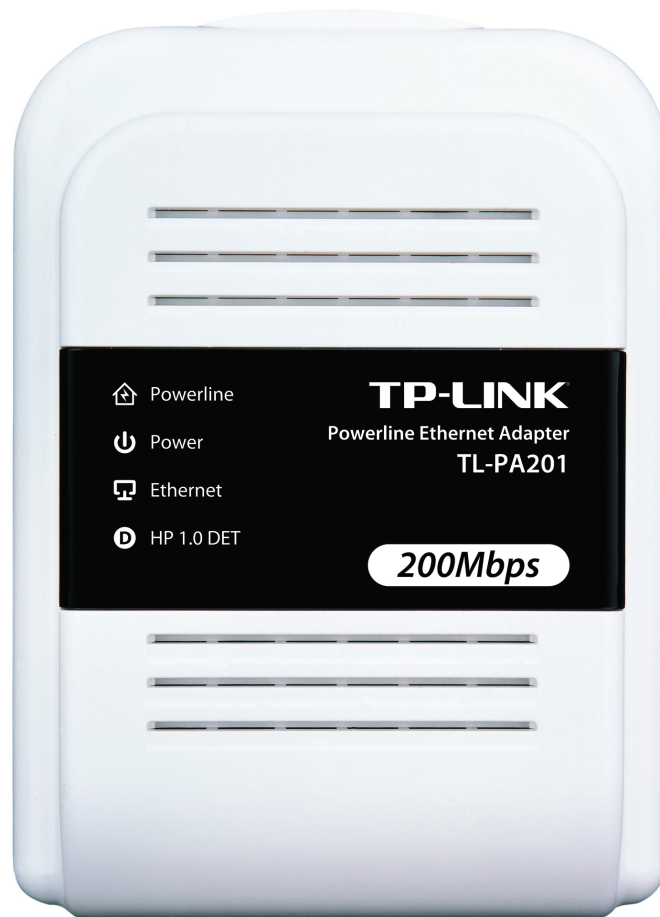


TP-LINK®

User Guide

TL-PA201

200Mbps Powerline Ethernet Adapter



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FCC 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.

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.
- 2) This device must accept any interference received, including interference that may cause undesired operation.

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

CE Mark Warning



This is a class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Important Safety Instructions

1. Do Not open this product or attempt to service this product, it may expose you to dangerous high voltage and other risks.
2. Do Not operate this product near water.
3. Do Not place or operate near or over radiator or heat register.
4. Do Not expose this product to dampness, dust or corrosive liquids.
5. Do Not connect this product and Disconnect from wall socket during a lightning or thunderstorm
6. Do Not obstruct this product ventilation slots, as insufficient airflow may harm this product.
7. Do Not put anything on this product.
8. Plug directly into wall socket (100Vac~240Vac). Do Not use an extension cord between this product and the AC power source.
9. When plugging this product into wall socket, make sure that electrical socket are not damaged, and no leakage for gas or water pipes to begin with.
10. Place the connecting cables carefully so people won't stumble or walk on it.
11. The Powerline Adapter should be operated from the type of power indicated on the marking label. If you are not sure of the type of power available, consult the qualified technician.
12. Unplug the Powerline Adapter from the mains and refer the product to qualified service personnel for the following conditions:
 - If liquid has been spilled on the product
 - If the product has been exposed to rain or water
13. Unplug from the wall socket before cleaning. Use a damp cloth for cleaning. Do not use liquid cleaners or aerosol cleaners

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Chapter 1 Introduction

Congratulations on your purchase of this outstanding Ethernet Powerline Adapter. This device is an 200Mbps Powerline Ethernet Adapter which transforms your house's existing electrical wiring into an ubiquitous networking infrastructure. Simply plug this 200Mbps Ethernet Powerline Adapter into an ordinary AC power outlet which will easily extend your Cable/xDSL broadband connection or existing Ethernet (LAN) network to any other electrical outlet in any room of a house without the need of any new cabling.

This Ethernet Powerline Adapter supports up to 200Mbps data rate over the existing household power circuit. With data rates of 200Mbps, full multimedia application can easily be supported throughout the whole house in addition to Internet access. This Ethernet Powerline Adapter uses the existing power lines installed in a home as a path to transmit digital data, voice, audio and video between devices.

To ensure data communication's security and multimedia applications, this Ethernet Powerline Adapter support built-in 128-bit AES encryption and Quality of Service (QOS)features. With minimum setup, you can install and use this Ethernet Powerline Adapter within minutes. The adapter add two new function to be useful

1. Existing connection with a new Unassociated device added via the **Pair** button.
2. Reset to default setting via the **Reset** button.

A. System Requirement

- a) At least two AC 100V ~ 240V power outlets with standard home power wiring
- b) A computer with the following:
 - Operating System with TCP/IP installed
 - Pentium III compatible processor and above
 - Ethernet LAN card installed with TCP/IP protocol
 - 64 MB RAM or more
 - 50 MB of free disk space (Minimum)
 - CD-ROM Drive

B. Package Contents

The 200Mbps Ethernet Powerline Adapter Starter Kit package contains the following items:

- One 200Mbps Ethernet Powerline Adapter (There are two 200Mbps Ethernet Powerline Adapters in Starter Kit)
- One CAT-5 Ethernet Cable (There are two CAT-5 Ethernet Cables in Starter Kit)
- One Quick Installation Guide
- One CD-ROM (Utility / Manual / Quick Installation Guide/Acrobat Reader)

If any of the above items are damaged or missing, please contact your dealer immediately..

Chapter 2 Connecting Mechanism

2.1 Introduction

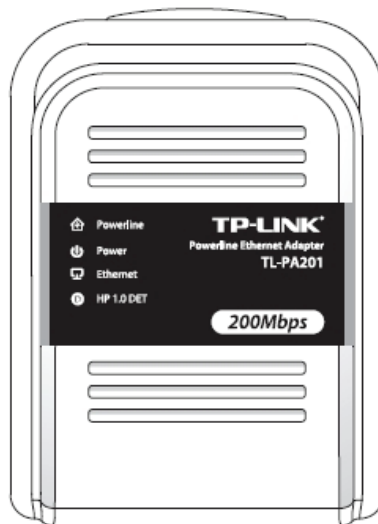
The Ethernet Powerline Adapter support up to 200Mbps data rate. With this high speed connection rate, this Ethernet Powerline Adapter allows you to setup a high speed home network by using your home existing electrical wiring. Simply plug this Ethernet Powerline Adapter into an ordinary power outlet to extend your Cable/xDSL broadband connection or existing LAN network to any other electrical outlet in any rooms of your house.

Take notes that this Ethernet Powerline Adapter works in pairs. You need to plug one Ethernet Powerline Adapter into a power outlet for each computer (Connect to the computer LAN card) you want to connect (Network access); you will also need another Ethernet Powerline Adapter connected to your Cable/xDSL broadband (Ethernet port) in order to extend your broadband connection or Internet surfing.

Section below describes the Ethernet Powerline Adapter's LED indicators, physical interface and hardware connection mechanism.

