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FCC Radiation Norm

This equipment has been tested and found to comply with limits for a Class B digital device pursuant to 47 CFR, Part 2 and Part 15 of the Federal Communication Commission (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 interferences that may cause undesired operations.

CE Radiation Norm

This equipment has been tested and found to comply with the limits of the European Council Directive 89/336/EEC on the approximation of the law of the member states relating to EN 55022:1998/A1:2000/A2:2003 Class B, EN6100-3-2:2000, EN 61000-3-3:1995/A1:2001, EN 55024:1998/A1:2001/A2:2003 and EN 60950.

FCC & CE Compliance Statement

These limits are designed to provide reasonable protection against radio interference in a residential environment. This equipment can generates, uses and 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 is found by turning the equipment ON and OFF, the user is encouraged to try to reduce the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connect to
- Consult a dealer or an experienced technician for assistance

CAUTION!

The Federal Communication Commission warns the user that changes or modifications to the unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Contents

Chapter 1 Introduction

Congratulations on your purchase of this outstanding Ethernet Powerline Adaptor. This device is a 85Mbps Powerline Ethernet Adaptor which transforms your house's existing electrical wiring into an ubiquitous networking infrastructure. Simply plug this 85Mbps Ethernet Powerline Adaptor 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 Adaptor supports up to 85Mbps data rate over the existing household power circuit. With data rates of 85Mbps, full multimedia application can easily be supported throughout the whole house in addition to Internet access. This Ethernet Powerline Adaptor 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 Adaptor support built-in 56-bit DES encryption and Quality of Service features.

With minimum setup, you can install and use this Ethernet Powerline Adaptor within minutes.

1.1 Features

- **Homeplug Turbo**
  - High speed data transfer rate up to 85Mbps
  - Fully compatible to HomePlug 1.0
  - Backward-compatible to HomePlug standard 1.0
  - Works with AC input of 100V ~ 240V
  - Plug-and-Play configuration
  - High-speed HomePlug adapter with Ethernet interface
  - Supports QAM 256/64/16, DQPSK, DBPSK and ROBO modulation
  - Low power consumption
  - OFDM techniques for high data reliability in noisy media conditions
  - Intelligent channel adaptation maximizes throughput under harsh channel conditions
  - Integrated Quality of Service (QoS) features
  - 56-bit DES Link Encryption with key management for secure power-line communications
  - Transmission range up to 300m over household power supply grid
  - Ethernet specifications IEEE 802.3u compliant
  - Support Auto MDI / MDIX feature

- **System Requirement**
  - At least two AC 100V ~ 240V power outlets with standard home power wiring
  - 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

- **Target Application**
  - Standard Video TV (SDTV) Distribution
  - Higher data rate broadband sharing
  - Shared broadband Internet access
  - Audio and video streaming and transfer
  - Expanding the coverage of wireless LANs
  - Voice Over IP calls
  - PC file and application sharing
  - Printer and peripheral sharing
  - Network and online gaming
  - Security cameras

1.2 Packet Contents

The 85Mbps Ethernet Powerline Adaptor package contains the following items:

- One 85Mbps Ethernet Powerline Adaptor
- One CAT-5 Ethernet Cable
- One CD-ROM (Utility / Manual / Quick Setup Guide)

