

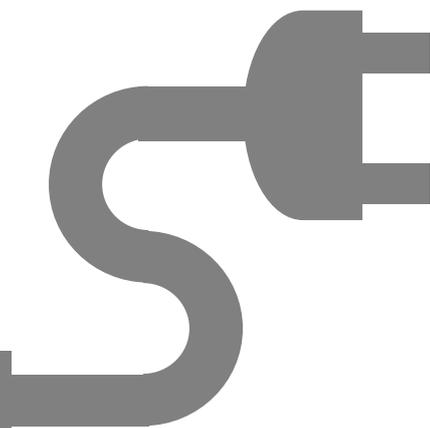
ZINWELL

- 802.11n + HomePlug AV
- Embedded antenna
- Low Power Consumption

Powerline Wireless N Extender

PWQ-5101

User Manual



Preface

This product is a wireless AP device with **PowerLine Communication (PLC)** capability. With its newest 500Mbps PLC technologies (Homeplug AV), crossing-floor communication in a concrete building, which has been a big problem of wireless networking, become very reliable. Its cutting edge 802.11n wireless technology provides the highest wireless throughput for devices in the same floors. Its embedded 1T1R MIMO antenna makes it the easiest for wall installations.

This product is suitable for general users to install in their home/houses, while advanced configuration through web-browser described in later chapters is suitable for the experienced users who installs and manages the **Powerline Wireless N Extender** products (hereafter referred to as the “device”). To use these chapters, you should have experience working with the TCP/IP configuration and be familiar with the concepts and terminology of wireless local area networks.

Important Safety Notes

This product is intended for connection to the AC power line. For installation instructions, refer to the Installation section. The following precautions should be taken when using this product.

- Please read all instructions before installing and operating this product.
- Please keep all instructions for later reference.
- Please follow all warnings and instructions marked on the product.
- **For safety reason, when device is being powered on, this product should NOT be installed in any electric socket which makes the surface with venting holes on the product to face downward (facing the floor).**
- **Unplug the Powerline device from the wall outlet before cleaning. Use a dry cloth for cleaning. DO NOT use liquid cleaners or aerosol cleaners.**
- **DO NOT** operate this product near water.
- This product should **never** be placed near or over a radiator, or heat register.
- This product relies on the building's electrical installation for short-circuit (over current) protection.
- **DO NOT** allow anything to rest on the product interconnect plug. **DO NOT** locate this product where people may walk on the cords.
- Because this product sends data over the power line, it is recommended that you plug directly into a power outlet. Do not plug the device into a UPS or power strip with surge protection. The product has its own power filter for protection against surges.
- **Only** a qualified technician should service this product. Opening or removing covers may result in exposure to dangerous voltage points or other risks.
- Unplug the product from the wall outlet and refer the product to qualified service personnel for the following conditions:
 - When the interconnect cords are damaged or frayed.
 - If liquid has been spilled into the product.
 - If the product has been exposed to rain or water.
 - If the product does not operate normally when the operating instructions are followed.
 - If the product exhibits a distinct change in performance.

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Ch 1. Product Overview

Packing List

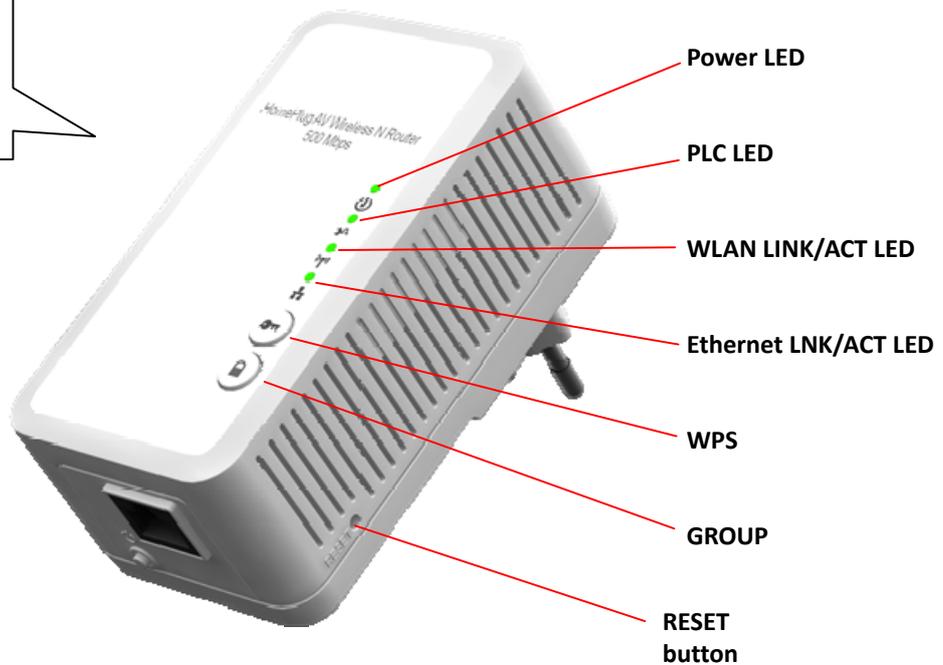
Before starting the installation of the device, please make sure the package contains the following items:

	Single package	Combo package
Device		 
Accessories	Powerline Wireless N Extender RJ-45 Cable x 1	Powerline Ethernet Bridge RJ-45 Cable x 2 Powerline Wireless N Extender

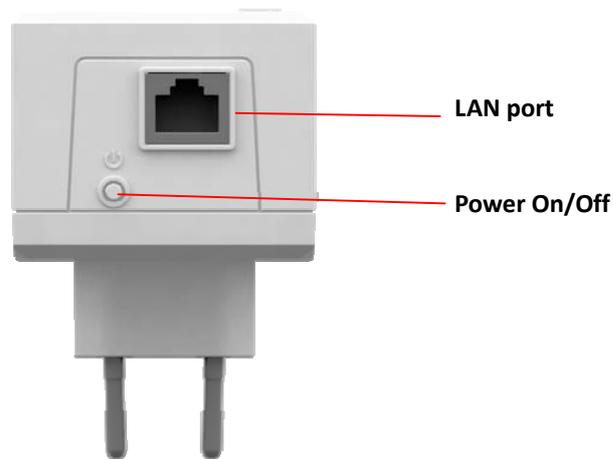
Buttons and LEDs

Front View

1T1R antennas are embedded into the device



Bottom View



LED	
Power LED Green	<u>ON</u> : Power on and ready. <u>BLINKING</u> : (0.5 sec ON / 0.5 sec OFF) 1. During Group pairing procedure . In this procedure, the device joining or being joined into same logical network will continue 2 minutes' blinking, until the procedure succeeds or is canceled). To enter or cancel Group pairing procedure , just press the GROUP button 2~3 sec. <u>OFF</u> : Power off.
PLC LED Green	<u>ON</u> : Powerline Link detected but no powerline traffic. <u>BLINKING</u> : 1. Fast blinking (0.06 s ON/ 0.06 s OFF): Powerline data rate higher than 80Mbps. 2. Normal blinking (0.2 s ON/ 0.2 s OFF) Powerline data rate between 40Mbps to 80Mbps. 3. Slow blinking (1 s ON/ 1 s OFF): Powerline data rate slower than 40Mbps. <u>OFF</u> : Powerline Link not detected (either other devices in same network is too far to communicate or it is alone in its logical network).
WLAN LED Green + Red	Steady Green : Wi-Fi active under security protection Flash Green : Wi-Fi transmits packets under security protection, Steady Red : Wi-Fi active under NO security protection, Flash Red : Wi-Fi transmits packets under NO security protection, BLINKING Green (0.5 sec ON / 0.5 sec OFF): WPS negotiation OFF : Wi-Fi off
Ethernet LNK/ACT LED	<u>ON</u> : Ethernet Link Detected. <u>BLINKING</u> : Ethernet traffic detected. <u>OFF</u> : No Ethernet Link detected.
Buttons	

WPS	Press it to enable PBC (Press Button Configuration) for WPS authentication.
GROUP	<p><u>Press 1 to 3 seconds (until the Power LED blinking) and release button: this will enter Group pairing procedure. In this procedure, the device starts joining into a logical network of other device or announcing its network group name for other devices to join. This maximum two-minute procedure automatically ends when it succeeds or is manually stopped. Press this button 2 to 3 seconds will manually stop the procedure.</u></p> <p><u>Press 10 seconds (until Power LED blink once and PLC LED off):</u> clear the current and randomly generate a new network group name.</p>
Power On/Off	Push to turn on and off the power of PWQ-5101
RESET button (inside the needle pin hole)	<p>Press the button when the device is powered on (not standby) to complete following functions:</p> <p><u>Pushing 1 second and release :</u> will make both PLC and Wi-Fi FW settings back to factory default.</p> <p><u>NOTE:</u> Every new PLC devices' factory default PLC network group name is HomePlugAV. During trouble shooting the powerline network group assignment, doing this to every PLC devices will make each device return to default network group, thus ensure their mutual communicability.</p>

