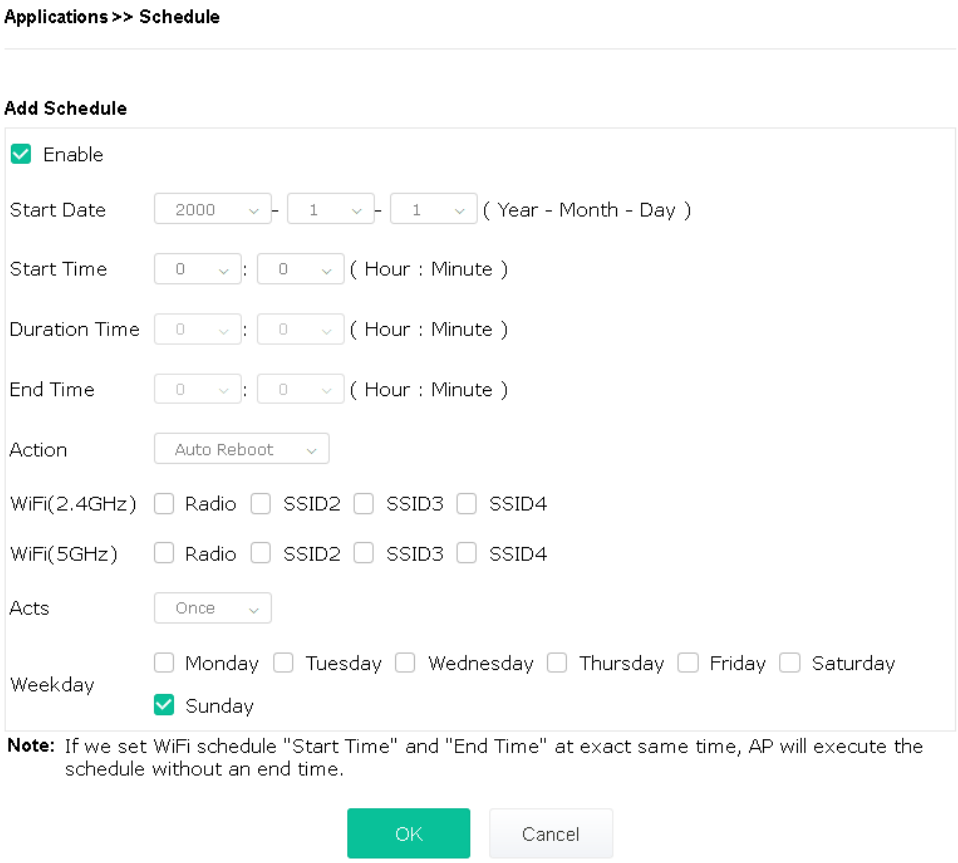
Available settings are explained as follows:

Item	Description
Schedule	**Enable Schedule** - Check it to enable the function of schedule configuration.
Schedule Configuration	**Index** – Display the sort number of the schedule profile. **Setting** – Display the summary of the schedule profile. **Action** – Display the action adopted by the schedule profile. **Status** – Display if the profile is enabled (V) or not (X).

	Add – Such button is available when **Enable Schedule** is checked. It allows to add a new schedule profile. **Delete** – Check the index box of the schedule profile and click such button to remove the profile.

You can set up to **15** schedules. To add a schedule:

1. Check the box of **Enable Schedule**.
2. Click the **Add** button to open the following web page.

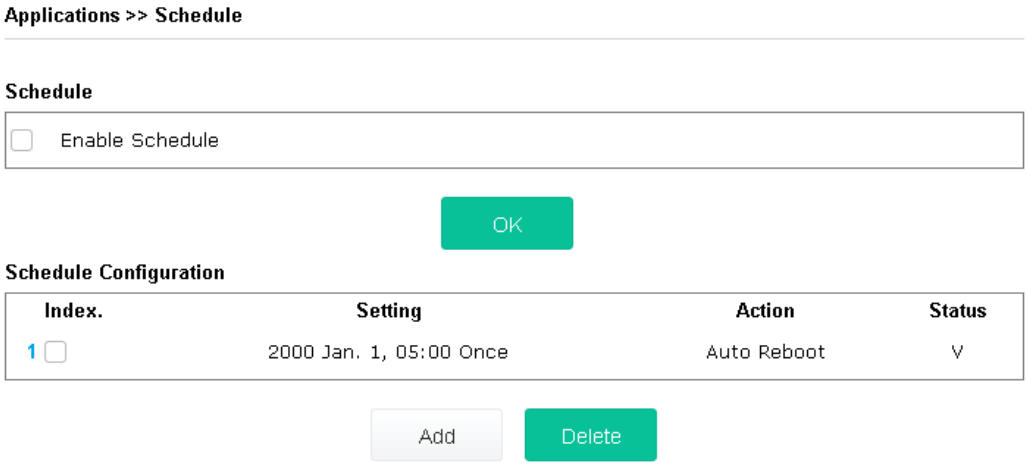


Available settings are explained as follows:

Item	Description
Enable	Check to enable such schedule profile.
Start Date	Specify the starting date of the schedule.
Start Time	Specify the starting time of the schedule.
Duration Time	Specify the duration (or period) for the schedule.
End Time	Specify the ending time of the schedule.
Action	Specify which action should apply the schedule.
WiFi(2.4GHz) / WiFi(5GHz)	When **Wi-Fi UP** or **Wi-Fi DOWN** is selected as **Action**, you can check the Radio or SSID 2~4 boxes (2.4GHz and 5GHz respectively) to setup the network based on the schedule profile. **Note**: When Radio is selected, SSID2, SSID3 and SSID4 are not available for choosing, vice versa. Moreover, SSID2, SSID3, and SSID4 are not available for choosing if they are not enabled.
Acts	Specify how often the schedule will be applied. **Once -**The schedule will be applied just once **Routine -**Specify which days in one week should perform the schedule.

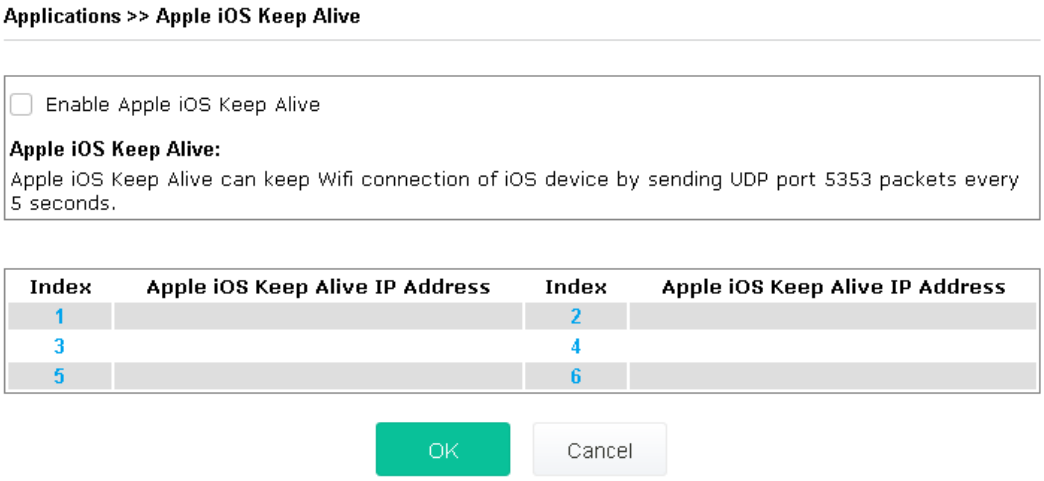
Weekday	Choose and check the day to perform the schedule. It is available when **Routine** is selected as **Acts**.

3. After finishing this web page configuration, please click **OK** to save the settings. A new schedule profile has been created and displayed on the screen.



IV-2-2 Apple iOS Keep Alive

To keep the wireless connection (via Wi-Fi) on iOS device in alive, VigorAP 903 will send the UDP packets with 5353 port to the specific IP every five seconds.