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

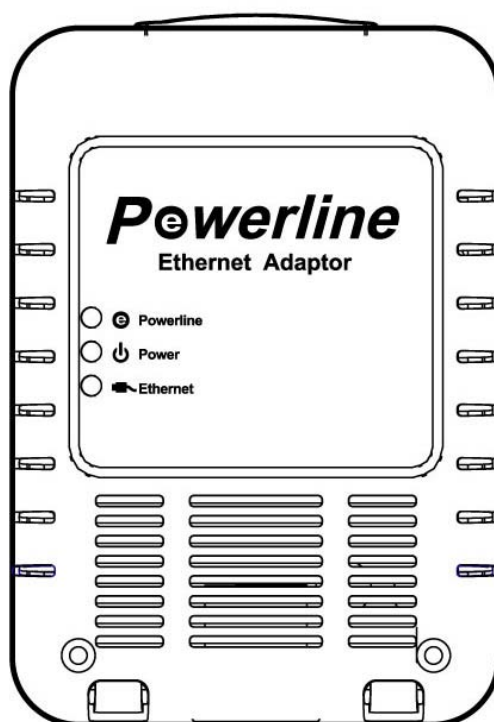# Chapter 2 Connecting Mechanism

2.1 Introduction

The Ethernet Powerline Adaptor support up to 85Mbps data rate. With this high speed connection rate, this Ethernet Powerline Adaptor allows you to setup a high speed home network by using your home existing electrical wiring. Simply plug this Ethernet Powerline Adaptor 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 Adaptor works in pairs. You need to plug one Ethernet Powerline Adaptor 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 Adaptor connected to your Cable/xDSL broadband (Ethernet port) in order to extend your broadband connection or Internet surfing.

Section below describe the Ethernet Powerline Adaptor's LED indicators, physical interface and hardware connection mechanism.
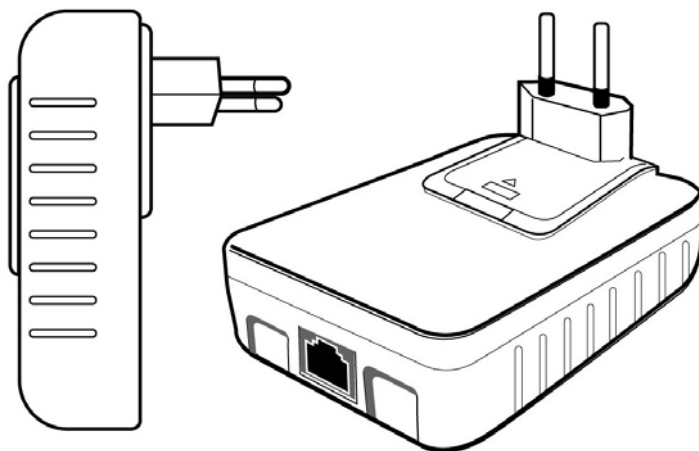
2.1 LED Indicator

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

Label	Status	Description
Power	ON	The Ethernet Powerline Adaptor is power on
	OFF	The Ethernet Powerline Adaptor is not receiving power
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
	Flashing	The Powerline port is transmitting/receiving data
Ethernet	ON	The Ethernet port is on and ready to receiving/transmitting data
	OFF	The Ethernet port is not connected or not power on
	Flashing	The Ethernet port is receiving/transmitting data

2.2 Physical Interface

There are two physical interface on this Ethernet Powerline Adaptor.

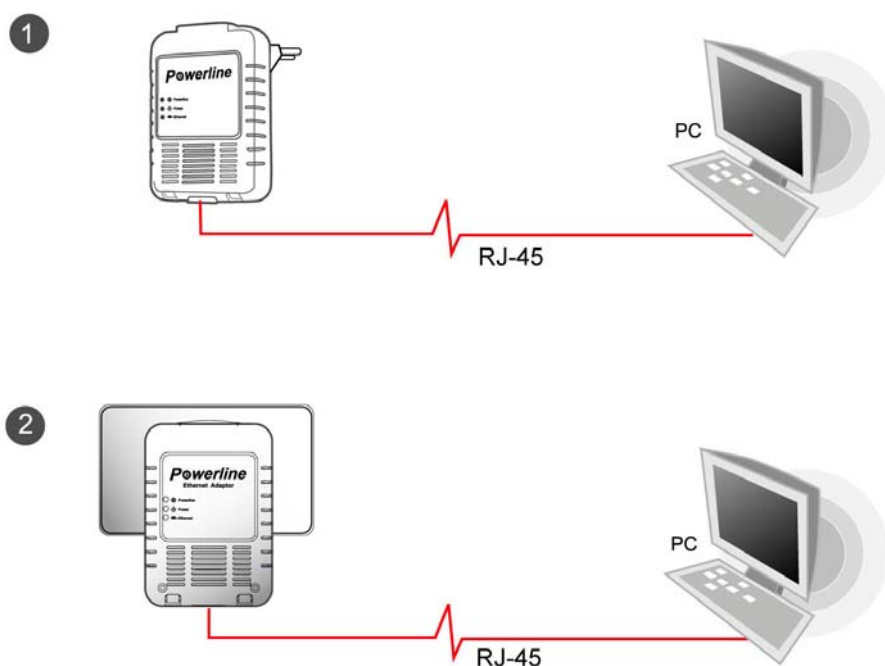| Interface	Description
Ethernet	One 10/100Mbps Ethernet port connected to PC LAN card or broadband device.
Power Plug	Power Plug connected to any 100V ~ 240V AC power socket.