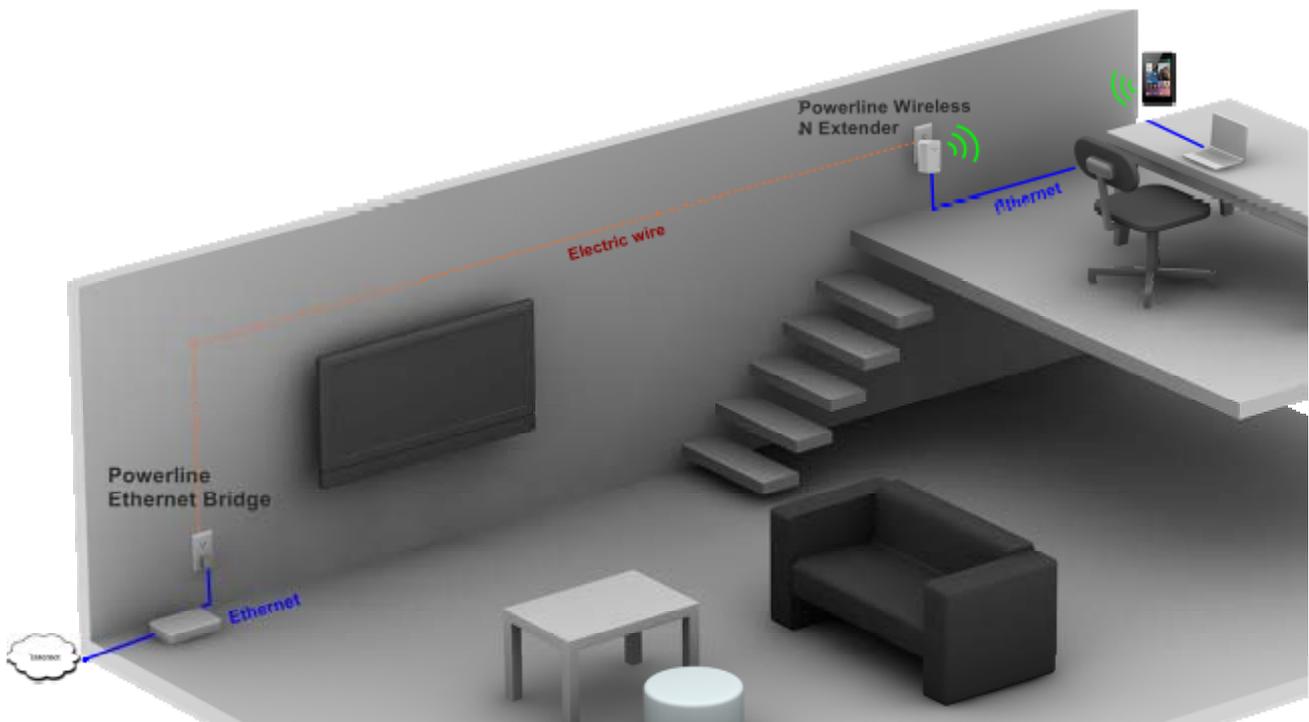
Ch 2. Hardware Installation

Once you check everything from the package, you can start to install the device. All wireless devices which want to connect this AP wirelessly need to search and connect the SSID of this device: **PWQ-5101** (factory default is no wireless security setting)

Please see the following application diagrams for different application connections of this device.

Application 1 – Link to remote DSL via Powerline

Via Powerline technology, the **Powerline Wireless N Extender** can access DSL modem at other floors for internet accesses. Note that this needs another **Powerline to Ethernet Bridge** device at other floor, so that connection between **Powerline to Ethernet Bridge** and **Powerline to Ethernet Bridge** can be done through the embedded PLC technology.



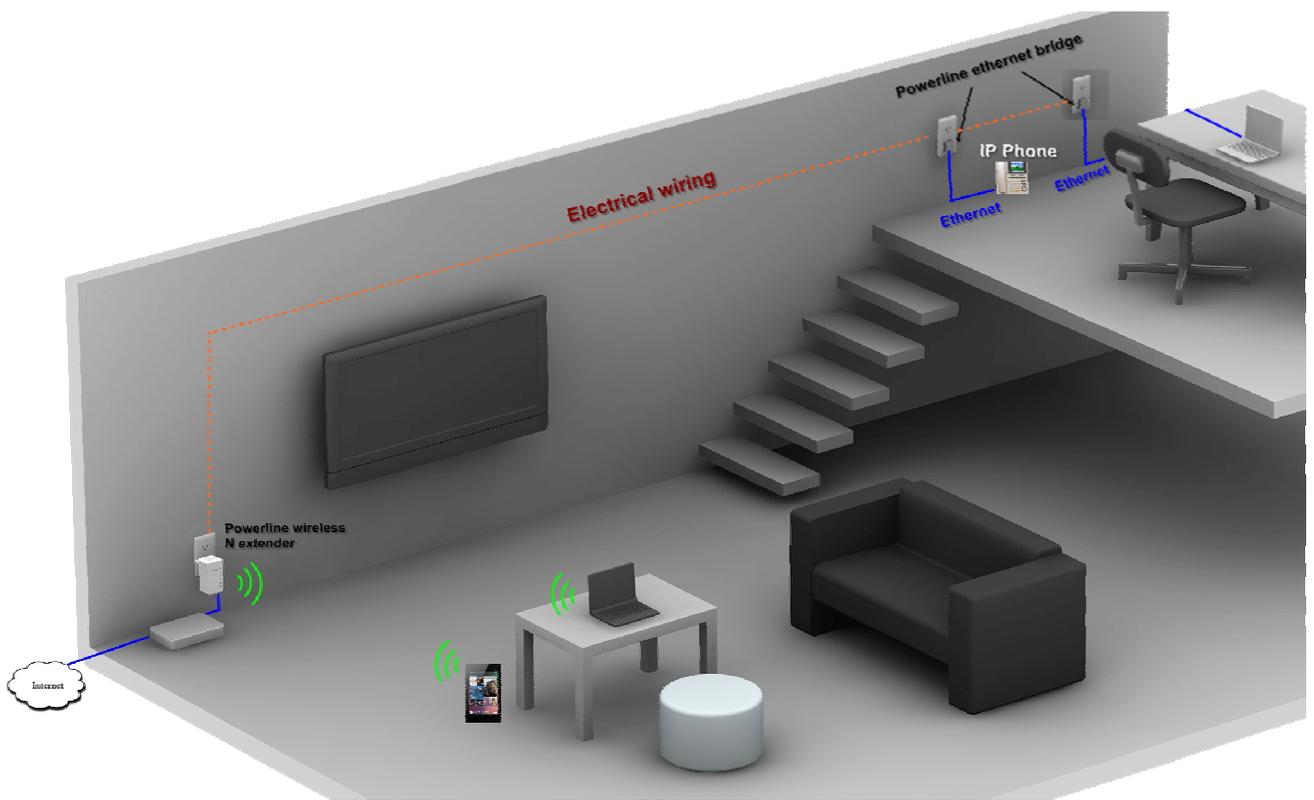
Application 2 – wireless AP + Ethernet switch

The **Powerline Wireless N Extender** can be a central 802.11n Access point and Ethernet switch hub to link all WLAN devices and Ethernet devices.



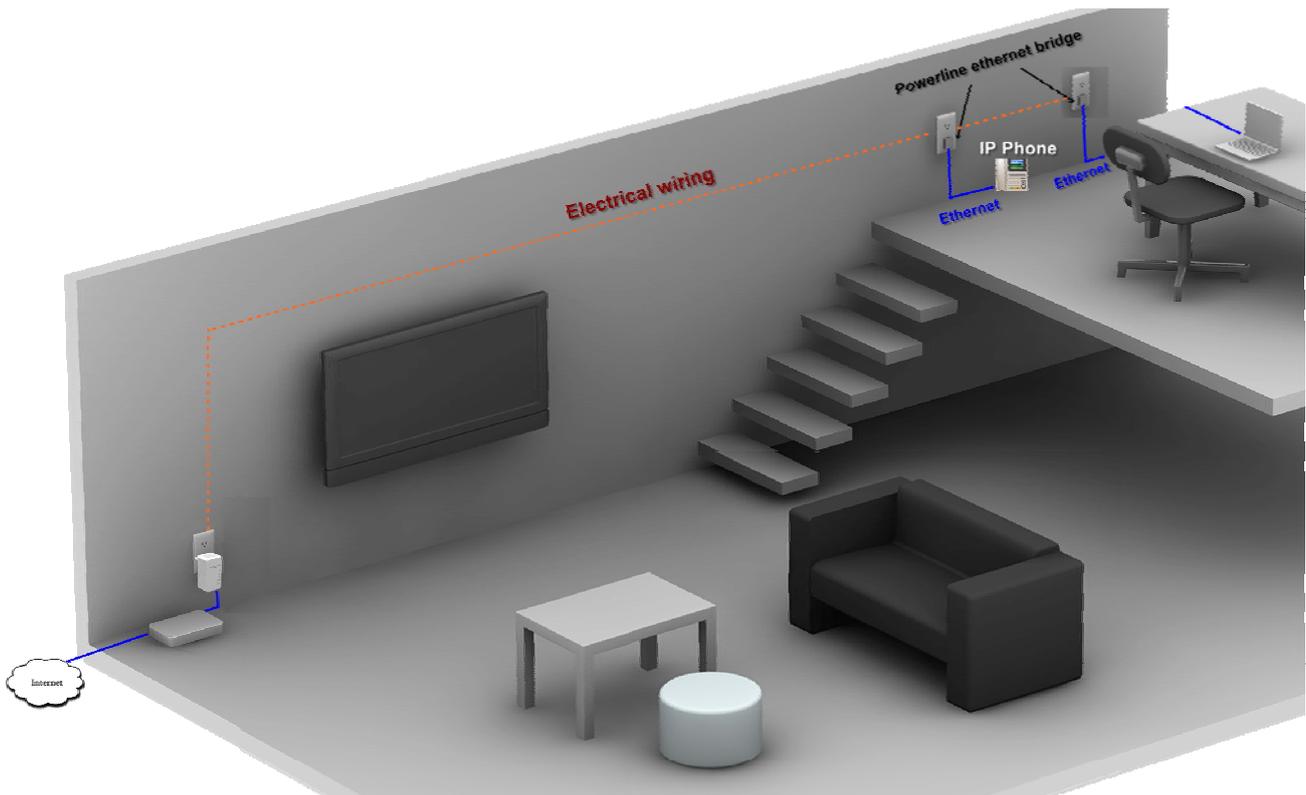
Application 3– multiple floor home networking