2.2 LED Indicator

The LED indicator displays information about the device's status.

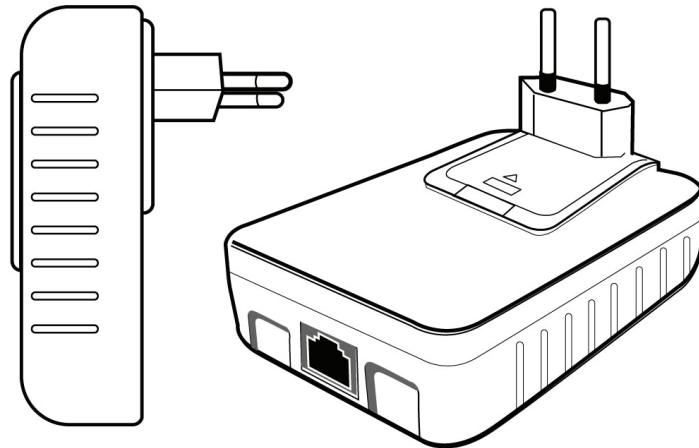


Label	Status	Description
Powerline	ON	Another powerline port is detected on the same powerline network
	OFF	Did not detect any other powerline port on the same powerline network
	Blinking	The powerline port is transmitting/receiving data
Power	ON	The Ethernet Powerline Adapter is power on
	OFF	The Ethernet Powerline Adapter is not receiving power
Ethernet	ON	The Ethernet port is on and ready to receiving/transmitting data
	OFF	The Ethernet port is not connected or not power on
	Blinking	The Ethernet port is receiving/transmitting data

HP 1.0 DET	OFF	Did not detect any HomePlug 1.0 device on the same powerline network
	Blinking	Another HomePlug 1.0 device is detected on the same powerline network

2.3 Physical Interface

There are two physical interfaces on this Ethernet Powerline Adapter.



Interface	Description
Ethernet	One 10/100Mbps Ethernet port connected to PC LAN card or broadband device.
Power Plug	Power Plug connected to any 100V ~ 240V AC power socket.

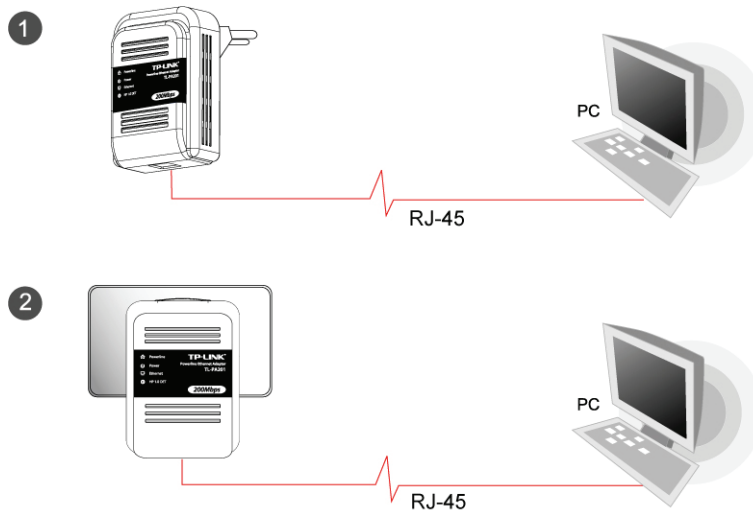
2.4 Hardware Connection – Computer

For those computers you wish to be networked by Ethernet Powerline Adapter, each of the computers must be properly connected with an Ethernet Powerline Adapter through an Ethernet (RJ-45) cable.

Following are the steps to properly connect the Ethernet Powerline Adapter to your computer:

1. Power off your PC or Notebook.
2. Connect the provided Ethernet (RJ-45) cable to the Ethernet Powerline Adapter's Ethernet port.
3. Connect the other end of the Ethernet (RJ-45) cable to you computer's LAN port.
4. Plug the Ethernet Powerline Adapter into a wall socket next to the computer.
5. Turn on your computer.
6. Check and confirm that the **Power** and **Ethernet** LEDs on the Ethernet Powerline Adapter are **ON**.

The hardware connection mechanism is shown below:

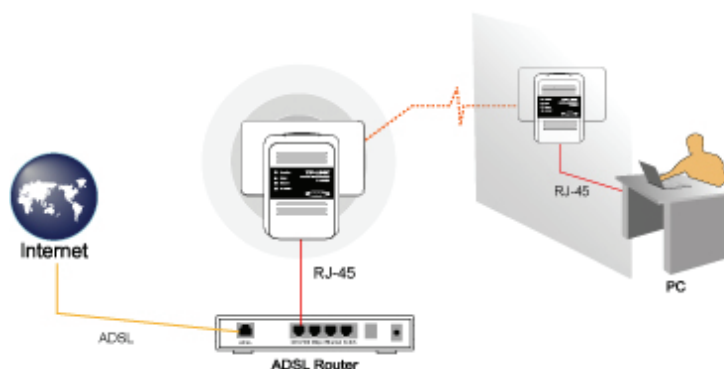


2.5 Hardware Connection – Internet

This section describes how to connect the Ethernet Powerline Adapter into your existing ADSL broadband connection via ADSL Ethernet port. Follow the procedures describe below to connect the Ethernet Powerline Adapter to your ADSL broadband connection:

1. Power off your PC or Notebook.
2. Connect the provided Ethernet (RJ-45) cable to the Ethernet Powerline Adapter’s Ethernet port.
3. Connect the other end of the Ethernet (RJ-45) cable to an available Ethernet port of your ADSL broadband Router.
4. Plug the Ethernet Powerline Adapter into a wall socket next to the computer.
5. Turn on your computer.
6. Check and confirm that the **Power**, **Powerline** and **Ethernet** LEDs on the Ethernet Powerline Adapter are **ON**.

The hardware connection mechanism is shown below:



 **Note:**

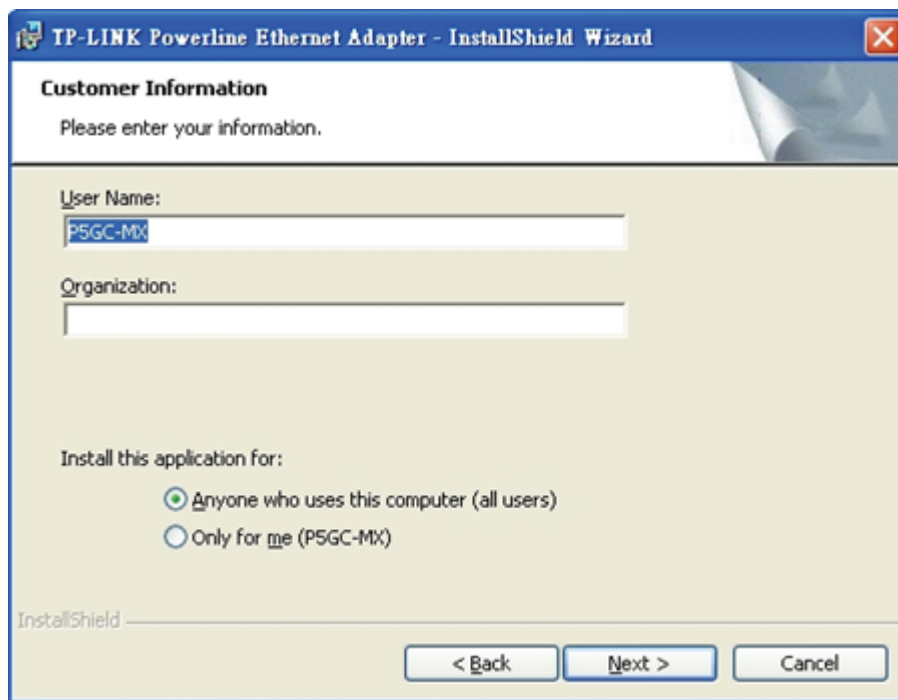
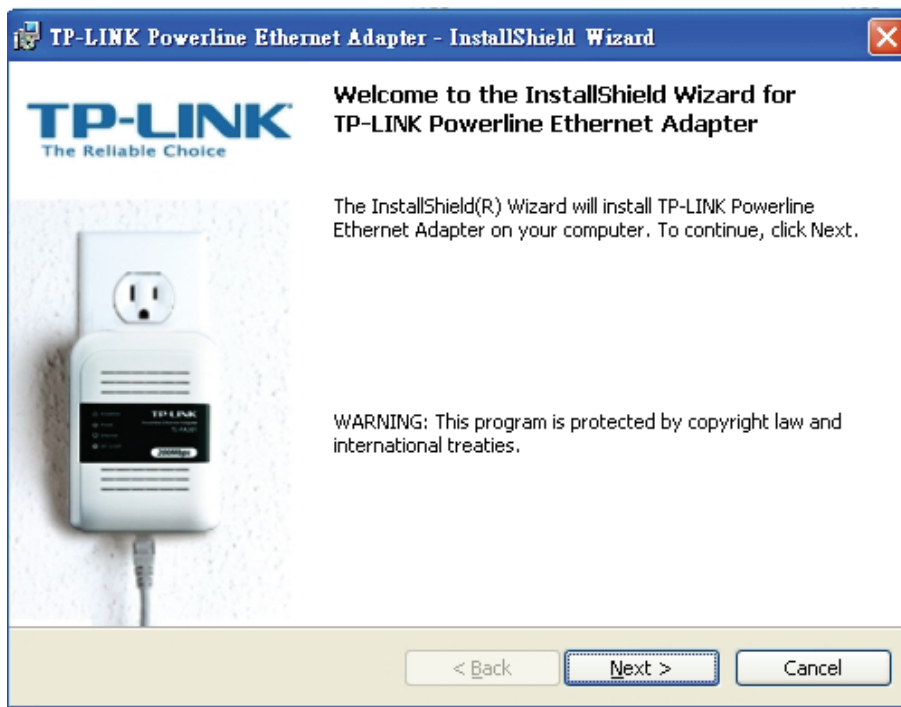
Do not connect the Powerline adapter to an extension lead, power strip, extension cord, surge protector as this may degrade the network performance

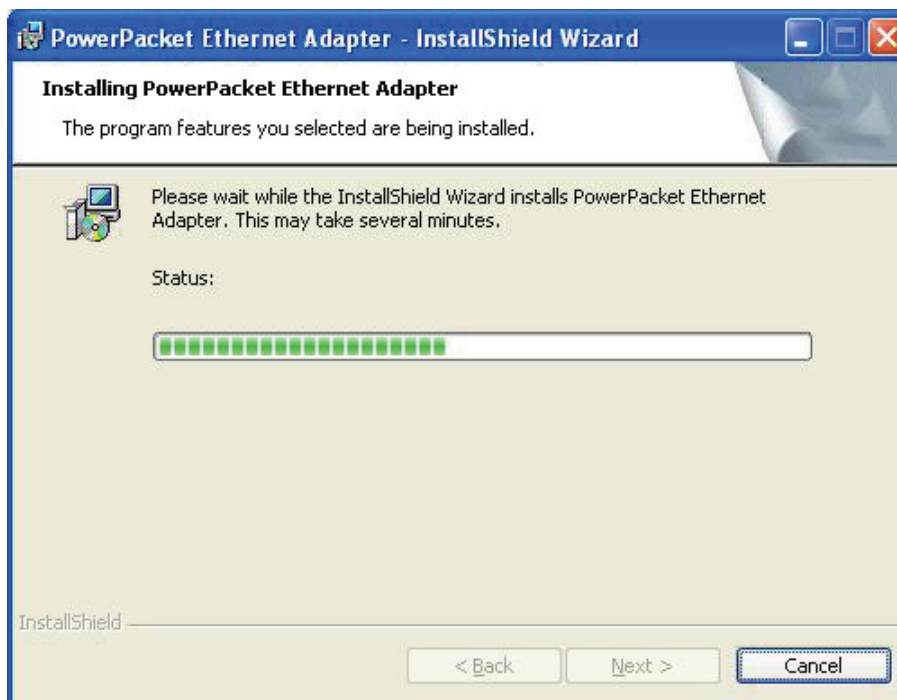
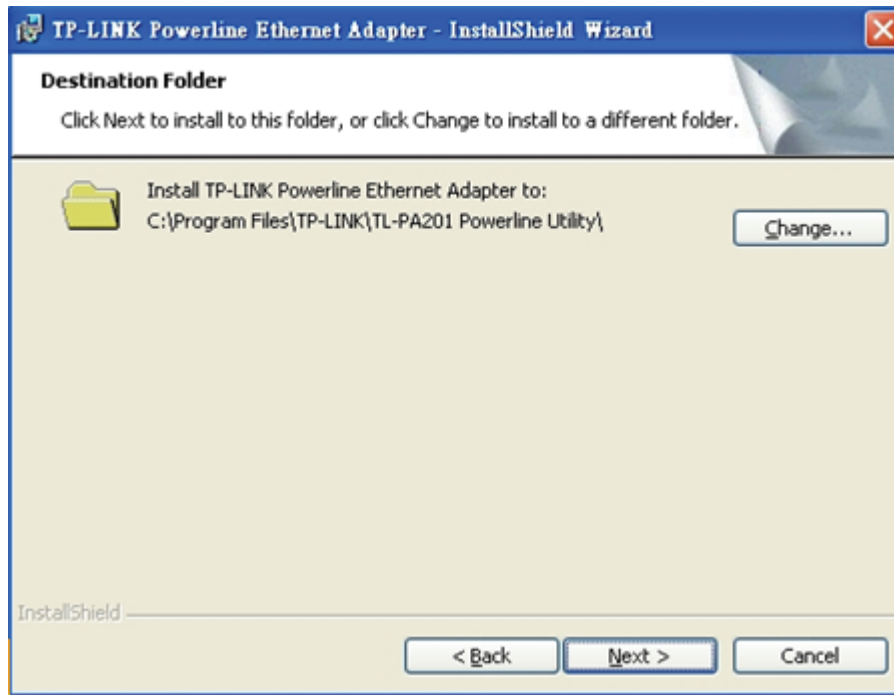
Chapter 3 Installing Management Utility