2.3 Hardware Connection – Computer

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

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

1. Power off your PC or Notebook.
2. Connect the provided Ethernet (RJ-45) cable to the Ethernet Powerline Adaptor'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 Adaptor 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 Adaptor are **ON**.

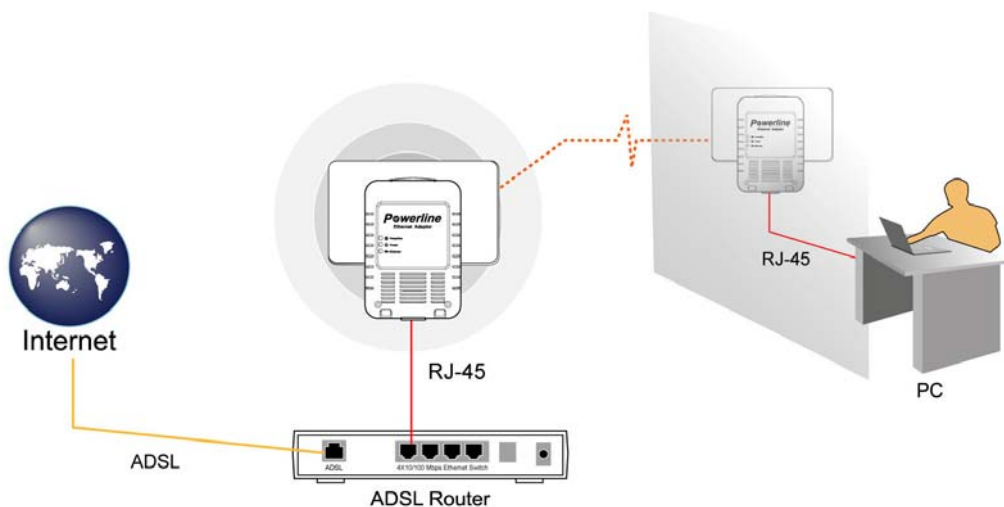The hardware connection mechanism is shown below:

2.4 Hardware Connection – Internet

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

1. Power off your PC or Notebook.
2. Connect the provided Ethernet (RJ-45) cable to the Ethernet Powerline Adaptor'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 Adaptor 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 Adaptor are **ON**.

The hardware connection mechanism is shown below:
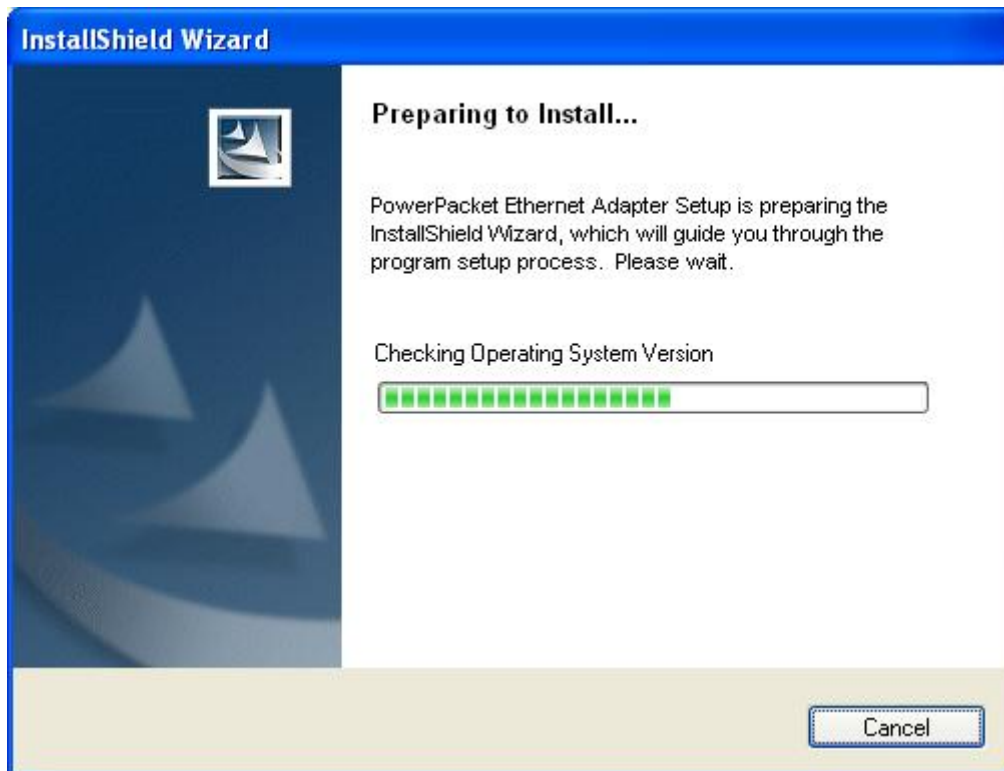
Chapter 3 Installing Management Utility