When WLAN signal is not good to penetrate concrete floors, use Powerline technology afforded by the **Powerline Wireless N Extender** to extend home networking range to upper (other) floors. While on the same floor, the WLAN function can be used for IP devices or PC/NB to access internet. Please see the diagram below and please note that this needs **Powerline to Ethernet Bridge** devices for users at the other floor to access network resources via the Powerline communication.



Application 4– Powerline Ethernet switch

By pushing the **WLAN ON/OFF** button, the wireless function of this device can be turned ON or OFF. In this case, **HomePlug AV Wireless N Extender** acts as **Powerline to Ethernet switch**, which, when used together with a remote **Powerline Ethernet Bridge**, enables two remote Ethernet devices (ex. PC, Notebook, or VIOP) on different floors or locations at home to communicate via the embedded Powerline technology.



Application 5 – AP client adapter

This device can act as wireless client adapter for a PC host (see application diagram below). To activate this function, visit the **operation mode** web page of the device and enable this mode through a web browser on your PC. Please see later chapters for detail description of this procedure.

Fast Encryption by Buttons

The factory default wireless setting of this machine is no encryption and default powerline communication encryption is public encryption, **HomePlugAV**. Using the buttons on the machine, this section describes quick wireless encryption set up using **WPS button** and quick encryption set up in a PLC network group using **Group button**.

Setting Wireless encryption by WPS button

This button can be pressed for WPS PBC authentication. First, login the web configuration to setup the wireless encryption to be WPA-PSK or WPA2-PSK, and then enable the WPS Config as well. Now press the WPS button on this device and then press WPS button on the WLAN station/client card to start WPS process. It is also working if pressing WPS button on the WLAN station card first and then this device. The WPS process will be started and connected after a few seconds.

For those WLAN station card without physical WPS button, the software WPS button should be found in its utility software for this function.

Create Private encrypted PLC network group

This product is a HomePlug AV powerline device. Each powerline device has predefined attributes of Powerline **network name**. Multiple Powerline devices with same network names can communicate to one another, thus belonging to a same PLC network group. Devices with different **network name** won't communicate. Max number of devices in a PLC network group is defined in the **SPECIFICATIONS** section of this manual.

Any Homeplug-AV compliant PLC device newly from factories, including this device, has its default network name of **HomePlugAV**, and can communicate with other brands of new Homeplug-AV compliant devices, thus belongs to the **public network**. Pushing the GROUP button of the device will change its **network name**. This way, users can create one or multiple private PLC network groups with the button, without complicated setup software involved, thus protect their data been transmitted over the powerline. Pressing the RESET button of a power-active powerline device will reset the network name back to its factory default.

By pushing GROUP button for more than 10 seconds, a random network name (different from **HomePlugAV**) for the device will be generated. This device can then ask other devices

to join its PLC network to form private network group. Any other devices, device B, which want to join this device's (device A) PLC network group need to follow steps below: (NOTE: it is more convenient to bring devices, which are to be configured into same logical network group, side by side during this procedure. After network group is set, the devices can be deployed anywhere at home)

Step 1. (Clear group attribute) Firstly clear the original network group of device B by pressing its GROUP button more than 10 seconds until all LED lights simultaneously turns off and on once. At this moment, its network group name has been changed to a random name and ready to be assigned another network name. At this moment, this device also can be used as a seed device so other PLC devices can join it to form a private network group.

Step 2. (Join) Press GROUP Button of device A and device B for 2 to 3 sec (make sure POWER LED starts blinking). The device (device B) which has cleared its **group attribute** will join to the device (device A) which hasn't. It doesn't matter which device's button is pushed earlier than the other, but please push the second device's Group button within two minutes after pushing first device's Group button.

This way, Powerline device B joins same encrypted network as device A. Users can join device C to device A's logical network with same procedure, thus make device A, B, and C all in the same encrypted network group.

Remove a device from a network Group

For example, device A and device B are in the same logical network group, if users want to remove device A from this logical network group, just follow the procedure in **Step 1** by pressing GROUP button of device A for 10 seconds. This makes device A not able to communicate with device B.

Make two public network devices private

If users want to make two new public devices (**network name** HomePlugAV) become private, please carry out **Step 1** on both devices, then do step 2 on these two devices. Finally, a private random **network name** is generated for these two devices.

Partition four devices into two network Groups

For example, A, B, C, and D four devices, originally are in same network group. Please carry out **step 1** on device A and B, to remove them from this network group. Then carry out **step 2** on A and B to form a new network group.

Ch 3. Advanced Setting – via Web Browser

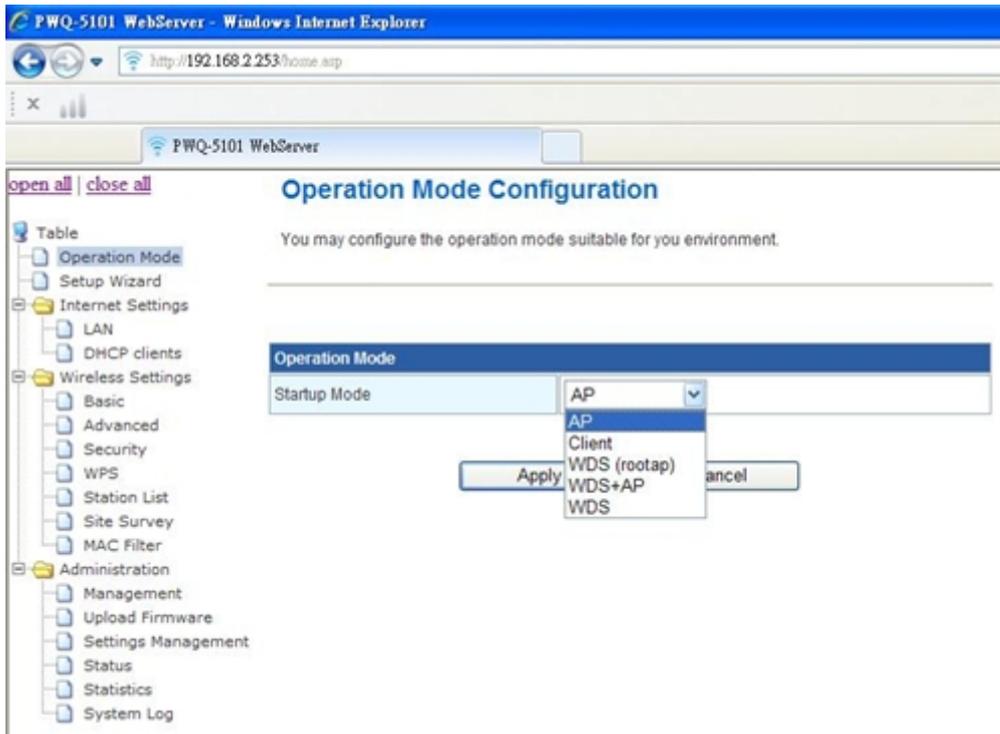
Before Starting Configure

The configuration of this device is through web-browser on a PC. The default IP address of the device is **192.168.2.253**, and the subnet-mask is **255.255.255.0**. The DHCP server inside the device is default to “Off” (Disable).

1. Power on PWQ-5101.
2. Set your IP to 192.168.2. X manually (**Control panel > Network connections > double click “Local area connection” > Properties > select “Internet Protocol TCP/IP” and click Properties > select “Use the following IP address”**)
3. Turn on a browser and type **192.168.2.253** on the place you enter URL address, then you may link to PWQ-5101 for further settings.
4. For the first time configuration, please login with username: **root** and password: **root**.
5. At first login, please select the language you want to use. (**English, Traditional Chinese, Simple Chinese**)

Please ensure there is not multiple DHCP servers in your network environment, otherwise it will cause abnormal situation.