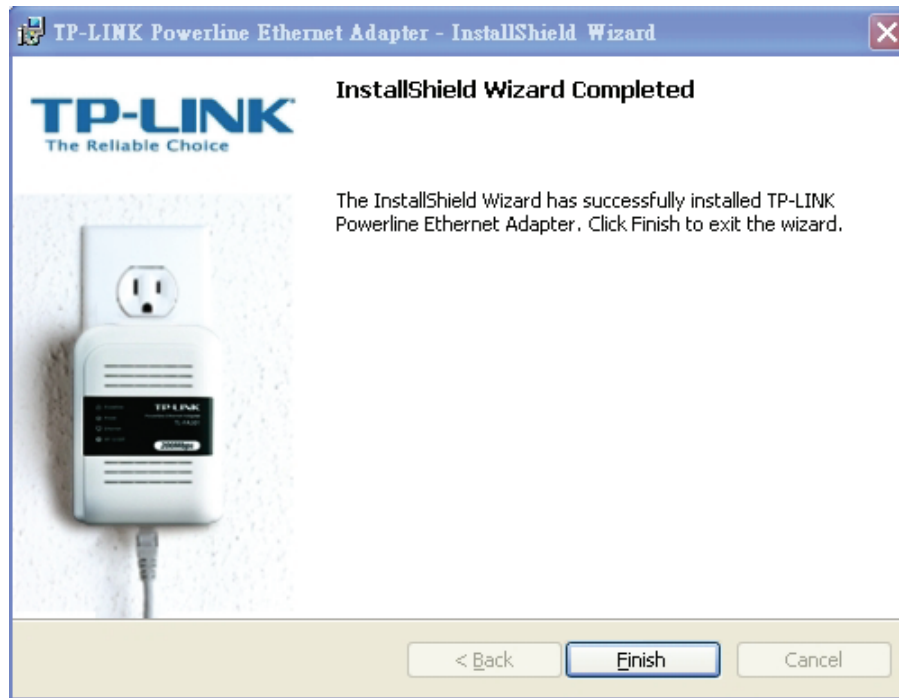
Please verify that no other Ethernet Powerline Adapter or any Encryption Management Utilities are installed before installing the provided software. If other Powerline Utilities are installed, uninstall them and restart your personal computer before installing this provided software.

Follow the following procedures to properly installing the provided Management Utility:

Step 1: The program installation process will carry out and copy all the necessary files to your system.







Step 2: After the installation, a shortcut to the “**TL-PA201 Powerline Utility**” application icon is provided on the windows desktop.



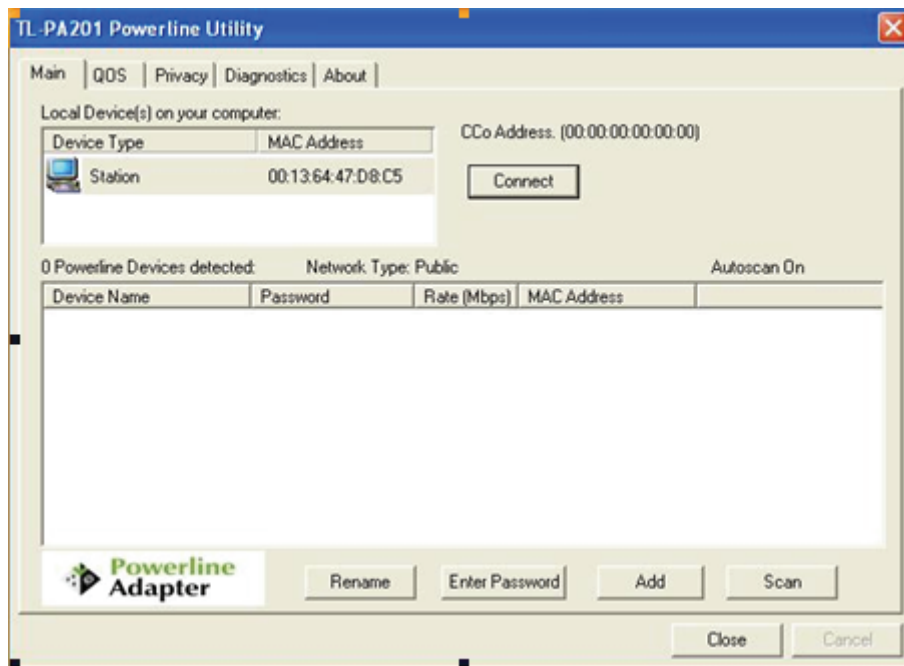
Step 3: Finally, there is an “Auto install Finish” icon on the windows desktop.

Chapter 4 Using The Management Utility

After you'd successfully installed the Ethernet Powerline Adapter hardware and Management Utility software, you can setup or configure the devices according to your need.

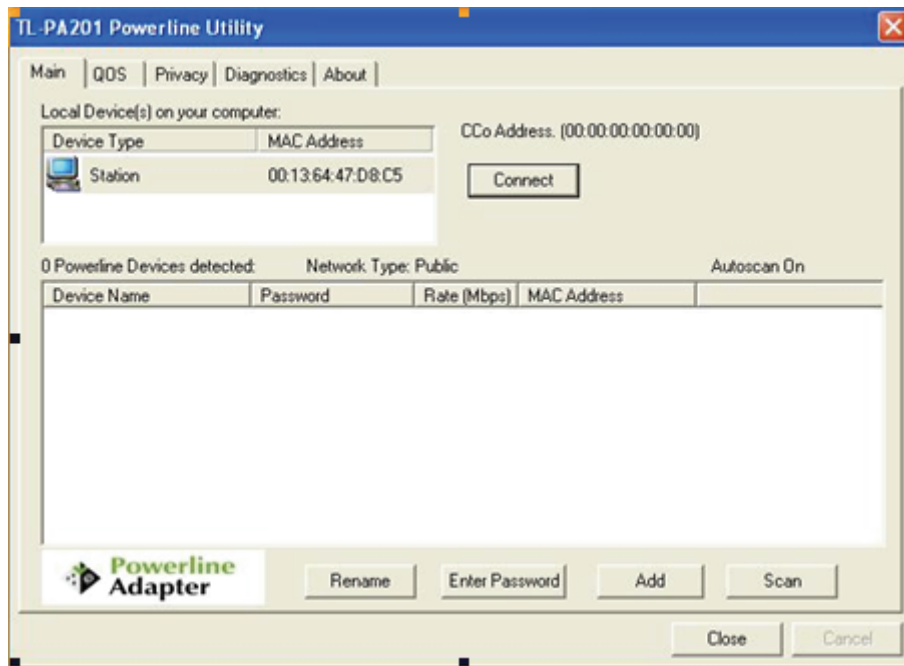
This Ethernet Powerline Adapter Configuration Utility enables the users to identify powerline devices on the powerline network, measures data rate performance, ensures privacy and performs diagnostics by setting user defined secure powerline networks.