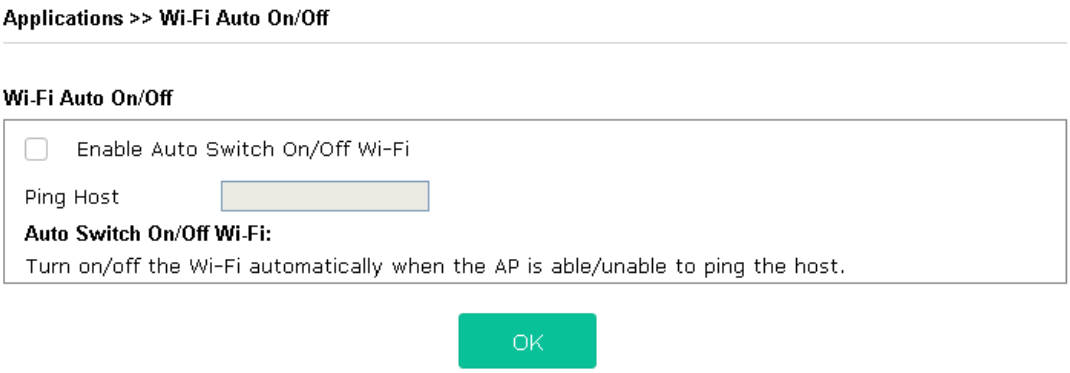
Available settings are explained as follows:

Item	Description
Enable Apple iOS Keep Alive	Check to enable the function.
Index	Display the setting link. Click the index link to open the configuration page for setting the IP address.
Apple iOS Keep Alive IP Address	Display the IP address.

Click **OK** to save the settings.

IV-2-3 Wi-Fi Auto On/Off

When VigorAP is able or unable to ping the specified host, the Wi-Fi function will be turned on or off automatically. The purpose of such function is to avoid wireless station roaming to an AP which is unable to access Internet.



Available settings are explained as follows:

Item	Description
Enable Auto Switch On/Off Wi-Fi	Check the box to enable such function.
Ping Host	Type an IP address (e.g., 8.8.8.8) or a domain name (e.g., google.com) for testing if the access point is stable or not.

Click **OK** to save the settings.

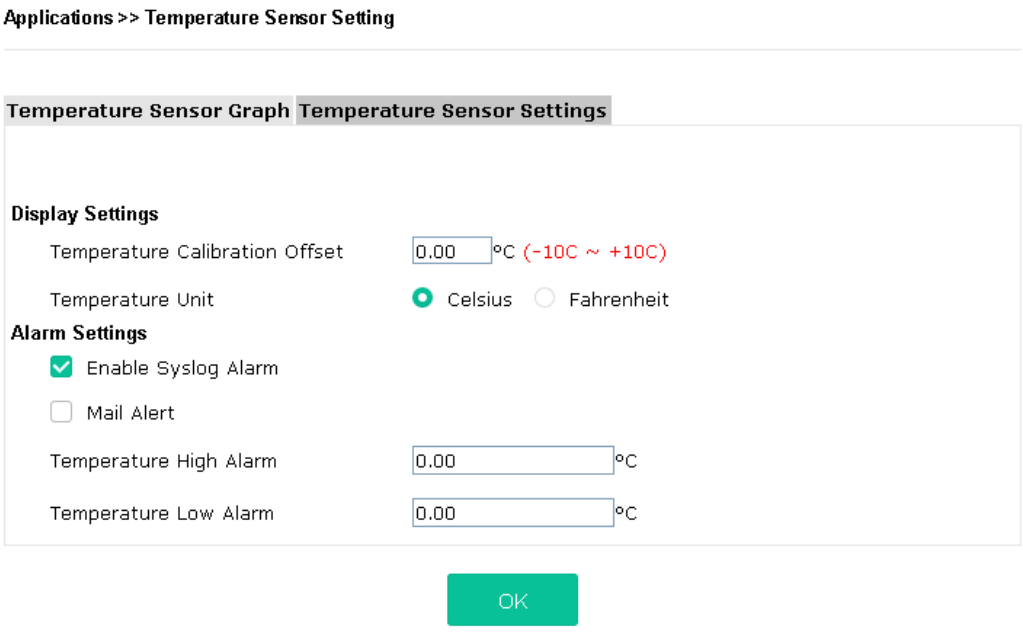
IV-2-4 Temperature Sensor

A USB Thermometer is now available that complements your installed DrayTek AP installations that will help you monitor the server or data communications room environment and notify you if the server room or data communications room is overheating.

During summer in particular, it is important to ensure that your server or data communications equipment are not overheating due to cooling system failures.

The inclusion of a USB thermometer in compatible VigorAP will continuously monitor the temperature of its environment. When a pre-determined threshold is reached you will be alerted via Syslog.

Temperature Sensor Settings



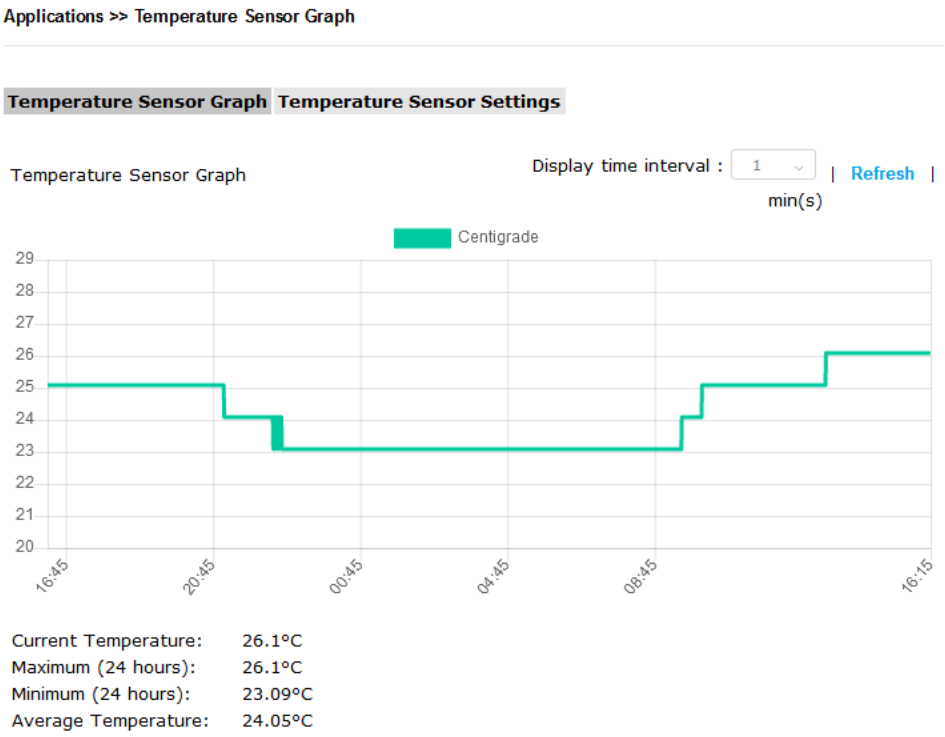
Available settings are explained as follows:

Item	Description
Display Settings	**Temperature Calibration Offset-** Type a value used for correcting the temperature error.

	Temperature Unit - Choose the display unit of the temperature. There are two types for you to choose.
Alarm Settings	**Enable Syslog Alarm** - The temperature log containing the alarm message will be recorded on Syslog if it is enabled. **Mail Alert** - The temperature log containing the alarm message will be sent by mail. **Temperature High Alarm / Temperature Low Alarm** - Type the upper limit and lower limit for the system to send out temperature alert.