Please verify that no other Ethernet Powerline Adaptor or any Encryption Management Utilities are installed before installing the provided software. If other Homeplug 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: Power on your computer and insert the provided CD into the CD-ROM drive, the following screen will pop-up automatically. Click on **"Management Utility"** to install the Management Utility.

Step 2: The program installation process will carry out and copy all the necessary files to your system.

PowerPacket Ethernet Adapter - InstallShield Wizard

Customer Information

Please enter your information.

User Name:

Organization:

Install this application for:

- ● Anyone who uses this computer (all users)
- ○ Only for me (Paul_Test)

InstallShield

[< Back]   [Next >]   [Cancel]

PowerPacket Ethernet Adapter - InstallShield Wizard
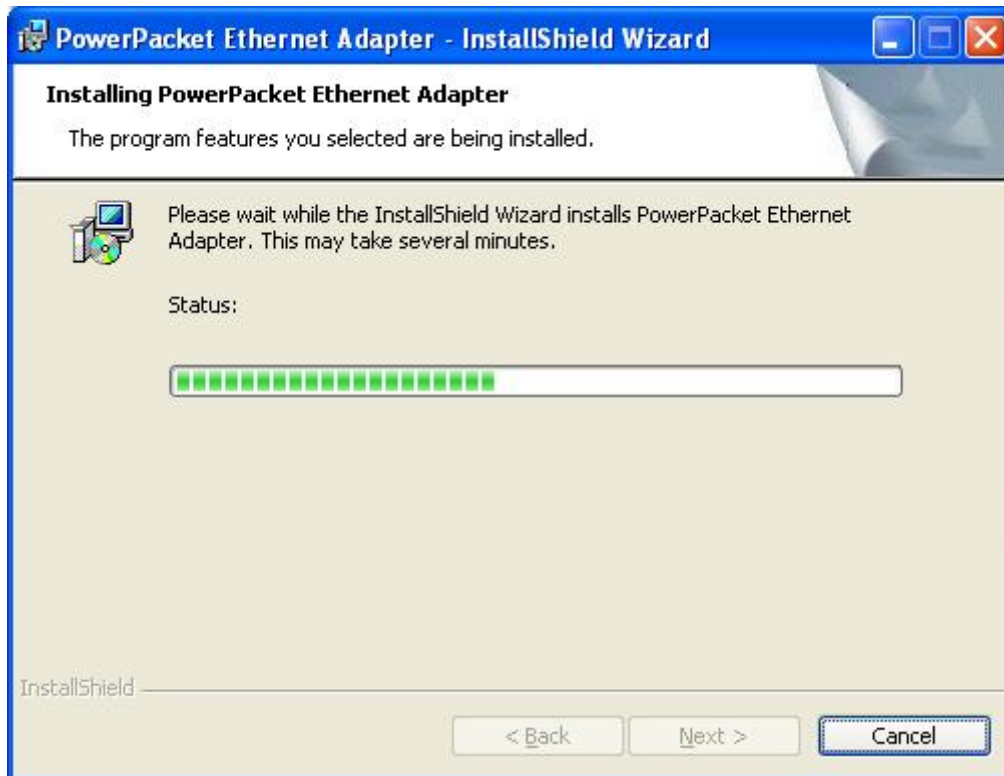
Destination Folder

Click Next to install to this folder, or click Change to install to a different folder.