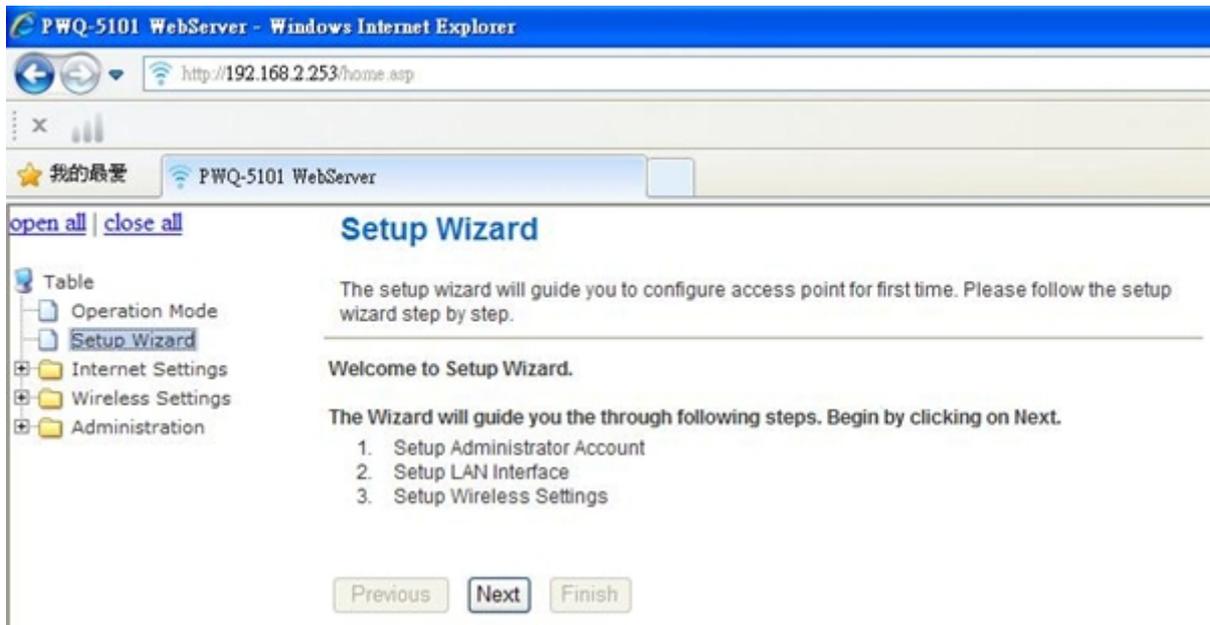
Operation Mode



This device supports 5 operation modes for the IP network. Click to select one between the following wireless operation modes, then press Apply button.

Item	Description
AP	The wireless radio of device serves as communications “hub” for wireless clients and provides a connection to a wired LAN
Client	This mode enables the establishment of connection with the other AP using infrastructure /Ad-hoc networking types. With bridge operation mode, you can directly connect one of the wired Ethernet port to your PC and the device becomes a wireless adapter
WDS (rootap)	The wireless radio of device serves as communications “hub” for wireless clients and provides a connection to a wired LAN (the other AP must use the same chipset with this device)
WDS+AP	This mode combines WDS plus AP modes, and it not only allows WDS connections but also the wireless clients can survey and associate to the device
WDS (Wireless Distribution System)	This mode combines up to 8 AP to a single wireless network; the device forwards the packets to another AP with WDS function. When this mode is selected, all the wireless clients can’t survey and connect to the device. The device only allows the WDS connection

Setup Wizard

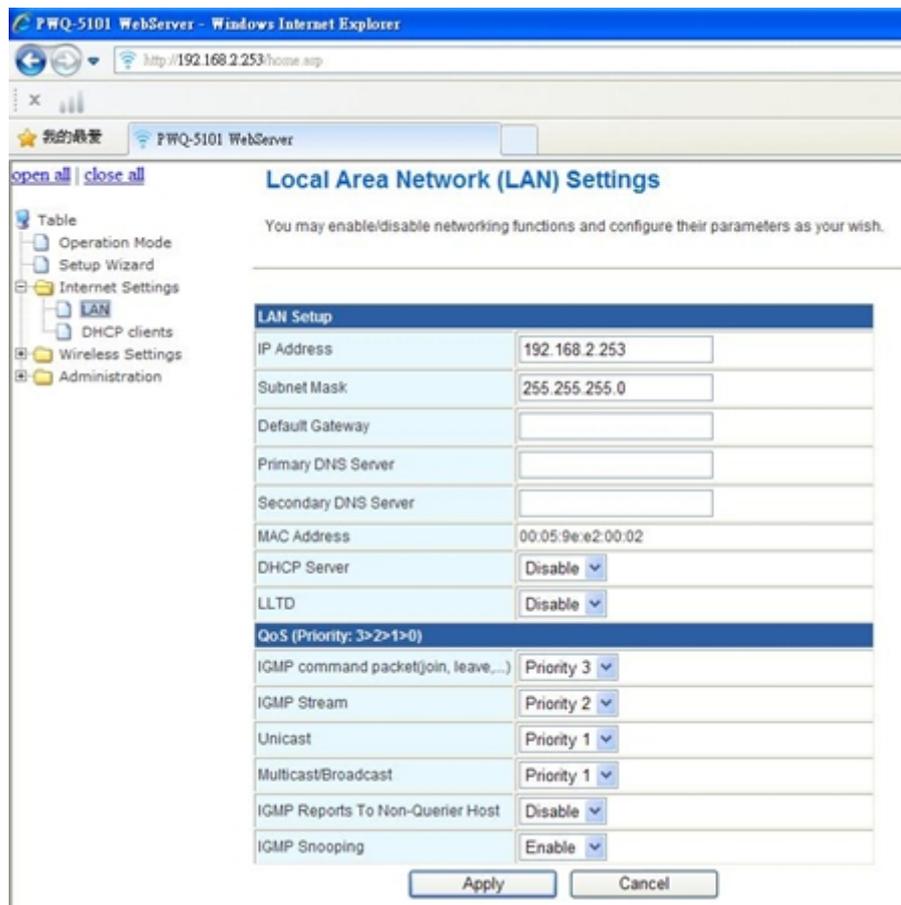


The setup Wizard can help you to setup the device with minimum setting. Open the page from the left panel and click “Next” button in the welcome page.

1. In the first page, enter the **new account** name and **password** for login this web page configuration in the future.
2. In the second page, you may choose to enable/disable networking functions and configure their parameters as you wish
3. The third page is for basic wireless setting, to set network mode and SSID...etc
4. The last page is about setting the wireless security and encryption to prevent from unauthorized access and monitoring.
5. Click “Finish” button and the device will reboot to apply the settings.

Internet Settings

LAN Settings



LAN setup	
Item	Description
IP Address	The Internet Protocol (IP) address of WAN interface provided by your ISP or MIS. The address will be your network identifier besides your local network.
Subnet mask	The number used to identify the IP subnet network, indicating whether the IP address can be recognized on the LAN or if it must be reached through a gateway.
Default gateway	The IP address of Default Gateway provided by your ISP or MIS. Default Gateway is the intermediate network device that has knowledge of the network IDs of the other networks in the Wide Area Network, so it can forward the packets to other gateways until they are delivered to the one connected to the specified destination.
Primary & Secondary DNS	The IP addresses of DNS provided by your ISP. DNS (Domain Name Server) is used to map domain names to IP addresses. DNS maintain central lists of domain name/IP addresses and map the domain names in your Internet requests to other servers on the Internet until the specified web site is found.
LLTD	Enable this function to support LLTD (Link Layer Topology Discovery) for Windows Vista. It shows the status of connection in the Windows Vista.

QoS	
Item	Description
IGMP command packet (join, leave..)	recommend to set the highest priority (3) to keep it work smoothly
IGMP Stream	recommend to set the higher priority (2) to make sure the good streaming video and audio quality
Unicast	recommend to set priority 1
Multicast/Broadcast	recommend to set priority 1
IGMP Reports To Non-Querier Host	default disable but recommend to turn on this function while using PWQ-5101 in China
IGMP Snooping	default and also recommend to enable IGMP snooping

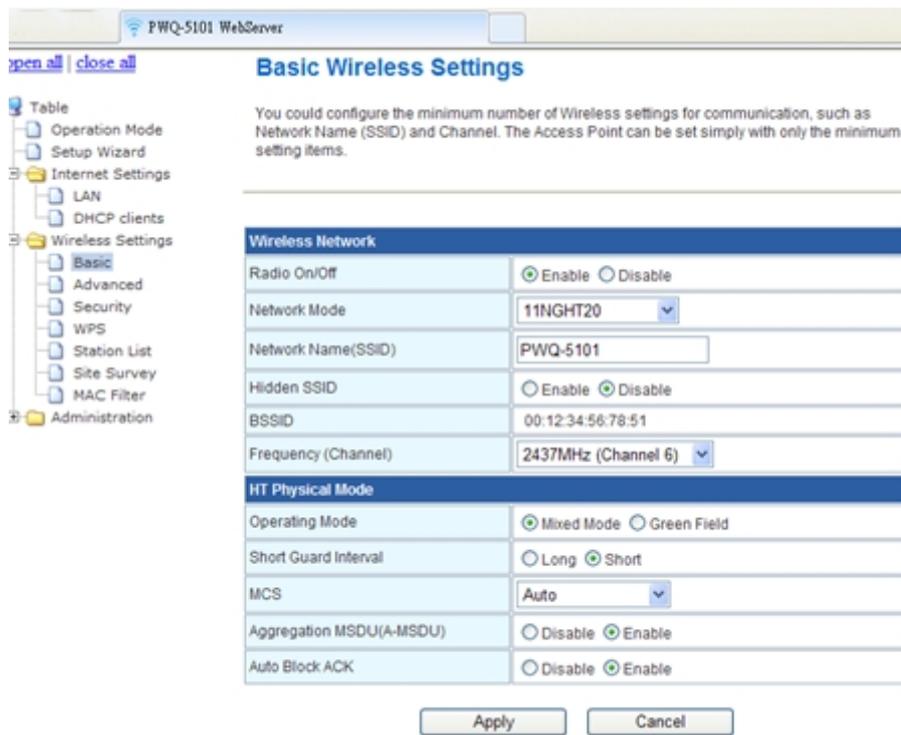
DHCP Clients

You could monitor DHCP clients here.