Temperature Sensor Graph

Below shows an example of temperature graph:



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Chapter V Troubleshooting

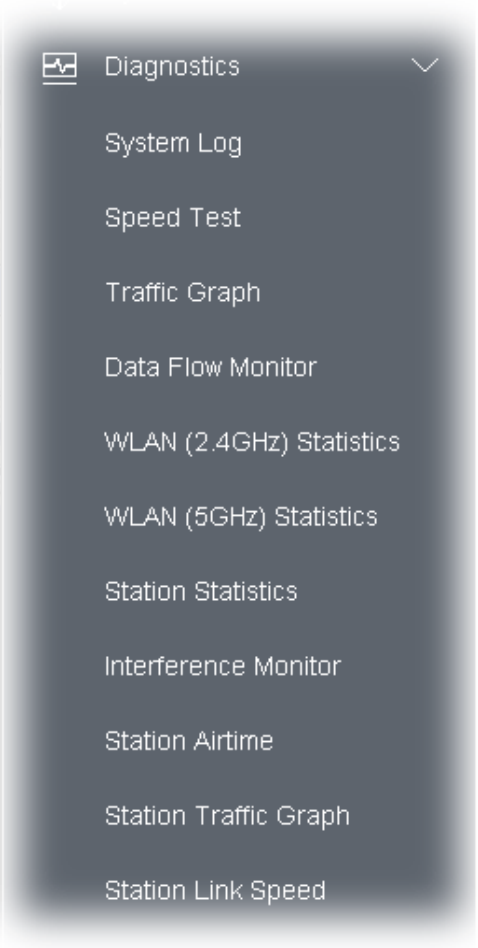
V-1 Diagnostics

This section will guide you to solve abnormal situations if you cannot access into the Internet after installing the router and finishing the web configuration. Please follow sections below to check your basic installation status stage by stage.

- Checking if the hardware status is OK or not.
- Checking if the network connection settings on your computer are OK or not.
- Pinging the router from your computer.
- Checking if the ISP settings are OK or not.
- Backing to factory default setting if necessary.

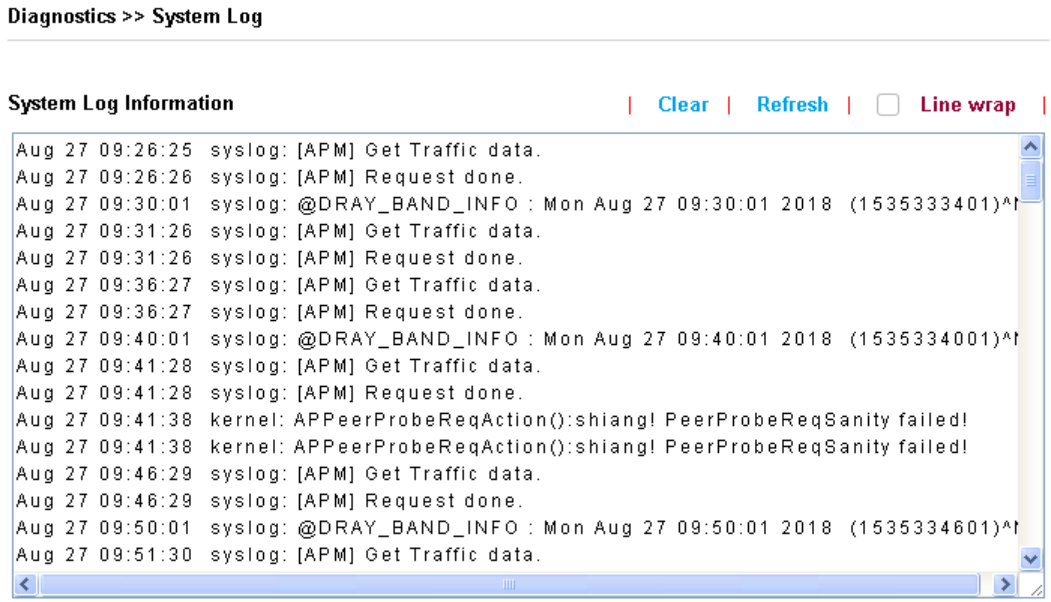
If all above stages are done and the router still cannot run normally, it is the time for you to contact your dealer or DrayTek technical support for advanced help.

Diagnostic tools provide a useful way to **view** or **diagnose** the status of your VigorAP 903.



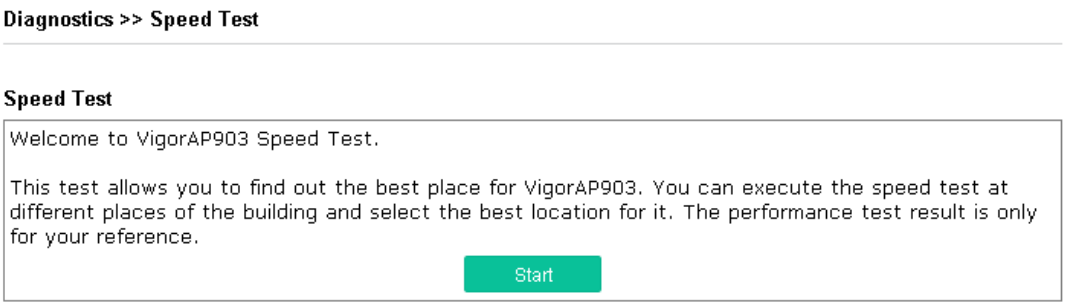
V-1-1 System Log

At present, only **System Log** is offered.



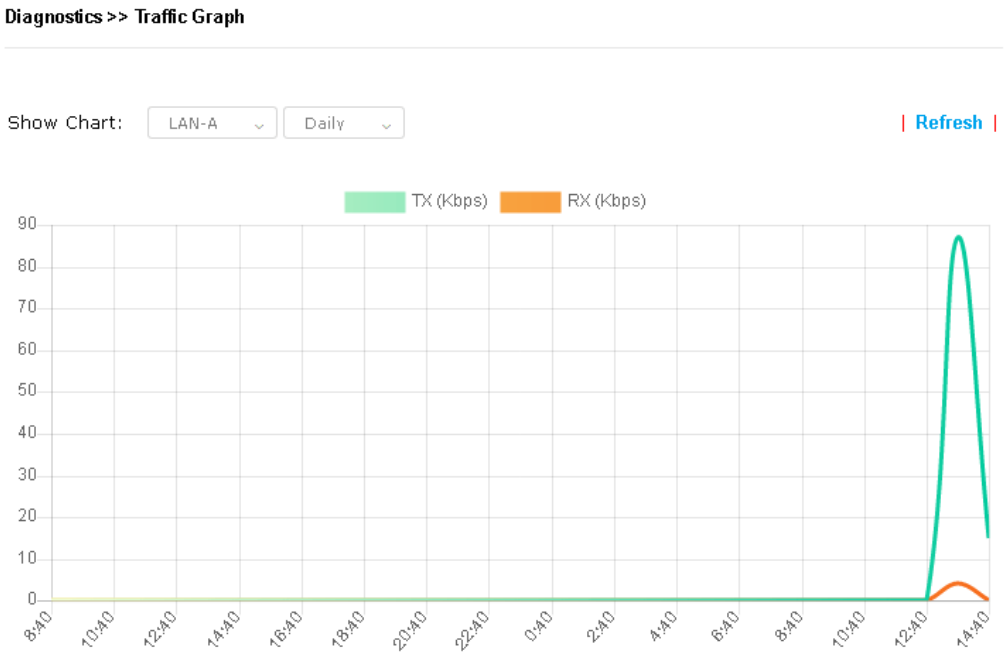
V-1-2 Speed Test

Click the **Start** button on the page to test the speed. Such feature can help you to find the best installation place for Vigor AP.



V-1-3 Traffic Graph

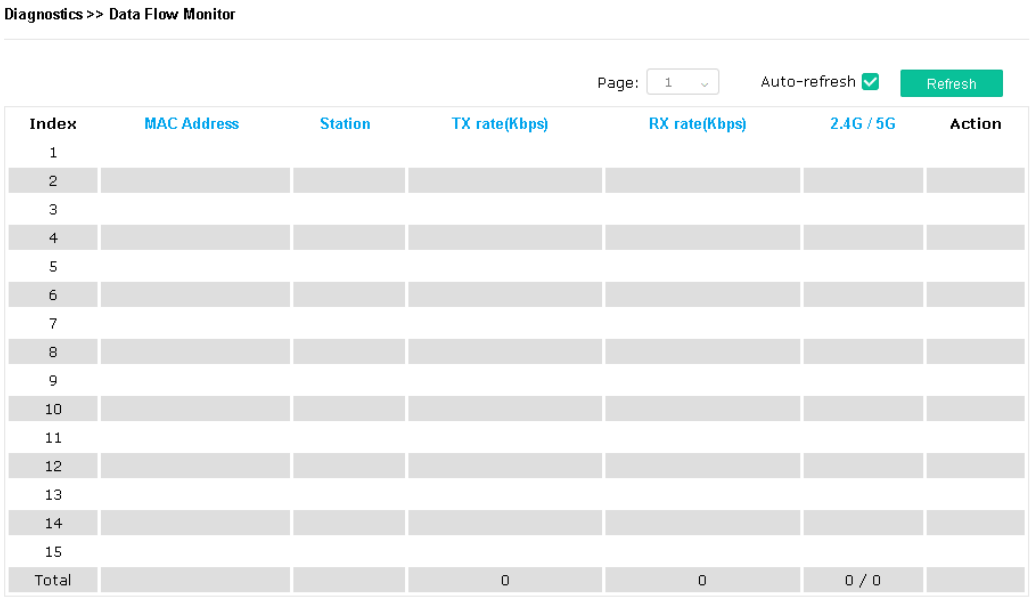
Click **Traffic Graph** to open the web page. Choose one of the managed Access Points, LAN-A or LAN-B, daily or weekly for viewing data transmission chart. Click **Refresh** to renew the graph at any time.