Double click on the "TL-PA201 Powerline Utility" from your windows desktop, the following screen display. This Management Utility consists of a set of five property sheets, viz., "Main", "QOS", "Privacy", and "Diagnostics" and "About".



4.1 Main

The **Main** tab shows all the Ethernet Powerline Adapter that are logically connected to the current computer where the Management Utility is running.



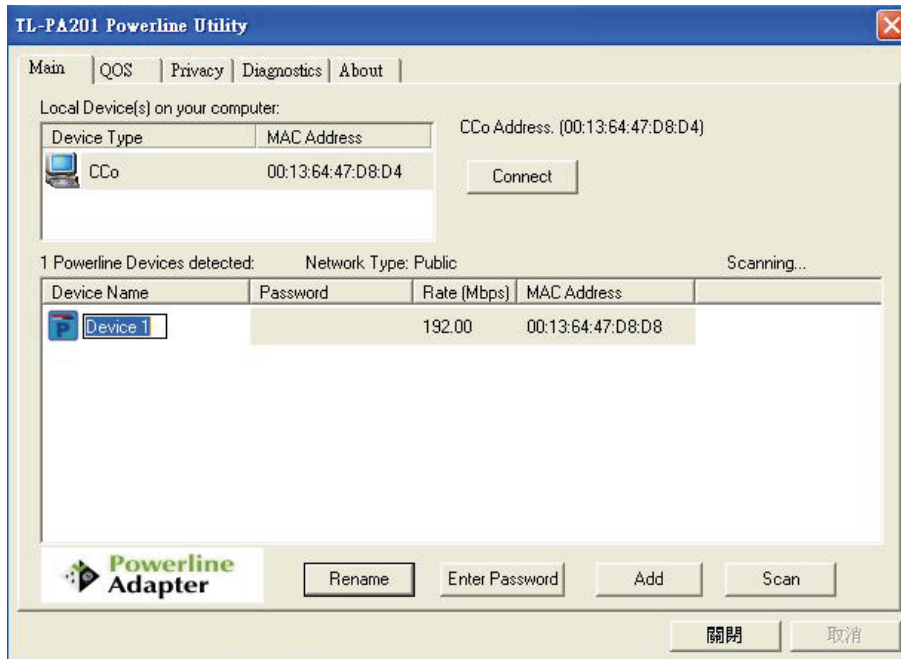
- **Local Device(s) on your computer:** This shows all local Ethernet **Powerline** Adapter found connected to the computer's LAN card. In most cases, only one device will display in this panel. Click and select the local device shown on the screen then click "**Connect**" tab to manage the Ethernet Powerline Adapter. The status message will be shown above the "**Connect**" button indicates that your PC is connected to the same device. Once the chosen Ethernet Powerline Adapter is properly connected, this Management Utility will automatically scan the power line periodically for any other existing powerline devices.
- "**x**" **Powerline Devices detected:** This display all the Ethernet Powerline Adapter found on the current logical network. "**x**" shows the number of remote Ethernet Powerline Adapter discovered by this Management Utility.
- **Network Type:** Displayed the type of logical network: "**Public**" or "**Private**".
- **Autoscan:** Shows the scanning status (Default is "**ON**").
 - **Device Name:** Shows the default device name. One may redefine or change the name by clicking on the name and editing in place or by clicking the "**Rename**" button.
 - **Password:** Shows the current password of the Ethernet Powerline Adapter.
 - **Quality:** Shows the quality of the Ethernet Powerline Adapter connection.
 - **Rate (Mbps):** Shows the current transmission rate of the selected Ethernet Powerline Adapter.
 - **MAC Address:** Shows the Ethernet Powerline Adapter's MAC address.
- **Rename:** Click to change the name of the selected Ethernet Powerline Adapter.
- **Enter Password:** Shows the supplied Ethernet Powerline Adapter's password (Initially left blank). To set the Ethernet Powerline Adapter password (Which is required when creating a private network), click and select the device shown in the lower panel and click on the "**Enter Password**" button. Follow the pop-up dialog box to complete your password setting.
- **Add:** Click this button to add a remote Ethernet Powerline Adapter to your network that is not on the lower panel displayed list. You will advice to locate the passwords for all Ethernet Powerline Adapter

you wish to manage and add them to the local logical network by clicking the “**Add**” button. Follow the pop-up dialog box to complete your setting.

- **Scan:** Click the “**Scan**” button to perform an immediate search of the Ethernet Powerline Adapter connected to the computer. The Management Utility will automatically perform the scanning process and update the display every few seconds by default.

4.1.1 Rename

This Management Utility allows you to change the name of the listed Ethernet Powerline Adapter. Click and select the Ethernet Powerline Adapter you wish to change from the list, then click on the “**Rename**” tab and editing-in-place to change the name.



4.1.2 Enter Password

To set or change your Ethernet Powerline Adapter’s password, click and select the Ethernet Powerline Adapter you wish to change from the list, then click on the “**Enter Password**” tab, the following screen display.

Enter your **Password** (Take note to the password format) and click “**OK**” after setup.



Note:

The Ethernet Powerline Adapter device must be present on the power line (plugged in) in order for the password to be confirmed and added to the network. If the Ethernet Powerline Adapter device could not be located, a warning message will be shown.

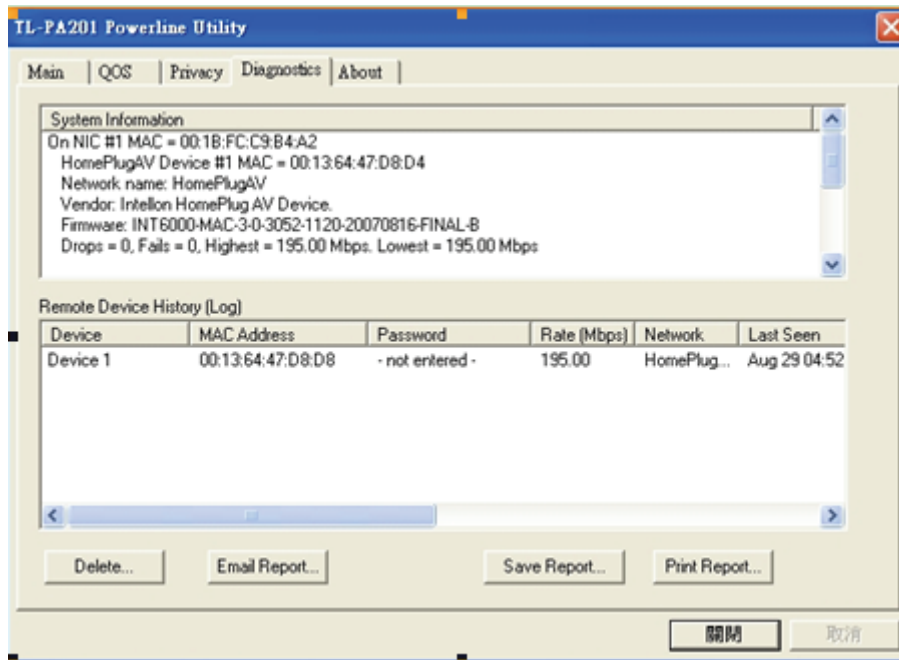
4.1.3 Add Device

The following dialog box pop-up when clicking the **“Add”** button under **Main** configuration homepage. The dialog box allows you to enter both the selected device’s name and password. Noted that the Ethernet Powerline Adapter must be present on the power grid in order to activate the set password and added to the local network.