DHCP Clients		
MAC Address	IP Address	Expires in

Wireless Settings

Basic

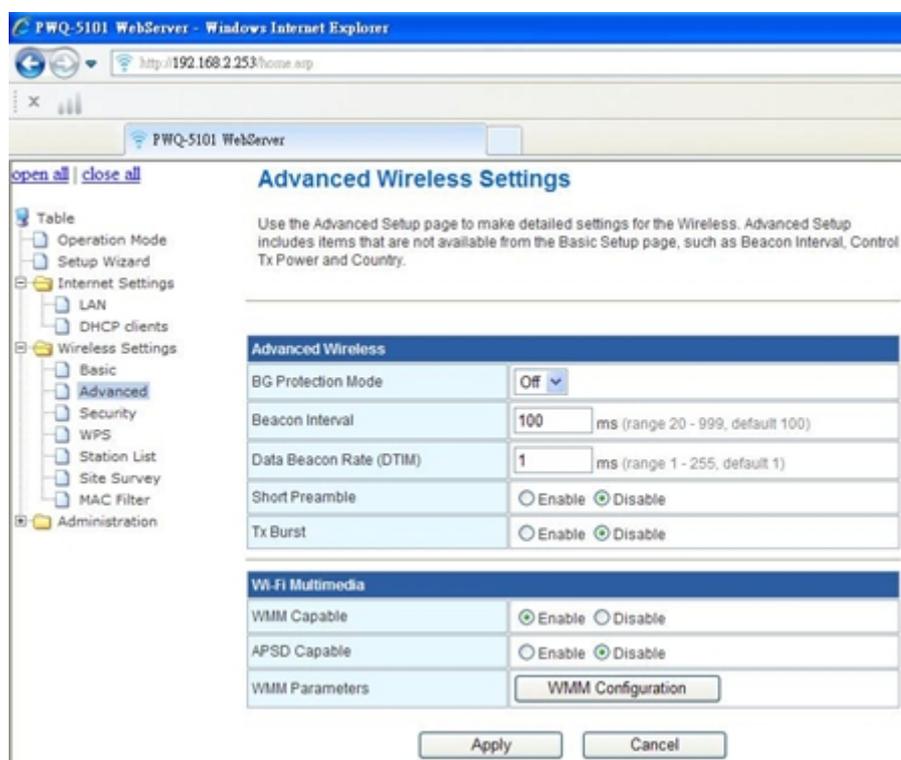


Wireless Network	
Item	Description
Radio On/Off	Click to enable/disable the radio.
Network Mode	The available options are 11B, 11G, 11NGHT20, 11NGHT40PUS (default), 11NGHT40MINUS
Network Name (SSID)	The SSID, which is also called ESSID is a unique identifier that wireless networking devices use in order to establish and maintain wireless connectivity. Multiple access point/bridges on a network or sub-network can use the same SSID. SSIDs are case sensitive and can contain up to 32 alphanumeric characters.
Hidden SSID	Click to enable/disable, With hidden SSID, the AP can't be scanned and the wireless client must input SSID manually to associate this AP.
BSSID	The BSSID is displayed in this field.
Frequency (Channel)	Click the drop down box to select the radio channel. Select the unused channel to prevent the radio overlapping.

HT Physical Mode	
Item	Description
Operating Mode	Default: Mixed (Mixed, Green Field). Mixed mode: In this mode the device transmits the packets with preamble compatible legacy (802.11g), so they can be decoded by legacy devices. The device receives and decodes both Mixed Mode packets and

	<p>legacy packets.</p> <p>Green Field mode: the device transmits HT packets without legacy compatible part. But the device receives and decodes both Green Field and legacy packets.</p>
Short Guard Interval	<p>The 11n device inserts the Guard Interval into the signal. You can choose the interval between “Long” and “Short”. This option affects the Phy data rate of radio. Please refer to the table below.</p>
MCS	<p>It is Modulation Coding Scheme. The available options are “Auto, 0, 1-7”. It changes the modulation of this device and effect the maximum Phy data rate. We recommend “Auto” setting. For the details, please refer to the table below.</p>
Aggregation MSDU (A-MSDU)	<p>The multiple HT packets can be transmitted with single ACK reply packet. Enable it to apply this function and reduce the network congestion.</p>
Auto Block ACK	<p>It is another aggregation technique which prevents sending ACK in the communication to increase the throughput. If this option is enabled, the device will activate this function when transmitting massive data.</p>

Advanced



Advanced Wireless	
Item	Description

BG Protection Mode	Default: Auto. You can select the other options including On and Off. The B/G protection technology is CTS-To-Self. It will try to reserve the throughput for 11g clients from 11b clients connecting to the device as AP mode.
Beacon Interval	Beacons are the packets sending by Access point to synchronize the wireless network. The beacon interval is the time interval between beacons sending by this unit in AP or AP+WDS mode. The default and recommended beacon interval is 100 milliseconds.
Data Beacon Rate (DTIM)	This is the Delivery Traffic Indication Map. It is used to alert the clients that multicast and broadcast packets buffered at the AP will be transmitted immediately after the transmission of this beacon frame. You can change the value from 1 to 255. The AP will check the buffered data according to this value. For example, selecting "1" means to check the buffered data at every beacon.
Short Preamble	Default: Disable. It is a performance parameter for 802.11 b/g mode and not supported by some of very early stage of 802.11b station cards. If there is no such kind of stations associated to this AP, you can enable this function.
Tx Burst	The device will try to send a serial of packages with single ACK reply from the clients. Enable this function to apply it.

Wi-Fi Multimedia	
Item	Description
WMM Capable	Choose "Enable" to enable WMM function.
APSD Capable	Turn on this feature so this device can detect whether the connecting wireless client device has turned on power saving feature. If yes, this device will send packets with power saving tag accordingly.
WMM Parameter	Click the button to edit the WMM parameter.

Security



Select SSID	
Item	Description
SSID choice	Choose the ESSID to configure the security setting.

Wireless Security/Encryption Settings	
Item	Description
Security Mode	Disable, OPEN, SHARED, WEPAUTO, WPA, WPA-PSK, WPA2, WPA2-PSK, WPA/WPA2 PSK, WPA/WPA2, 802.1X.

WPA Authentication Mode

This device supports six WPA modes including WPA-PSK (Pre-Shared Key), WPA, WPA2-PSK, WPA2 and additional WPA/WPA2 PSK and WPA/WPA2 mixed mode. For individual and residential user, it is recommended to select WPA-PSK or WPA2-PSK to encrypt the link without additional RADIUS server. This mode requires only an access point and client station that supports WPA-PSK. For WPA/WPA2, authentication is achieved via WPA RADIUS Server. You need a RADIUS or other authentication server on the network.

- **WPA/WPA2-PSK:**

- **Pass Phrase:**

- Option: Pass Phrase (8-32bytes). This mode requires only an access point and client station that supports WPA-PSK. The WPA-PSK settings include Key Format, Length and Value. They must be as same as each wireless client in your wireless network. When Key format is Passphrase, the key value should have 8-63 ACSII chars.

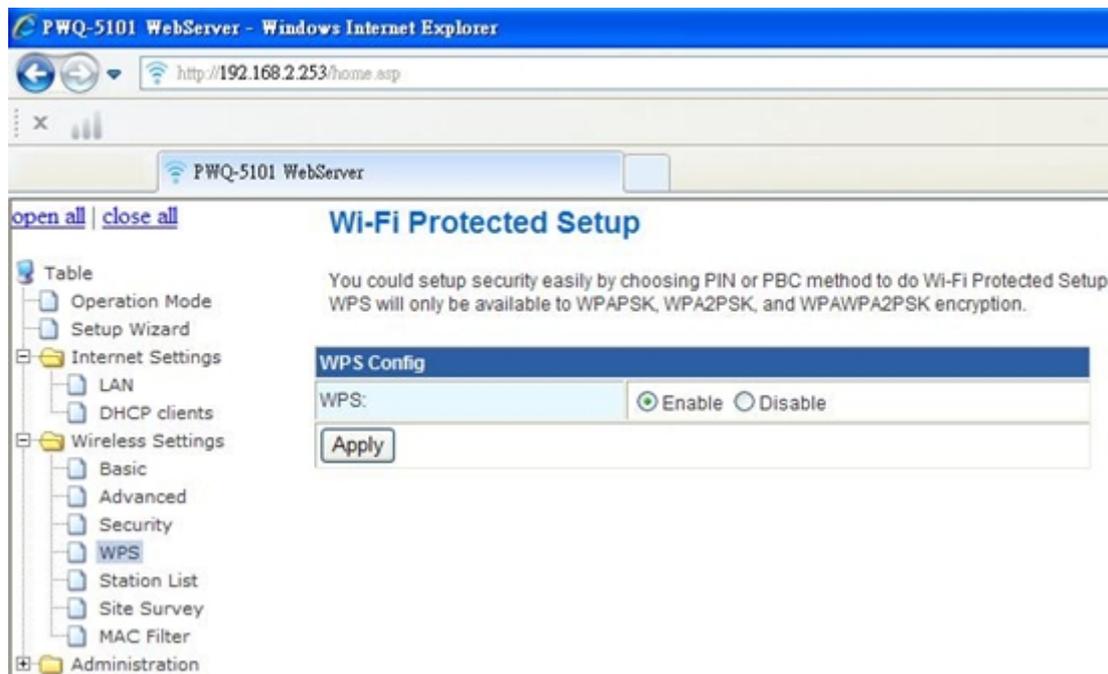
- Key Renewal Interval:
The WPA Algorithm will regroup the key for a period. The default value is 3600 seconds and you can adjust the time interval.