The horizontal axis represents time; the vertical axis represents the transmission rate (in kbps).

V-1-4 Data Flow Monitor

This page displays general information for the client connecting to VigorAP 903.

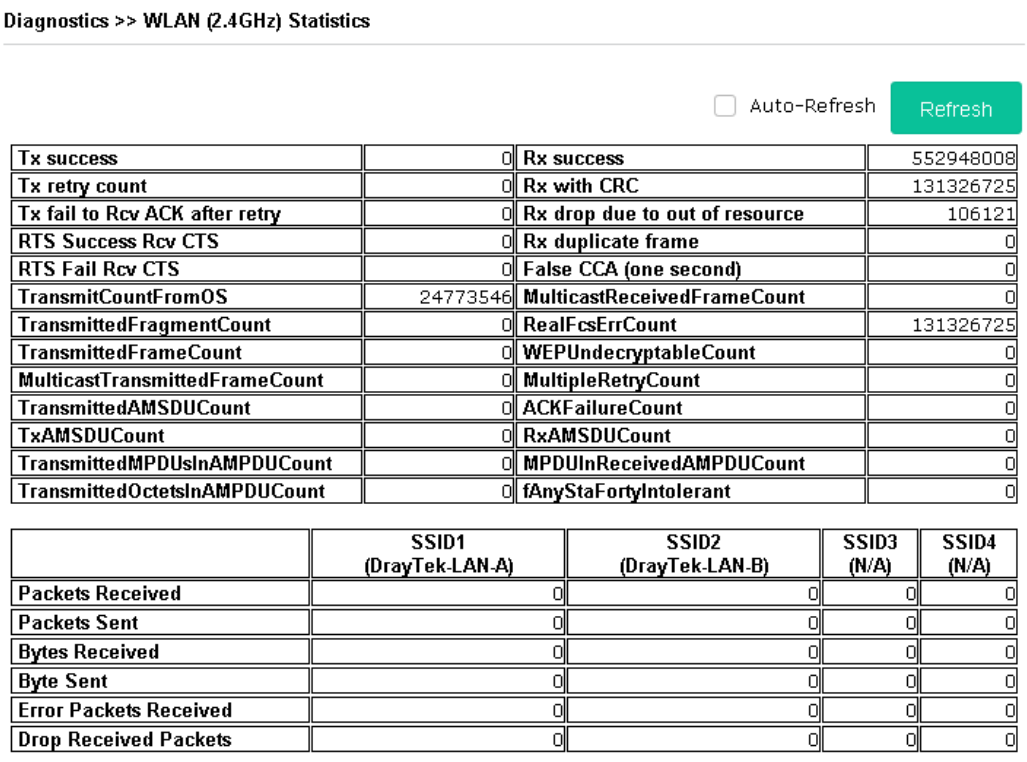


Available parameters are explained as follows:

Item	Description
Auto-refresh	After checking this box, Vigor system will refresh such page periodically.
Refresh	Click this link to refresh this page immediately.
Index	Display the number of the data flow.
MAC Address	Display the MAC address of the monitored device.
Station	Display the IP address/host name of the wireless client.
TX rate (kbps)	Display the transmission speed of the monitored device.
RX rate (kbps)	Display the receiving speed of the monitored device.
2.4G/5G	Display what wireless band (2.4G or 5G) used by the wireless client.
Action	**DeAuth** – Deauthenticate a wireless station.

V-1-5 WLAN (2.4GHz) Statistics

Such page is used for debug by RD only.



V-1-6 WLAN (5GHz) Statistics

Such page is used for debug by RD only.

Diagnostics >> WLAN (5GHz) Statistics

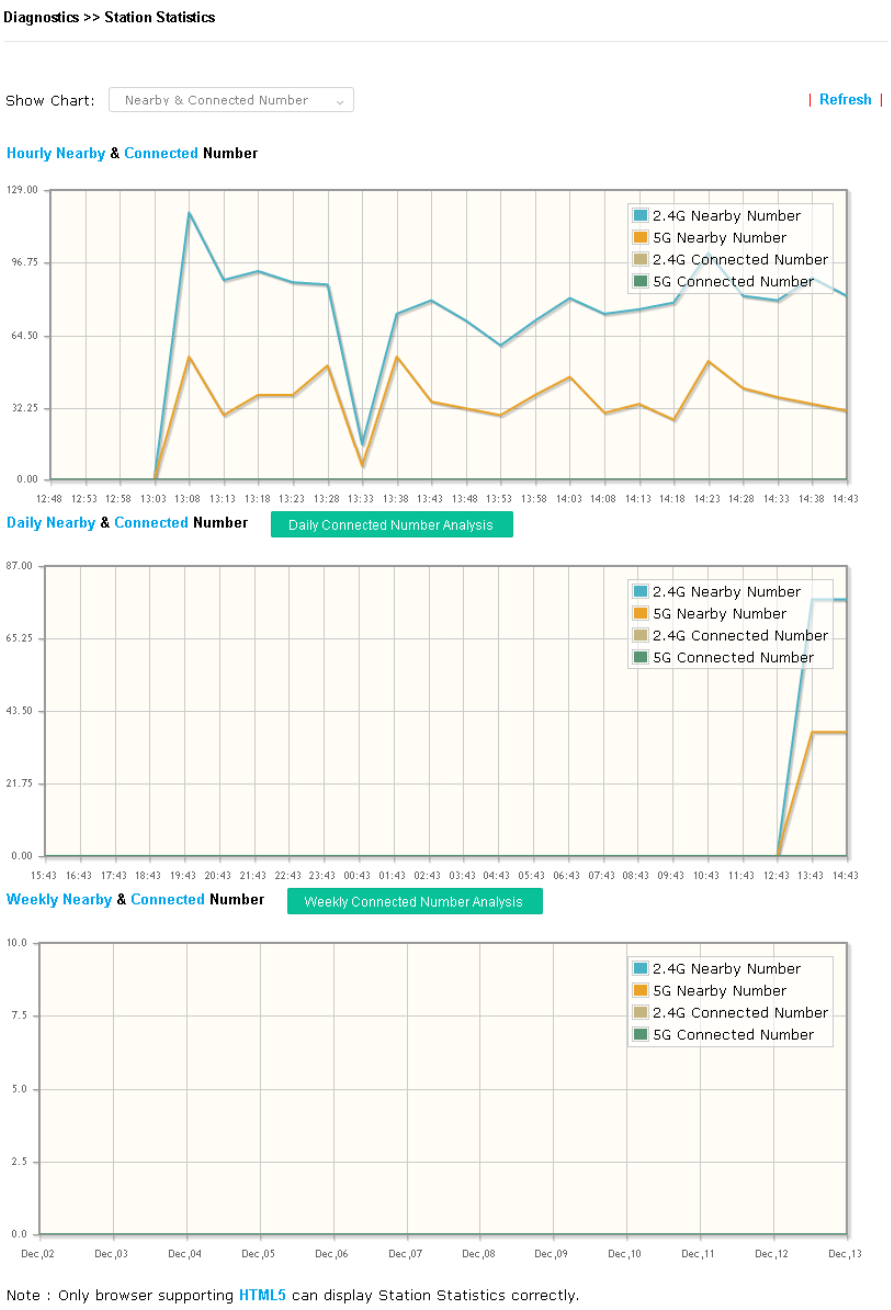
Auto-Refresh | Refresh

Tx success	0	Rx success	0
Tx retry count	0	Rx with CRC	0
Tx fail to Rcv ACK after retry	0	Rx drop due to out of resource	106291
RTS Success Rcv CTS	0	Rx duplicate frame	0
RTS Fail Rcv CTS	0	False CCA (one second)	0
TransmitCountFromOS	0	MulticastReceivedFrameCount	0
TransmittedFragmentCount	0	RealFcsErrCount	131418513
TransmittedFrameCount	0	WEPUndecryptableCount	0
MulticastTransmittedFrameCount	0	MultipleRetryCount	0
TransmittedAMSDUCount	0	ACKFailureCount	0
TxAMSDUCount	0	RxAMSDUCount	0
TransmittedMPDUsInAMPDUCount	0	MPDUInReceivedAMPDUCount	0
TransmittedOctetsInAMPDUCount	0	fAnySta40IntolerantCount	0