Enter your **Device Name** and **Password** (Take note to the password format) and click **“OK”** after setup.

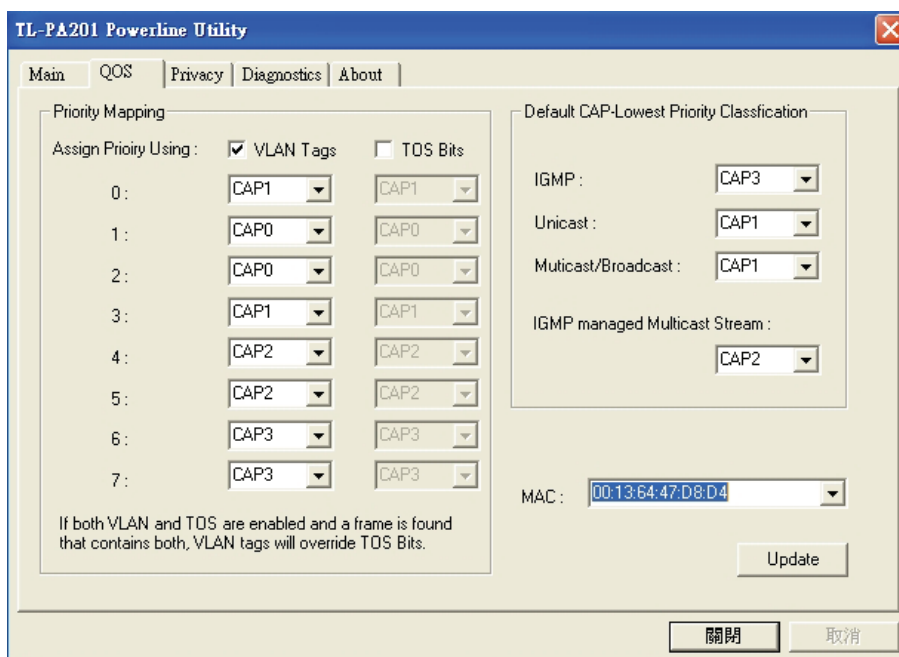


The following screen display after the naming and password setting process, which is also the **Diagnostics** configuration homepage.



4.2 QOS

The second tabbed window, labeled 'QoS' for Quality of Service, is shown in Figure.



QoS requirements are different for various data types such as streaming video or music, voice and raw data. To provide higher QoS for streaming data, priority levels can be set using tags at the beginning of data frames. Virtual Local Area Network (Vlan) 802.1p priority tags on Ethernet frames are used to specify 8 (0~7) levels of 'user priority'. Powerline AV powerline allows for 4 levels of Channel Access Priority (CAP(0-3)). Therefore, the 8 levels of VLAN Ethernet tags must be mapped to the 4 levels of CAP priority, where CAP 3 is the highest priority and CAP 0 is the lowest. CAP 3 priority might be used for voice and network management frames, CAP 2 is used for streaming video-and must while CAP 1 can CAP 0 are used for data. Mapping VLAN tags or TOS bits to CAP levels is easily done using the VLAM Priority Mapping function on the QoS tab window.

The 'Priority Mapping' group contains both VLAN and TOS Bit mapping capability. When selected,

packages matching the VLAN or TOS Bit priority will be assigned the Powerline contention priority (channel Access Priority, CAP) as set in the corresponding dropdown box. If a package has both VLAN and TOS in it, VLAN will override TOS.

The 'Default CAP' group allows for default priority mapping of packages that do not have a VLAN or TOS bit (or if these are disabled). Settings are available for Unicast (directed to a host).

- IGMP - (default CAP 3) – sets the channel access priority for IGMP frames – these are the group management frames, not the stream data
- Unicast – (default CAP 1) – sets the default channel access priority for unicast frames not matching any other classification or mapping.
- IGMP managed Multicast Stream (Fixed to CAP 2) – sets the default channel access priority for stream data belonging to a snooped IGMP multicast group.
- Multicast/Broadcast – sets the default CAP for multicast frames not in a snooped group and for broadcast frames.

After making CAP settings, clicking the Write button will commit these, along with the values from the Configuration tab, to NVRAM on the connected device.

4.3 Privacy

The **Privacy** configuration page provides a means for managing the local network and providing additional security for the logical network and also to select the devices that has to be included in the network. All Powerline devices are shipped using a default logical network (network name), which is normally “**HomePlug**”

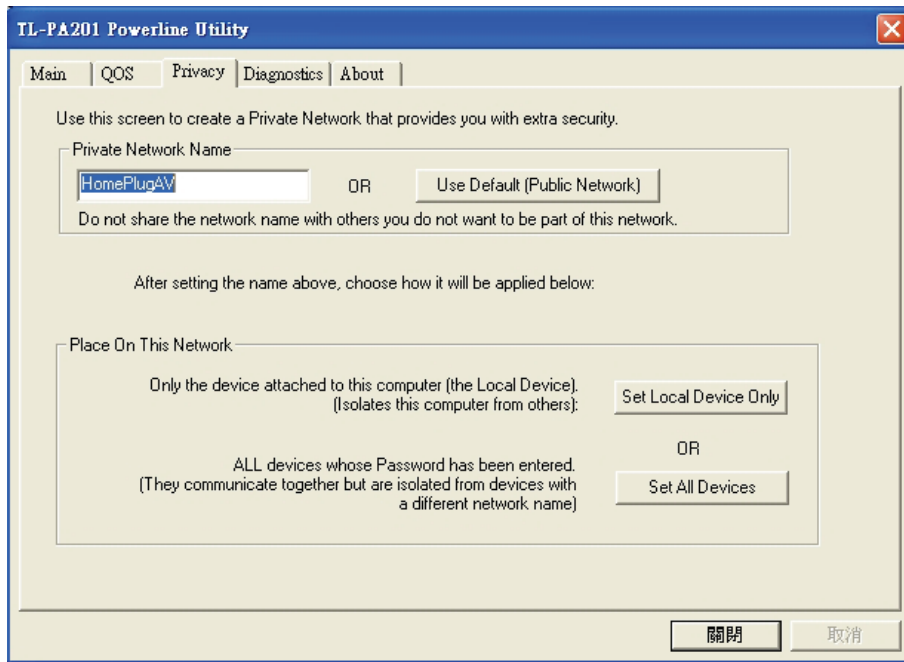
The **Privacy** configuration homepage allows you to change the **Network Name** of the Ethernet Powerline Adapter that is currently connected to this computer into a private network. Reset the private network to universal public network by clicking on the “**Use Default (Public Network)**” or entering/editing “**HomePlug**” under column of “**Private Network Name**” is always available.