- **WPA/WPA2:**

When selecting WPA/WPA2, you have to add user accounts and the target device to the RADIUS Server. In the device, you need to specify the Server Network, Server address, Server Port and Server Key of the target RADIUS server.

- WPA Algorithms: TKIP, AES, TKIP/AES. Select the encryption type. When selecting TKIP/AES, the client can use whether TKIP or AES for the authentication.
- Pre-Authentication Support option: This option only appears when selecting WPA2 or WPA/WPA2 as the authentication mode. Enable it to use this function.

WPS



This function helps to establish the Wi-Fi security. For AP mode, it can be setup one WPS method including PIN (Personal Identification Number) and PBC (Push Button Certification). To begin the WPS progress, the WLAN security must be setup first. Please setup one among WPAPSK, WPA2PSK, WPA/WPA2PSK and then apply WPS setting. WPS will only be available in these encryption types.

PIN: query the PIN code in the utility of the WLAN client connecting to this AP, and then enter it in the PIN field. The Wi-Fi link between the WLAN client and the device should be encrypted.

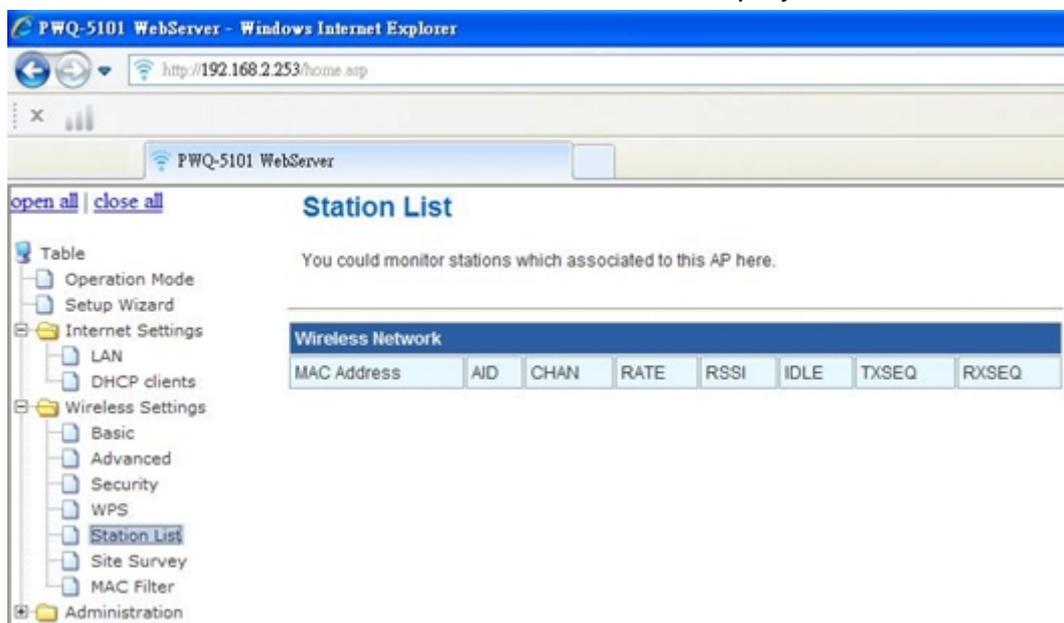
PBC: Select PBC, and then you can begin the PBC process. Press the PBC button in the front panel can also trigger this process. Press or click the PBC button on the WLAN client to finish the communication. You can press the PBC button on the WLAN client first and then click the PBC button on this device to establish the encryption.

The options and the information fields are showed below.

WPS Config	
Item	Description
WPS Capable	Select enable then press Apply button to start this function.

Station list

In the Station list, the information of associated clients is displayed.



Site Survey

Site survey page shows information of APs nearby;

You may choose one of these APs connecting or adding it to profile.

Site survey page shows information of APs nearby. You may choose one of these APs connecting or adding it to profile.

Site Survey				
	SSID	BSSID	Channel	Encryption
<input type="radio"/>	8tec-01	80:1F:02:1F:2D:F0	6	ON
<input type="radio"/>	Wendy_Cha	00:D0:41:C7:62:89	6	ON
<input type="radio"/>	VAR-PERL	00:13:F7:58:6D:C7	8	ON
<input type="radio"/>		14:D6:4D:4D:E8:2A	6	OFF

MAC Filter

MAC filtering allows the user to either limit specific MAC addresses from associating with the AP, or specifically indicates which MAC addresses can associate with the AP

These commands are used to setup and modify the MAC filtering list. MAC filtering allows the user to either limit specific MAC addresses from associating with the AP, or specifically indicates which MAC addresses can associate with the AP.

MAC Filter Disable Apply

MAC address Filter Settings

Action: Allow Deny

MAC Address: Add MAC

The maximum allow rule count is 8

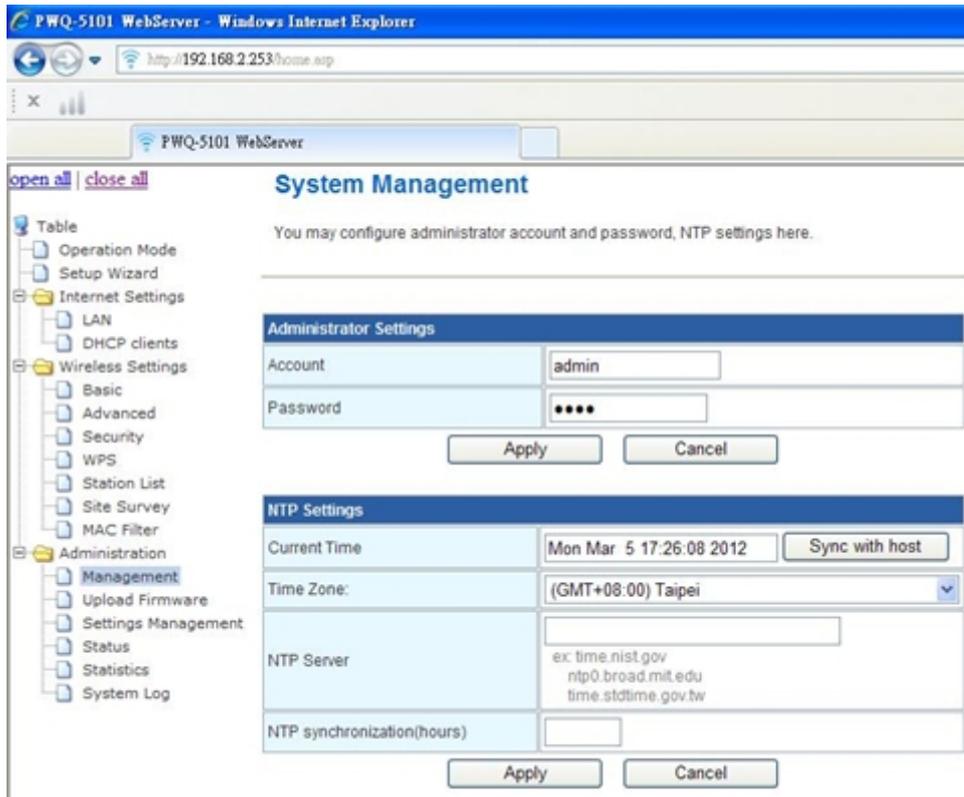
Index	MAC Address	Comment
Delete ALLOW Selected		