	SSID1 (DrayTek-LAN-A)	SSID2 (DrayTek-LAN-B)	SSID3 (N/A)	SSID4 (N/A)
Packets Received	0	0	N/A	N/A
Packets Sent	0	0	N/A	N/A
Bytes Received	0	0	N/A	N/A
Byte Sent	0	0	N/A	N/A
Error Packets Received	0	0	N/A	N/A
Drop Received Packets	0	0	N/A	N/A

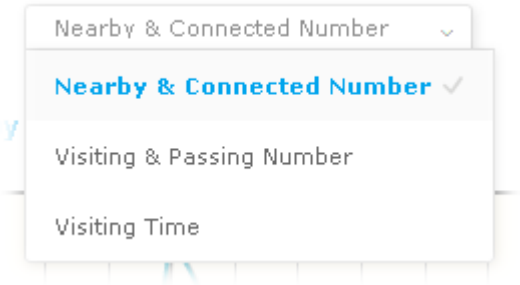
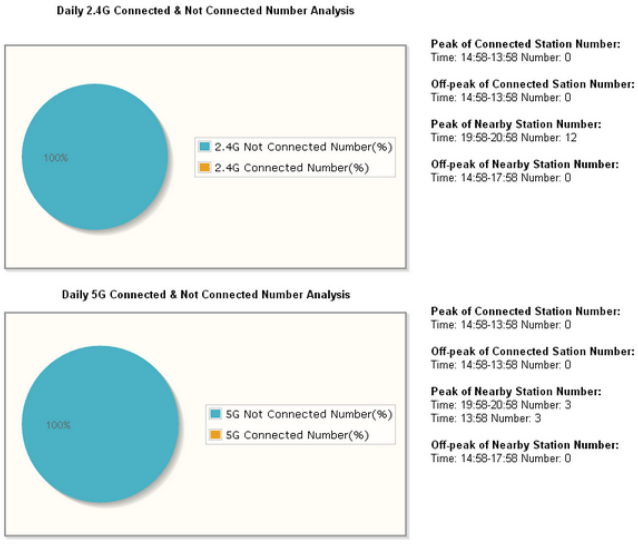
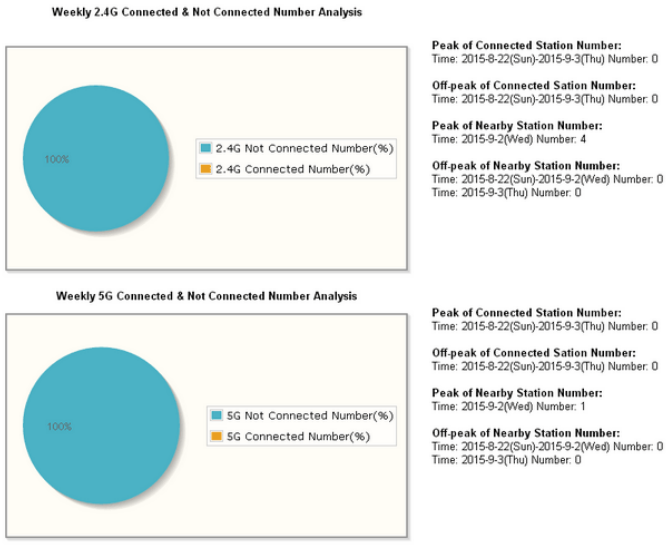
V-1-7 Station Statistics

Such page is used for debug or for the user to observe network traffic and network quality.



Available parameters are explained as follows:

Item	Description
Show Chart	Choose one of the items to display the statistics chart for wireless stations.

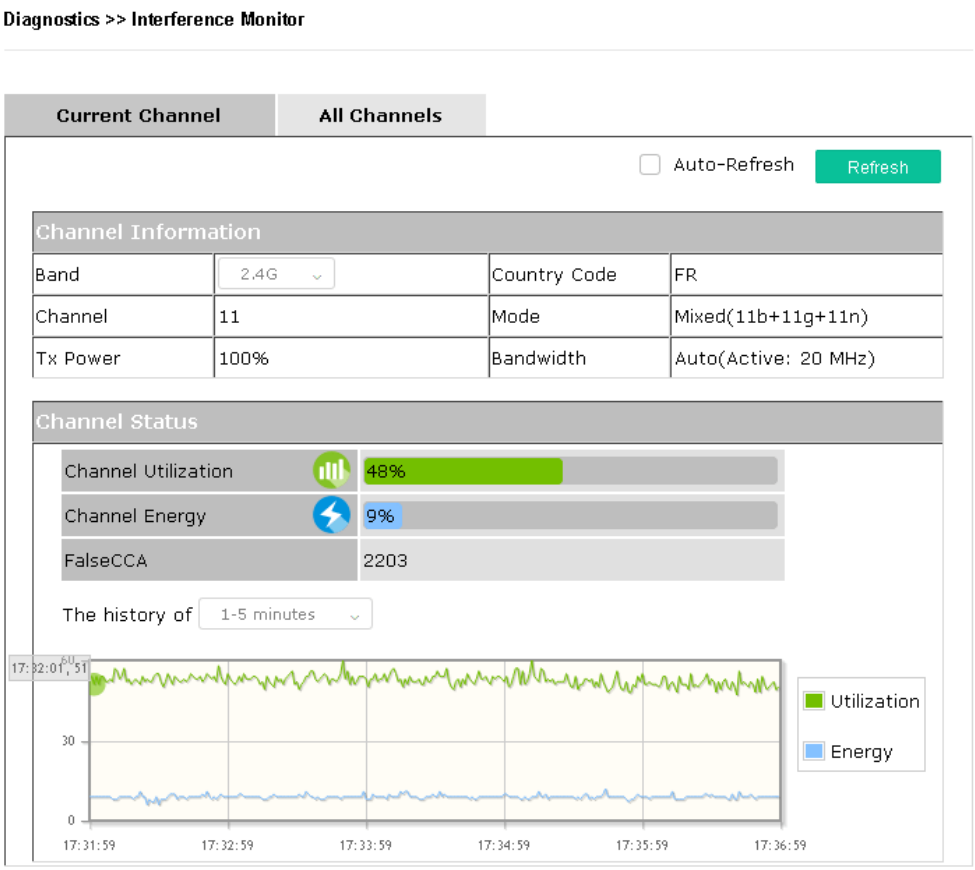
	 **Nearby & Connected Number** – Choose it to have the statistics of the wireless stations which is nearby and connected to VigorAP 903. **Visiting & Passing Number** – Choose it to have the statistics of the wireless stations which is visiting and passing to VigorAP 903. **Visiting Time** - Choose it to have the statistics of the wireless stations which is visiting VigorAP 903.
Daily Connected Number Analysis / Daily Visiting Number Analysis	Click this button to get analysis pie chart for daily connected wireless stations / daily visiting wireless station. 
Weekly Connected Number Analysis / Weekly Visiting Number Analysis	Click this button to get analysis pie chart for weekly connected wireless stations / weekly visiting wireless station. 

V-1-8 Interference Monitor

As an interference detector, VigorAP can detect all of the environmental interference factors for certain channel used or for all of the wireless channels.