Note that every Ethernet Powerline Adapter on your home network **MUST** have the same **Network Password** for connectivity to be established throughout your home.



Note:

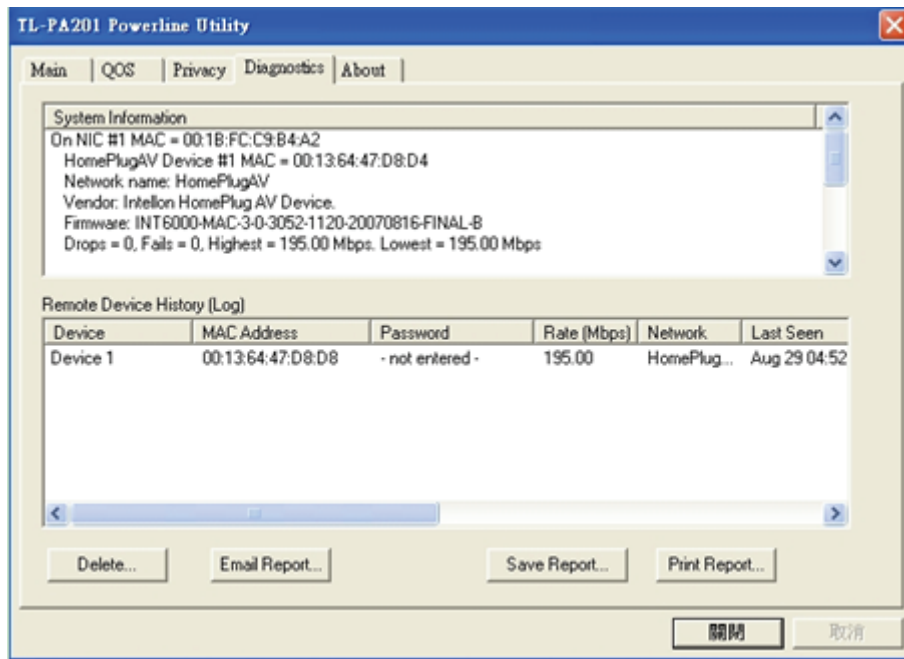
Changing the network name to anything other than “**HomePlug**” will show the network type on the Main configuration screen as “**Private**”.



- **Set Local Device Only:** Click this tab to change the network name of the local Ethernet Powerline Adapter device only. All Ethernet Powerline Adapter devices seen on the **Main** configuration homepage prior to this will be no longer present in the new network, effectively making the local devices not to communicate to the devices who were in the old logical network. Devices previously set up with the same logical network (same network name) will appear in the device list afterward selecting this option.
- **Set All Devices:** The **Set All Devices** button is used to change the logical network of all devices that appear on the **Main** configuration homepage whose Device's Password had been entered for the same logical network. A dialog window will appear to report the success of this operation. For devices whose device passwords were not entered, this operation will fail and will report a failure message.

4.4 Diagnostics

The **Diagnostics** homepage shows the **System Information** and **Remote Device History** of all remote devices seen over a period of time which are only readable. Click on the "**Diagnostics**" tab and the following screen display.



The **Diagnostics** information displayed can be saved to a text file. One can email the saved text file to the local supplier when there's technical support require or print the saved text file as reference during a technical support conference.

The **Upper Panel** shows technical data concerning software and hardware present on the host computer which were used to communicate over Ethernet Powerline Adapter on the Powerline network. It may include the following:

- Operating System Platform/Version
- Host Network Name
- User Name
- MAC Address of all NICs (Network interface card) connected to the host
- Identify versions of all Driver DLLs and Libraries used (NDIS) and optionally
- MAC addresses of all devices connected locally to the host

Click the **“Delete”** tab when there's Ethernet Powerline Adapter devices no longer part of the network.

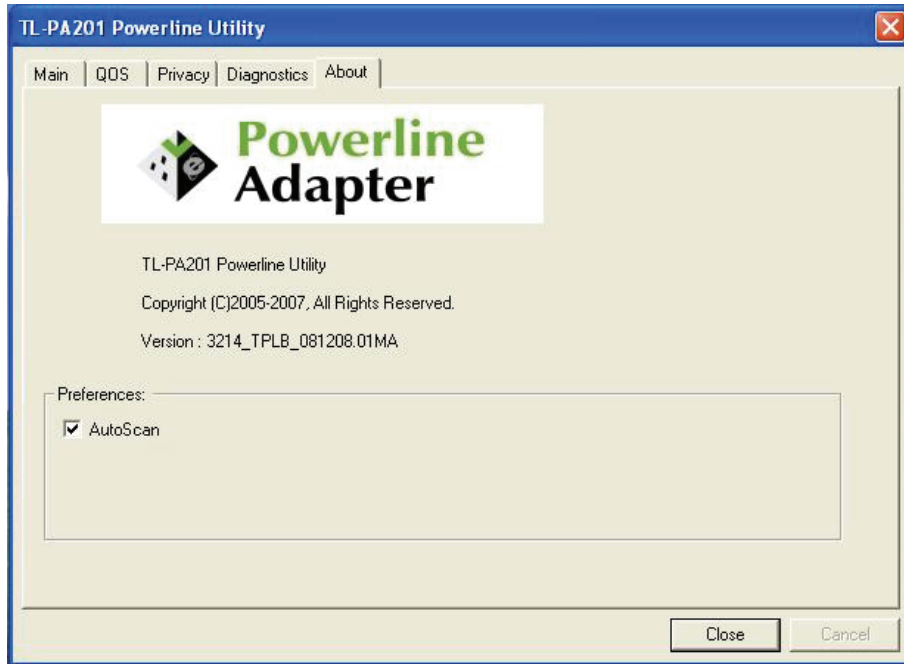
The **Lower Panel** contains a history of all remote Ethernet Powerline Adapter devices seen on the computer over a certain period of time. All devices that were on the powerline network are listed here along with a few other parameters. Ethernet Powerline Adapter devices that are active on the current logical network will show a transfer rate in the Rate column; devices on other networks, or devices that may no longer exist are shown with a **“?”** in the Rate column. The following remote Ethernet Powerline Adapter devices information is available from the diagnostics screen:

- Device Alias Name
- Device MAC Address
- Device Password
- Device Last known rate
- Device Last Known Network name
- Date device last seen on the network

The diagnostics information displayed may be saved to a text file for later use, or can be printed for reference for a technical support call. Ethernet Powerline Adapter devices, which are not part of the network anymore, can be deleted using the delete button. A dialog window pops up with a confirmation message if we try to delete a device whose password has been entered.

4.5 About

The **About** homepage show the Management Utility software version.



- **AutoScan:** When enabled (Place a check), the Management Utility will automatically scan for Ethernet Powerline Adapter devices on the local network every few seconds and updated the scanning information on the **Main** configuration homepage.