The maximum deny rule count is 8

Index	MAC Address	Comment
Delete DENY Selected		

Administration

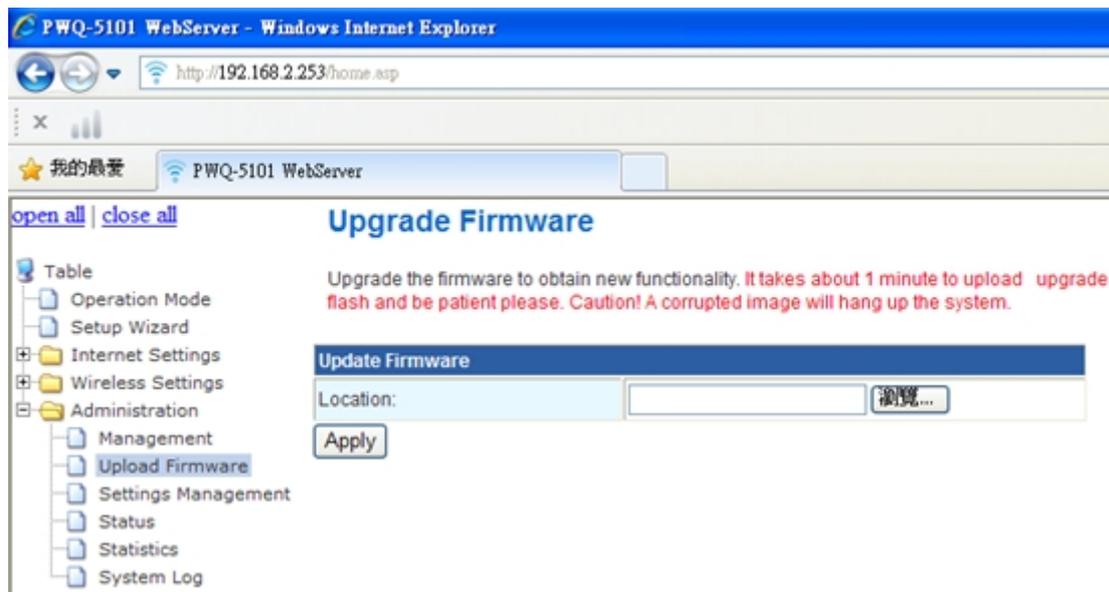
Management



Management	
Item	Description
NTP server	set the NTP (network time protocol) server address
NTP Synchronization	set a duration of checking time with the server (ex. 48 hours)

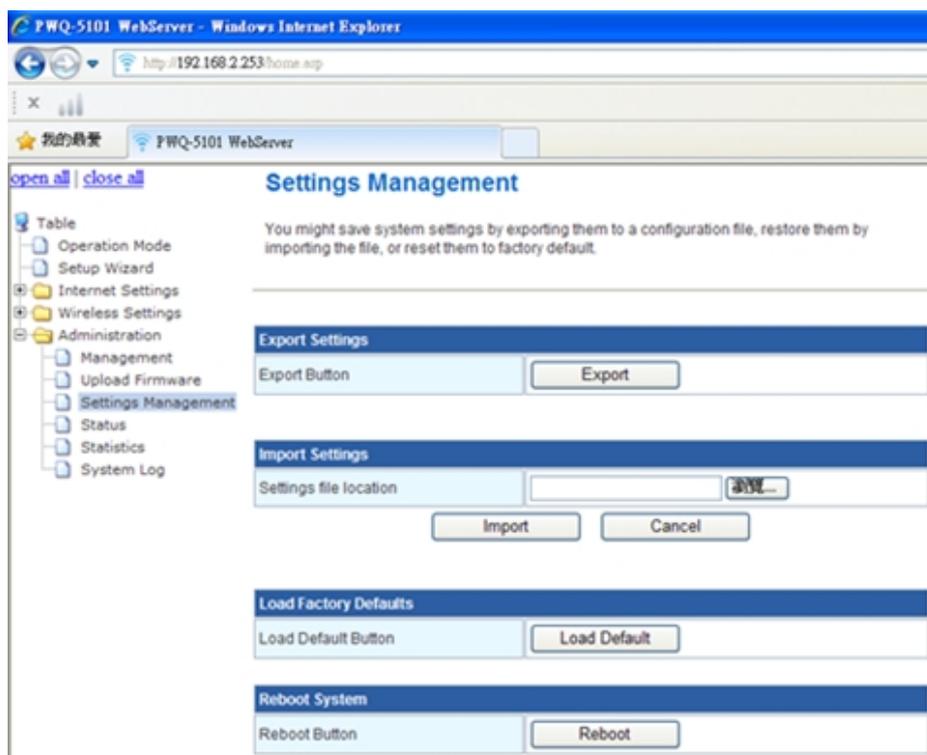
Upgrade firmware

Click “ Brows “ to upload file to upgrade PWQ-5101’s firmware



Settings management

You might save system settings by exporting them to a configuration file, restore them by importing the file, or reset them to factory default



Status

The system info, network and wireless status of PWQ-5101

PWQ-5101 WebServer - Windows Internet Explorer

http://192.168.2.253/home.asp

我的最爱 PWQ-5101 WebServer

open all | close all

Access Point Status

Let's take a look at the status of PWQ-5101.

System Info	
Model Name	PWQ-5101
System Version	PWQ51017231 (Aug 1 2012)
System Time	Mon Mar 5 10:37:18 2012

Local Network	
Local IP Address	192.168.2.253
Local Netmask	255.255.255.0
Default Gateway	
Primary Domain Name Server	
Secondary Domain Name Server	
MAC Address	00:05:9e:e2:00:02

Wireless Information	
Mode	AP
Band	11NGHT20
SSID	PWQ-5101
Channel	6
Encryption	None
MAC Address	00:12:34:56:78:51
Associated Clients	0

Refresh

Statistics

Memory and interface

PWQ-5101 WebServer - Windows Internet Explorer

http://192.168.2.253/home.asp

我的最爱 PWQ-5101 WebServer

open all | close all

Statistic

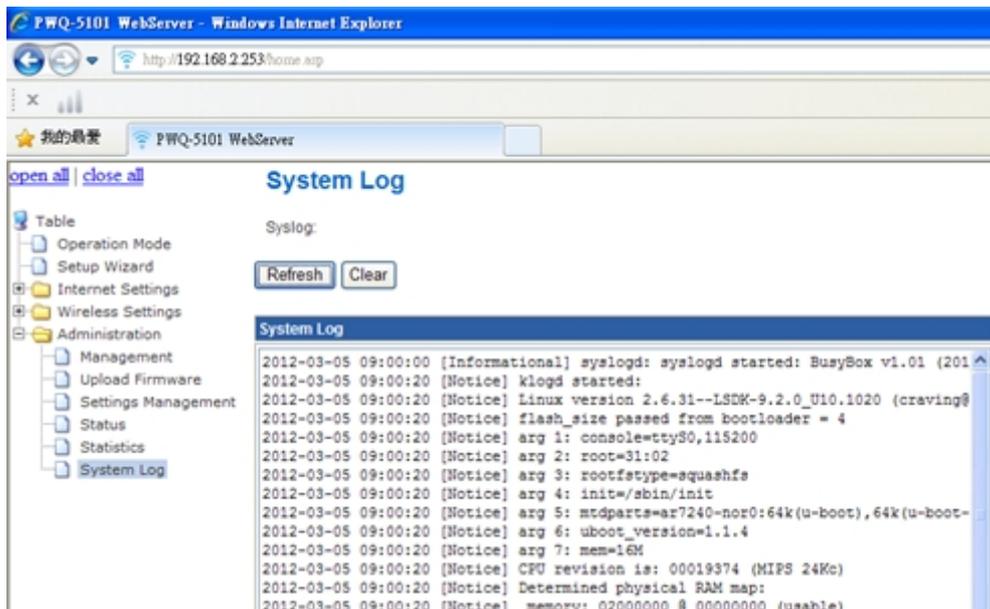
Take a look at the PWQ-5101 statistics

Memory	
Memory total:	13980 kB
Memory left:	7484 kB

All interfaces	
Interfaces	Ethernet
Rx Packet:	1205
Rx Byte:	229502
Tx Packet:	398
Tx Byte:	194745
Interfaces	Wireless
Rx Packet:	31
Rx Byte:	8896
Tx Packet:	12791
Tx Byte:	3008164

System log

Show the log of PWQ-5101



FEDERAL COMMUNICATIONS COMMISSION INTERFERENCE STATEMENT

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

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

CAUTION:

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

Labeling requirements

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

RF exposure warning

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

Canada, Industry Canada (IC) Notices

This Class B digital apparatus complies with Canadian ICES-003 and RSS-210.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Radio Frequency (RF) Exposure Information

The radiated output power of the Wireless Device is below the Industry Canada (IC) radio frequency exposure limits. The Wireless Device should be used in such a manner such that the potential for human contact during normal operation is minimized.

This device has also been evaluated and shown compliant with the IC RF Exposure limits under mobile exposure conditions. (antennas are greater than 20cm from a person's body).

Canada, avis d'Industry Canada (IC)

Cet appareil numérique de classe B est conforme aux normes canadiennes ICES-003 et RSS-210. Son fonctionnement est soumis aux deux conditions suivantes : (1) cet appareil ne doit pas causer d'interférence et (2) cet appareil doit accepter toute interférence, notamment les interférences qui peuvent affecter son fonctionnement.

Informations concernant l'exposition aux fréquences radio (RF)

La puissance de sortie émise par l'appareil de sans fil est inférieure à la limite d'exposition aux fréquences radio d'Industry Canada (IC). Utilisez l'appareil de sans fil de façon à minimiser les contacts humains lors du fonctionnement normal.

Ce périphérique a également été évalué et démontré conforme aux limites d'exposition aux RF d'IC dans des conditions d'exposition à des appareils mobiles (les antennes se situent à moins de 20 cm du corps d'une personne).