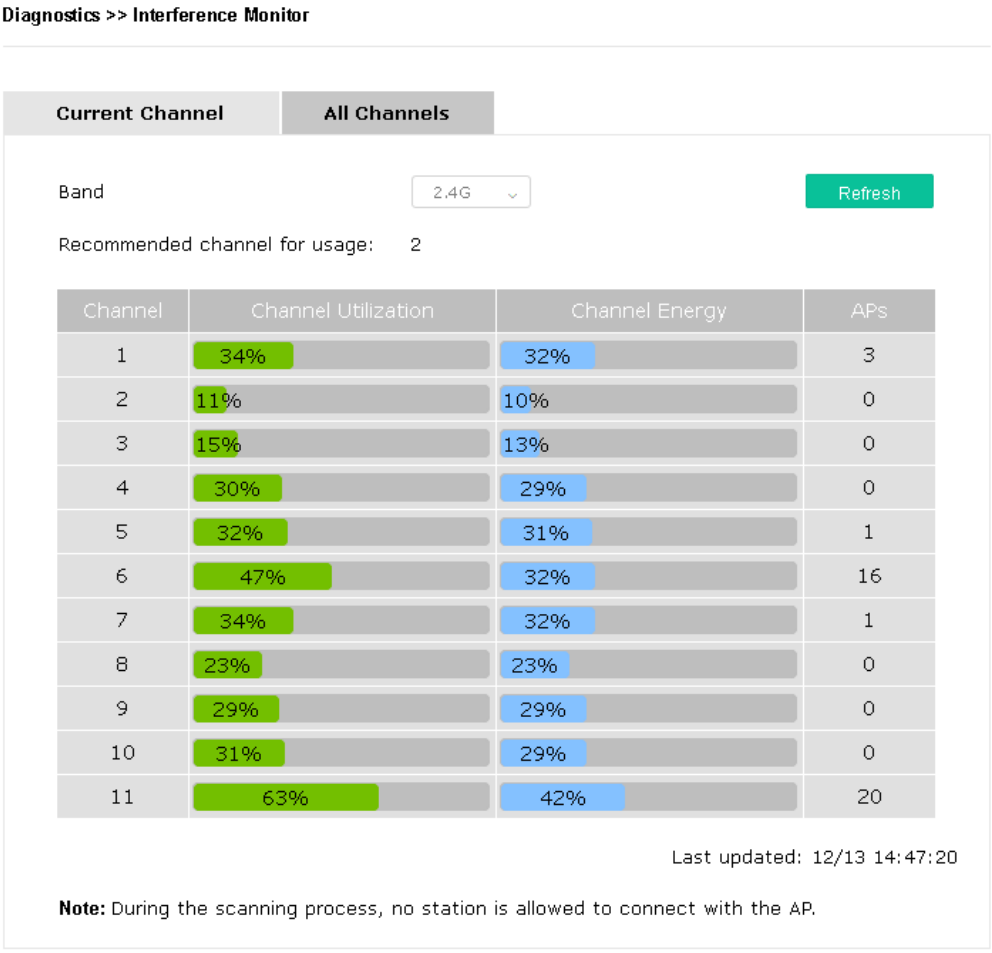
Current Channel

The analysis page with information about wireless band, channel, transmission power, bandwidth, wireless mode, and country code chosen will be displayed on this page completely based on the wireless band (2.4G or 5G) selected. Also, channel status can be seen easily from this page.



All Channels

This page displays the utilization and energy result for all channels based on 2.4G/5G. Click **Refresh** to get the newly update interference situation.

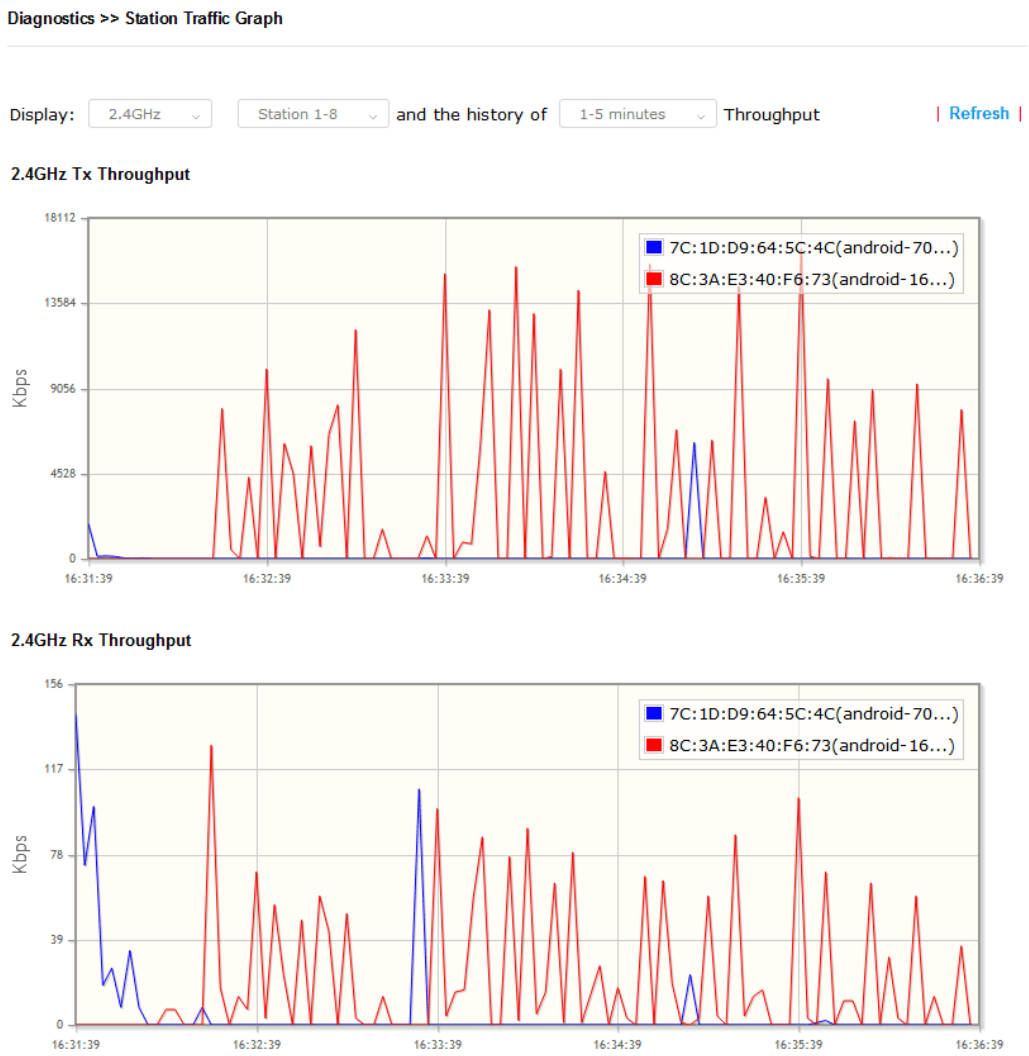


V-1-9 Station Airtime

This page displays the operation status for 2.4GHz wireless stations within 30 minutes.

V-1-10 Station Traffic Graph

This page displays the data traffic (receiving/transmitting) status for 2.4GHz wireless stations within 30 minutes with a run chart.

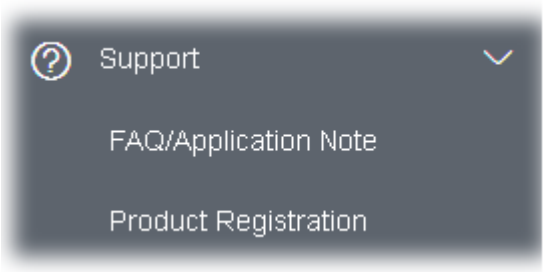


V-1-11 Station Link Speed

This page displays the link rate status for 2.4GHz/5GHz wireless stations within one hour with a run chart.

V-1-12 Support Area

When you click **Support Area**, you will be guided to visit www.draytek.com and open the corresponding pages directly.



V-2 Checking the Hardware Status

Follow the steps below to verify the hardware status.