Chapter 5 Advance Feature: How to Use the Push buttons

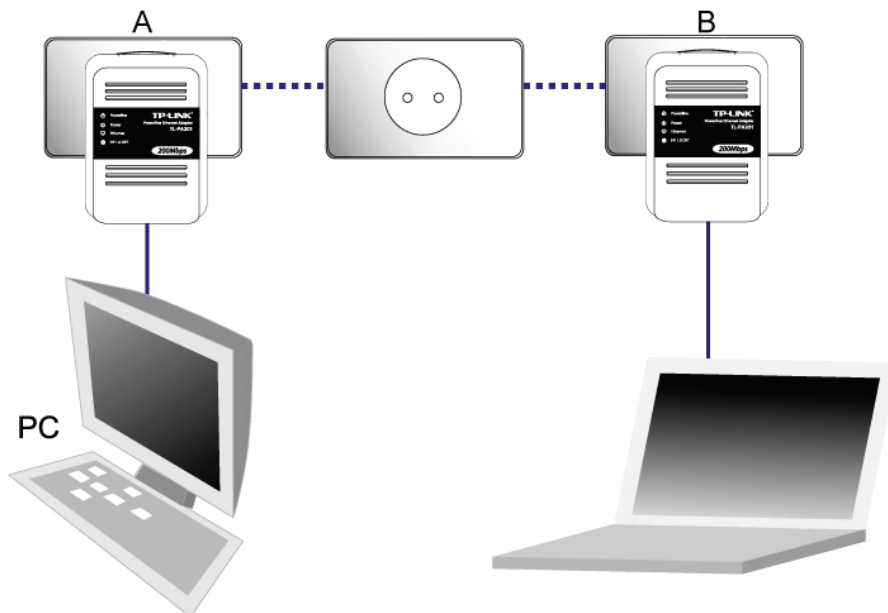
5.1 Pair(Secure with 128 bits-AES)

The Powerline AV standard uses 128-bit AES (Advanced Encryption Standard) to safely transmit data between powerline adapters. For the powerline adapters to communicate with each other they all need to use the same Network Membership Key (NMK). Otherwise, they cannot unscramble the encrypted data sent in the powerline network.

The **Pair** button allows you to set up a secure powerline connection with other HomePlug AV compliant powerline devices which also support the **Pair** feature.

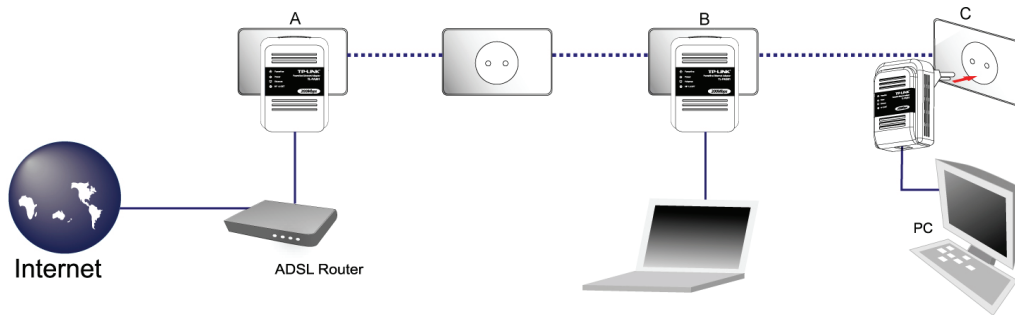
5.2 Set Up a Powerline AV Network with the Pair button

You can connect a number of devices on a powerline network, but you can use the **Pair** button on only two devices at a time.



Create a Powerline network using the Pair button:

- Step 1. Place Powerline adapter A close to another Powerline adapter B . After you set up the Powerline adapter A, you have 120 seconds to set up the Powerline adapter B.
- Step 2. Press the Pair button of Powerline adapter A for 2 seconds, the Power LED will start blinking.
- Step 3. Press the Pair button of Powerline adapter B for 2 seconds, the Power LED will start blinking (This must be done within 120 seconds after pressing the Pair button of Powerline adapter A.)
- Step 4. Wait for about 60 seconds while your Powerline adapter A and B are connecting. The Power LED on both adapters will stop blinking and light up when the connection is made.



Join an existing Powerline AV Network:

- Step 1. Press and hold the Pair button on Powerline adapter C for more than 10 seconds until both the Powerline and Power LED are off, then release the button and the Power LED will start blinking.
- Step 2. Press the Pair button of Powerline adapter B for 2 seconds.
- Step 3. Press the Pair button on Powerline adapter C for 2 seconds (This must be done within 120 seconds after pressing the Pair button of Powerline adapter B.)
- Step 4. Wait for about 60 seconds while your Powerline adapters are connecting. The Power LED on Powerline adapter B and C will stop blinking and light up when the connection is made.
- Step 5. Now Powerline adapter A, B and C are connected.

5.3 Pair Button Behavior

The following table summarizes the actions that occur when the Pair button is pressed for specific time.

Pair button Action	Status	Power LED Light Behavior
less than 3 seconds	The adapter joins a network. It shares the same network name as other adapters on the Powerline network.	The Power LED turns on if your adapter is connected to another Powerline adapter or a Powerline network.
more than 10 seconds	The adapter leaves any network it is associated with and its network name assumes a random value.	The Power LED turns off when it disconnects from the Powerline network.

5.4 Reset

To reset the Powerline AV device:

Please make sure **unplug (remove) the Ethernet cable** first, and then press the Reset button.

Press and hold the Reset button for 2 seconds. Release the Reset button when the Power LED begins to blink. The default settings have been restored. Be careful, don't power off when the device is in reset process.

Chapter 6 Appendix A: Troubleshooting Guide

The Troubleshooting Guide provides answers to common problems regarding the Ethernet Powerline Adapter.

1. The Power LED does not light up.

Ans. Check the following:

- a) Make sure that the Ethernet Powerline Adapter is properly plugged into a power outlet.
- b) Make sure the power outlet is active (working) by plugging another electric device into it.
- c) Re-plug the Ethernet Powerline Adapter to the power outlet again. If the Power LED still failed to light up, contact your local dealer for technical support.

2. The Ethernet LED does not light up.

Ans. Check the following:

1. Make sure that the Ethernet cable (RJ-45) is properly connected to the Ethernet Powerline Adapter's Ethernet port.
2. Make sure that the other end of the Ethernet cable (RJ-45) is properly connected to the computer LAN card or to your Cable/xDSL Ethernet port.
3. Make sure your computer LAN card is properly installed and configured.
4. Make sure your Cable/xDSL broadband access is working and configured correctly.
5. Contact your local dealer for technical support if the Ethernet LED still failed to light up after the above procedures.

3. Powerline LED does not light up.

Ans. Check the following:

1. Double click to enable the Management Utility and click the "**Scan**" tab under the **Main** configuration homepage. The Management Utility will automatically detect all other Ethernet Powerline Adapter on your power line network.
2. Try to plug a second Ethernet Powerline Adapter into a near by power outlet and check whether the Powerline LED lights up or not.
3. Contact your local dealer for technical support if the Powerline LED still failed to light up after the above procedures.