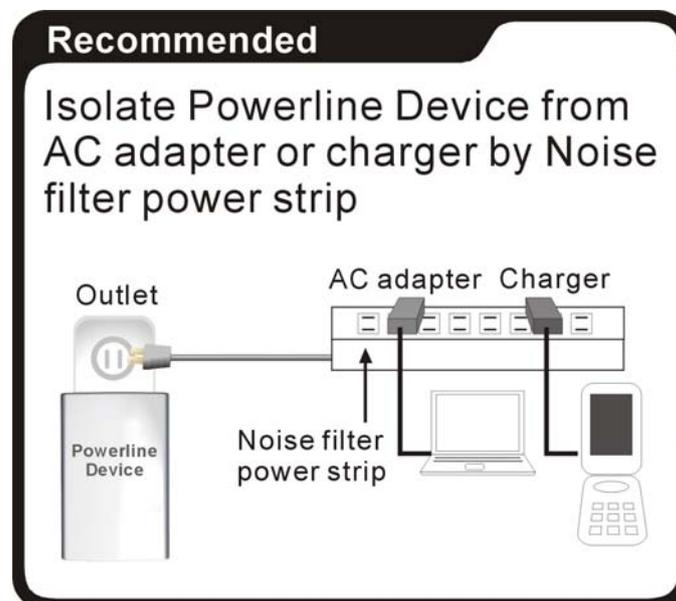
Ch 4 Enhance PLC performance during installation

This Powerline device sends data to remote device using WLAN or PLC technology. When it sends data to another remote Powerline device over the existing electrical wiring in your home, it may be affected by noises on the electric wire or the length of the wiring between transmitting and receiving devices. Keep the following in mind when placing this Powerline device at home.

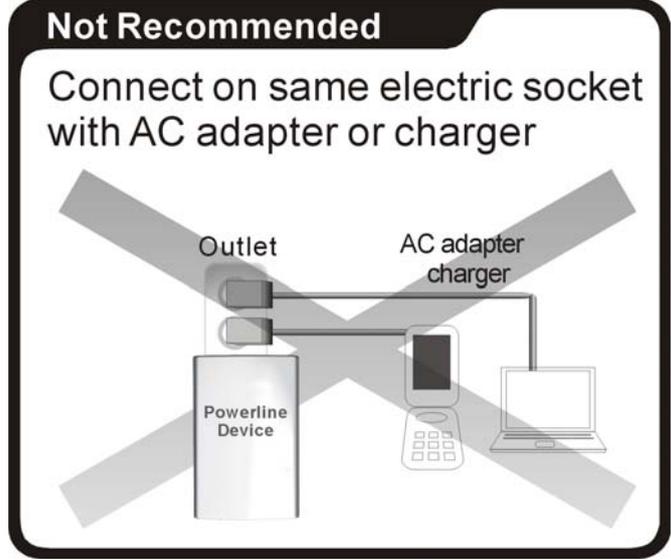
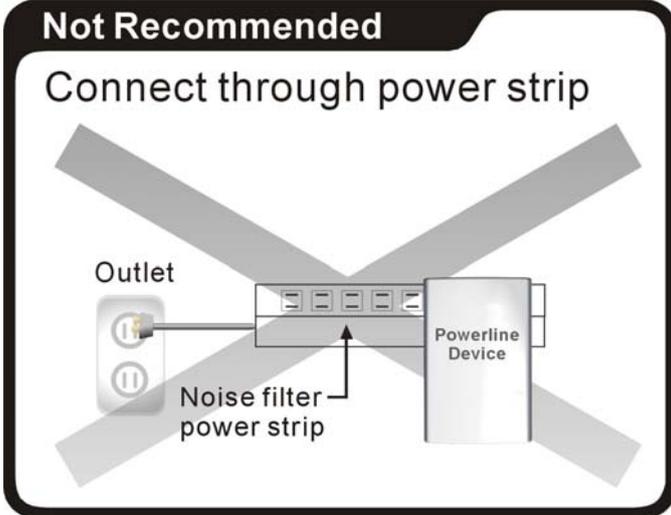
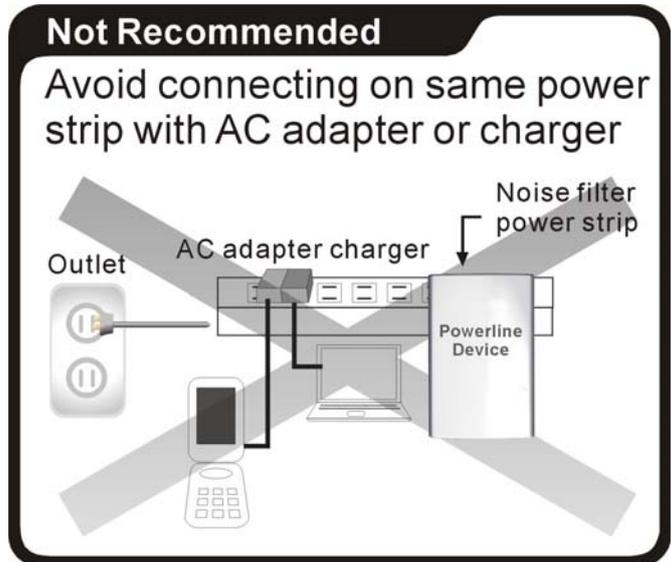
AC outlets connection

Avoid connecting this device to an uninterruptible power supply (UPS) or backup power supply device. For best results, we recommend connecting the adaptors directly to a wall outlet. Avoid connecting high power-consumption appliances to the same wall outlet. Plug these power consuming devices onto a noise filtering power strip to prevent these device interfere with this Powerline device. See the following illustration figure:

For better performance, the following connection is recommended, although not isolate with Noise filter power strip will still work OK.



The following connections are **NOT** recommended, although current PLC technology will overcome most noise interference from electronic devices' AC adapters or chargers.



Connection via power strip

If you must connect this device to a power strip, please keep the following recommendation in mind:

- Make sure the power strip does not have a noise filter or a surge protector, as these features may impair communication signaling of the Powerline device sent over the electric wiring, and its throughput or distance will be degraded.
- Use a power strip with an AC cord that is as short as possible.
- Do not connect the adaptor to a power strip that receives power from another power strip.

Electrical interference

Certain electrical devices emit electrical noise. If this noise is spread over to the electrical wiring in your home, it may interfere with the performance, speed, and reliability of this device. For best results, we recommend connecting an electrical noise filter to noise emitting appliances.

The following appliances are more likely to produce noise:

- Battery chargers (including cell phone chargers)
- Hair dryers
- Power drills
- Halogen light
- vacuum cleaner

Additionally, this product may interfere with the following appliance:

- Lights or lamps which have a touch-sensitive on/off feature

Electrical wiring

This device sends data to and from each other over the existing electrical wiring of your house. If two wall outlets are separated by a great distance of electrical wiring, these devices may not communicate well with each other. For more information, refer to the troubleshooting section.

Ch 5 Specification

Powerline Wireless N Extender	
Standards	WLAN: IEEE 802.11 b/g, IEEE 802.11n
	LAN: IEEE 802.3, IEEE 802.3u
	Powerline: HomePlug AV 1.0
Maximum Throughput	WLAN to Ethernet: up to 93 Mbps (Under 802.11n 40MHz)
	Powerline to Ethernet: TCP: 92 Mbps
Frequency band	WLAN: 2.4~2.4835GHz
	PLC: 2~ 68MHz
WLAN transceiver spec	RF Power:
	802.11b TX: 16 dBm +/- 1.5dB (typ.)@1Mbps
	802.11g TX : 16 dBm +/- 1.5dB (typ.)@6Mbps
	802.11n TX : 14 dBm +/- 1.5dB (typ.)@6.5Mbps 802.11n TX : 13 dBm +/- 1.5dB (typ.)@13.5Mbps
	Sensitivity:
	802.11b RX: -82 dBm (typ.)@11Mbps
	802.11g RX: -70 dBm (typ.)@54Mbps
	802.11n RX(20MHz): -67dBm (typ.)@ 72.2Mbps
	802.11n RX(40MHz): -64dBm (typ.)@ 150Mbps
	Physical Data Rate:
	802.11b: 1,2, 5.5, 11Mbps
	802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps
	802.11n (20MHz): MCS0~7, Up to 72.2Mbps
	802.11n (40MHz): MCS0~7, Up to 150Mbps
Wi-Fi mode	Wireless AP+ Bridge mode (Default)
Security mode	WLAN WPS PBC / PIN code, WPA-PSK, and WPA2-PSK
	PLC 128-bit AES
Antenna type	1T1R
LAN port	1 port
AC input	100 - 240 V
	50-60Hz

Power consumption	(Note: Ethernet and Wi-Fi is connected and running)
LEDs	POWER LED (Green);
	PLC Link/Activity LED (Green);
	Wireless & Security LED (dual color);
	Ethernet (Green)
Buttons	WPS
	GROUP/Pairing
	Power on/off
	RESET
PLC PHY Rate	500 Mbps
PLC Modulation	OFDM (QAM 8/16/64/256/1024/4096, BPSK, QPSK, ROBO)
PLC Distance	AC Wire : up to 300 meters
Max. dev in a PLC network Group	8/16 (Active/Total)
Temperature	Operating: 0~40 °C ; Storage: -20~60 °C
Relative Humidity	Operating: 10~85% Non-Condensing , Storage: 5~90% Non-Condensing
Dimension	56 x 105 x 48(H) mm
Certification	FCC, CE, CE-LVD, RoHS, WEEE