1. Check the power line and cable connections.
   Refer to "**I-2 Hardware Installation"** for details.
2. Power on the modem. Make sure the **POWER** LED**, ACT** LED and **LAN** LED are bright.
3. If not, it means that there is something wrong with the hardware status. Simply back to **"I-2 Hardware Installation"** to execute the hardware installation again. And then, try again.

V-3 Checking the Network Connection Settings

Sometimes the link failure occurs due to the wrong network connection settings. After trying the above section, if the link is stilled failed, please do the steps listed below to make sure the network connection settings is OK.

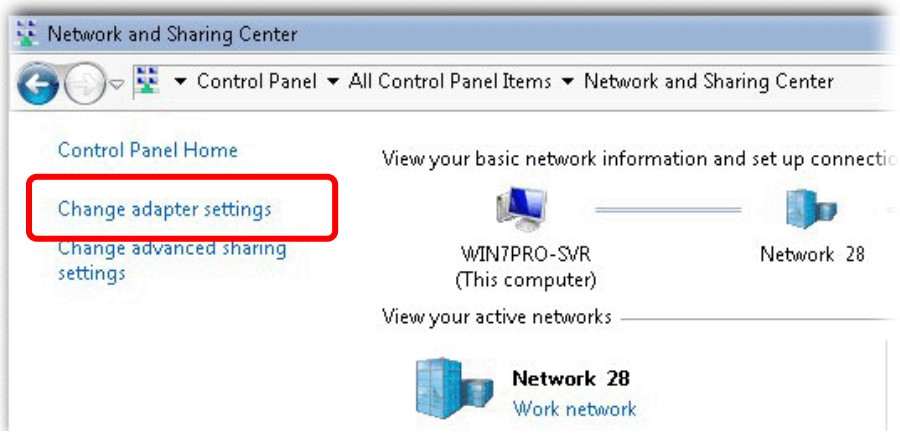
V-3-1 For Windows

Note:

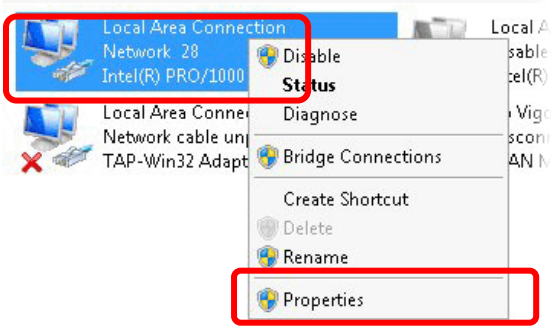
The example is based on Windows 7 (Professional Edition). As to the examples for other operation systems, please refer to the similar steps or find support notes in **www.draytek.com**.

1. Open **All Programs>>Getting Started>>Control Panel.** Click **Network and Sharing Center.**

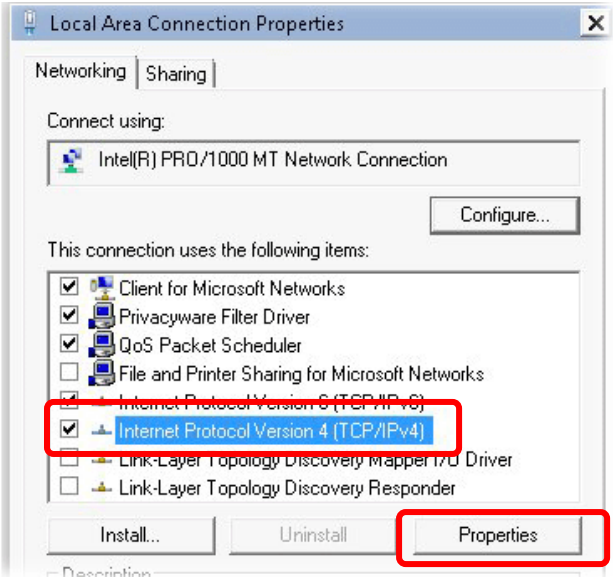
2. In the following window, click **Change adapter settings**.



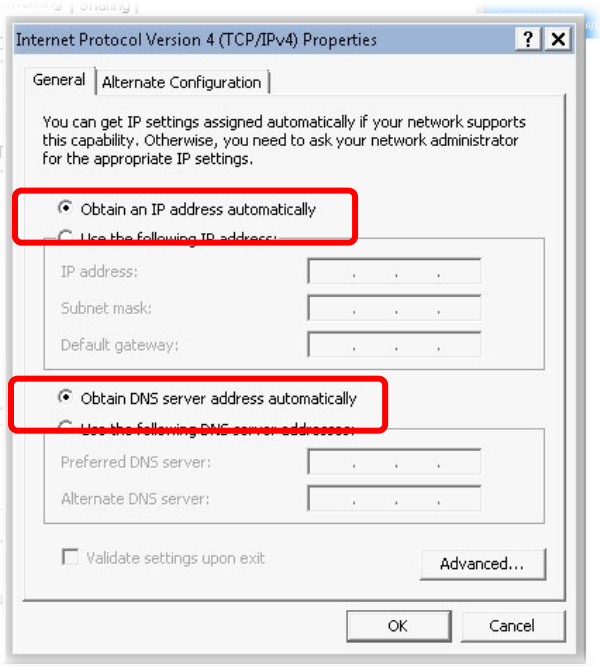
3. Icons of network connection will be shown on the window. Right-click on **Local Area Connection** and click on **Properties**.



4. Select **Internet Protocol Version 4 (TCP/IP)** and then click **Properties**.

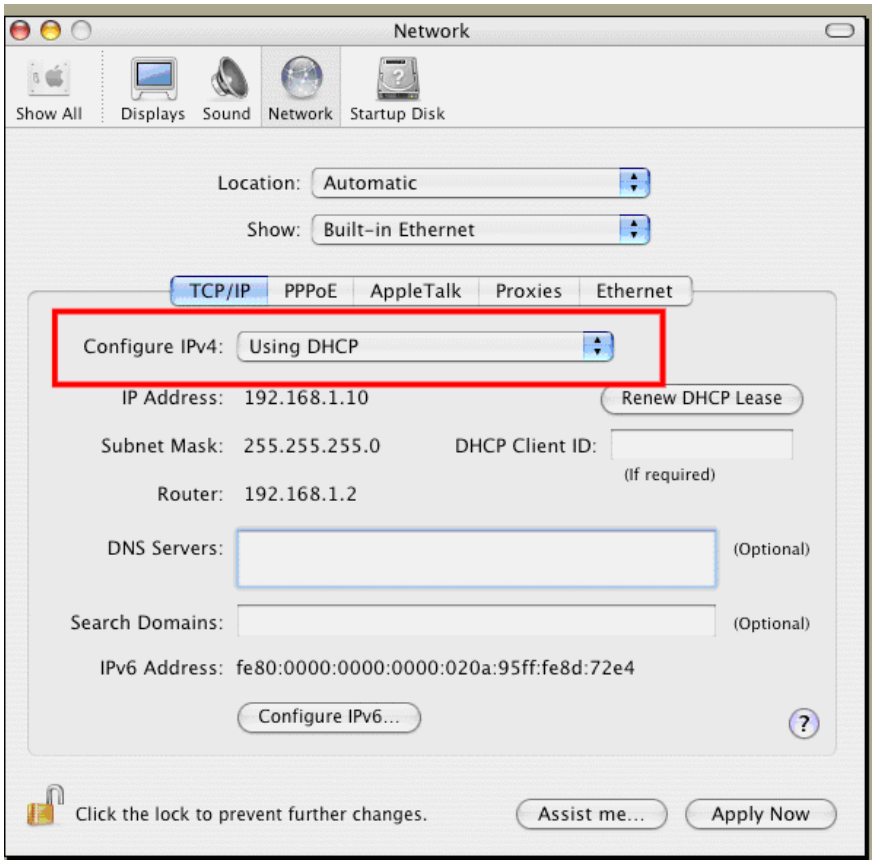


5. Select **Obtain an IP address automatically** and **Obtain DNS server address automatically**. Finally, click **OK**.



V-3-2 For Mac Os

1. Double click on the current used Mac Os on the desktop.
2. Open the **Application** folder and get into **Network**.
3. On the **Network** screen, select **Using DHCP** from the drop down list of Configure IPv4.



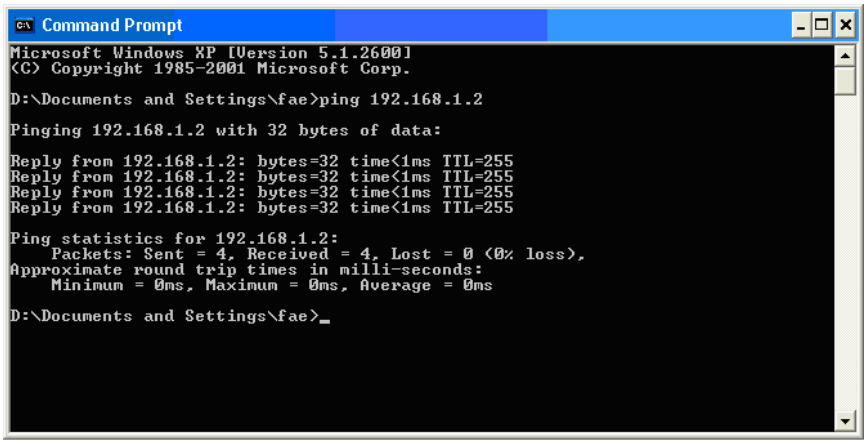
V-4 Pinging the Device

The default gateway IP address of the modem is 192.168.1.2. For some reason, you might need to use "ping" command to check the link status of the modem. **The most important thing is that the computer will receive a reply from 192.168.1.2.** If not, please check the IP address of your computer. We suggest you setting the network connection as **get IP automatically**. (Please refer to the section V-2)

Please follow the steps below to ping the modem correctly.

V-4-1 For Windows

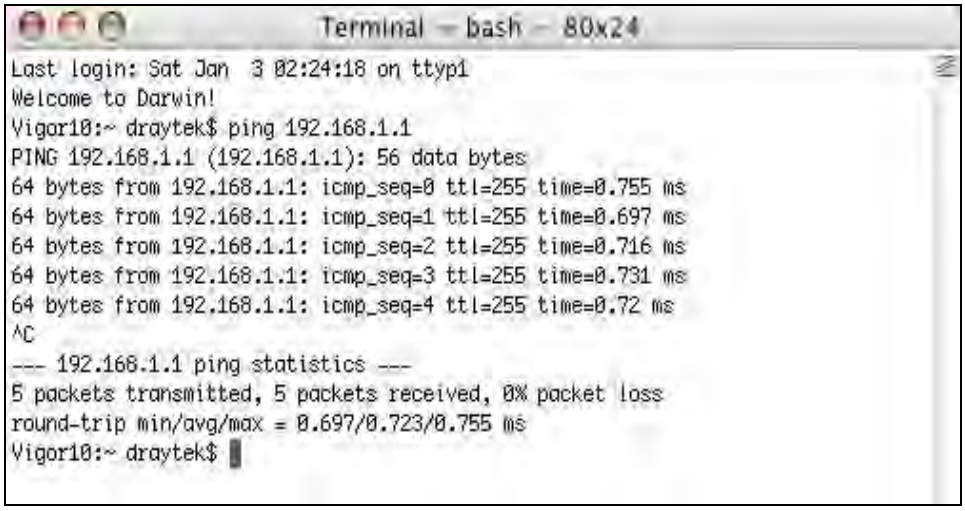
1. Open the **Command** Prompt window (from **Start menu> Run**).
2. Type **command** (for Windows 95/98/ME) or **cmd** (for Windows NT/2000/XP/Vista/7). The DOS command dialog will appear.



3. Type ping 192.168.1.2 and press [Enter]. If the link is OK, the line of **"Reply from 192.168.1.2:bytes=32 time<1ms TTL=255"** will appear.
4. If the line does not appear, please check the IP address setting of your computer.

V-4-2 For Mac Os (Terminal)

1. Double click on the current used Mac Os on the desktop.
2. Open the **Application** folder and get into **Utilities**.
3. Double click **Terminal**. The Terminal window will appear.
4. Type **ping 192.168.1.2** and press [Enter]. If the link is OK, the line of **"64 bytes from 192.168.1.2: icmp_seq=0 ttl=255 time=xxxx ms**" will appear.


Terminal — bash — 80x24
Last login: Sat Jan 3 02:24:18 on ttyp1
Welcome to Darwin!
Vigor10:~ draytek$ ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1): 56 data bytes
64 bytes from 192.168.1.1: icmp_seq=0 ttl=255 time=0.755 ms
64 bytes from 192.168.1.1: icmp_seq=1 ttl=255 time=0.697 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=255 time=0.716 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=255 time=0.731 ms
64 bytes from 192.168.1.1: icmp_seq=4 ttl=255 time=0.72 ms
^C
--- 192.168.1.1 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 0.697/0.723/0.755 ms
Vigor10:~ draytek$

V-5 Backing to Factory Default Setting

Sometimes, a wrong connection can be improved by returning to the default settings. Try to reset the modem by software or hardware.

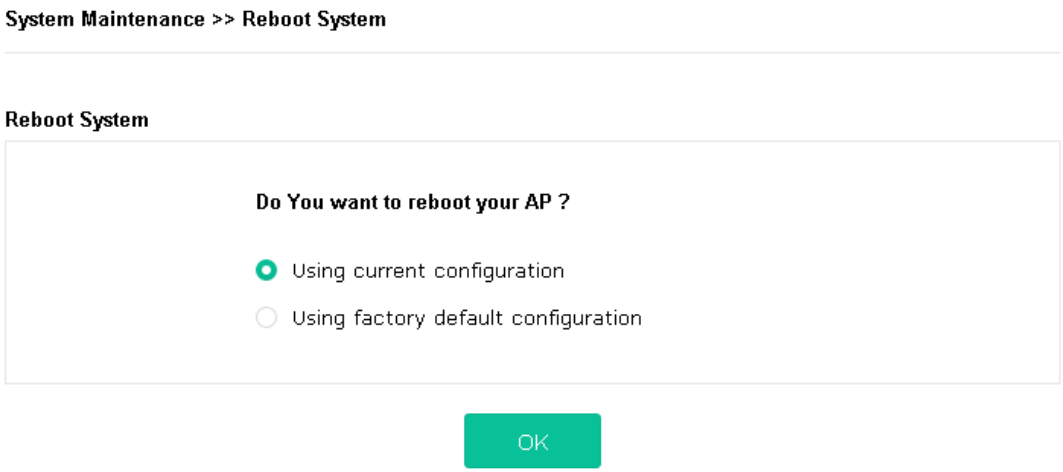
Warning:

After pressing **factory default setting**, you will loose all settings you did before. Make sure you have recorded all useful settings before you pressing. The password of factory default is null.

V-5-1 Software Reset

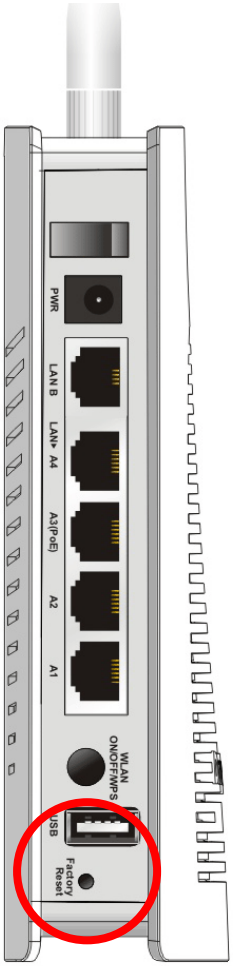
You can reset the modem to factory default via Web page.

Go to **System Maintenance** and choose **Reboot System** on the web page. The following screen will appear. Choose **Using factory default configuration** and click **OK**. After few seconds, the modem will return all the settings to the factory settings.



V-5-2 Hardware Reset

While the modem is running, press the **Factory Reset** button and hold for more than 5 seconds. When you see the **ACT** LED blinks rapidly, please release the button. Then, the modem will restart with the default configuration.



After restore the factory default setting, you can configure the settings for the modem again to fit your personal request.

V-6 Contacting DrayTek

If the modem still cannot work correctly after trying many efforts, please contact your dealer for further help right away. For any questions, please feel free to send e-mail to support@draytek.com.

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