Install PowerPacket Ethernet Adapter to:
C:\Program Files\PowerPacket\

[Change...]

InstallShield

[< Back]   [Next >]   [Cancel]

Step 3: After the installation, a shortcut to the **"Power Packet Utility"** application icon is provided on the windows desktop.
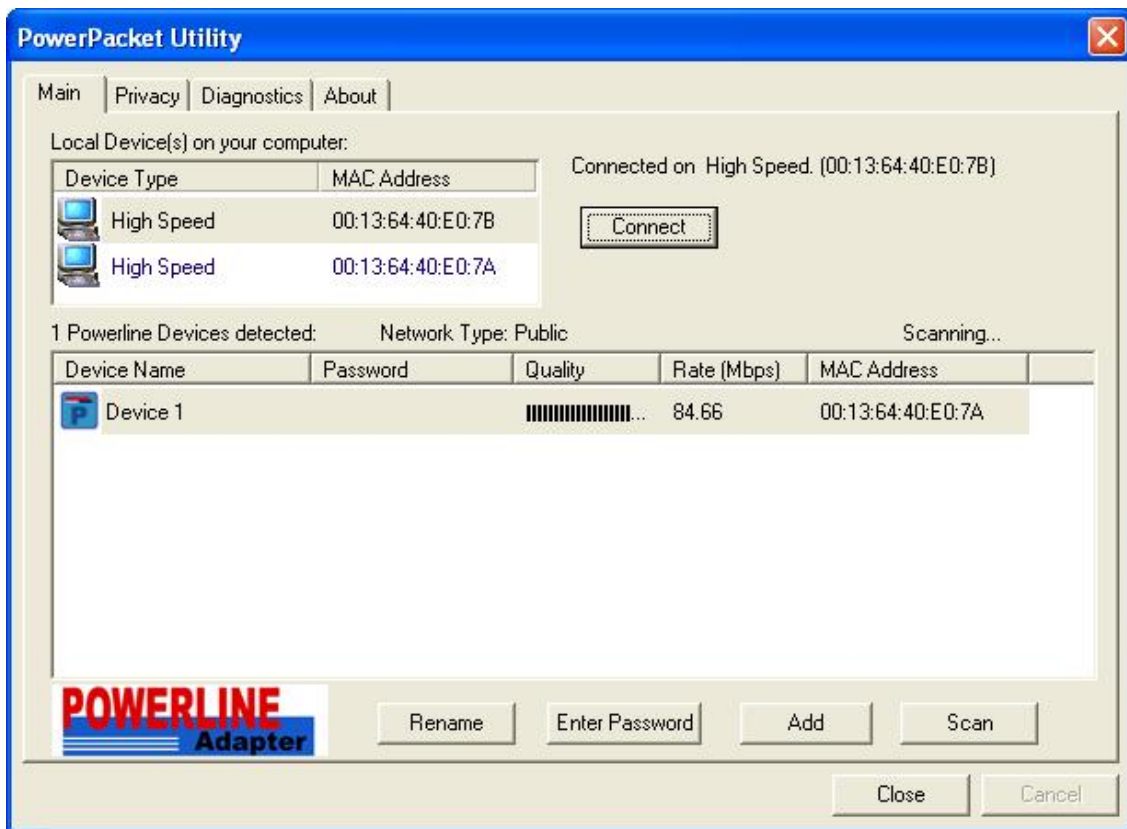
Chapter 4 Using The Management Utility

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

This Ethernet Powerline Adaptor Configuration Utility enables the users to identify HomePlug 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 **"Power Packet Utility"** from your windows desktop, the following screen display. This Management Utility consists of a set of four property sheets, viz., **"Main"**, **"Privacy"**, **"Diagnostics"** and **"About"**.

4.1 Main

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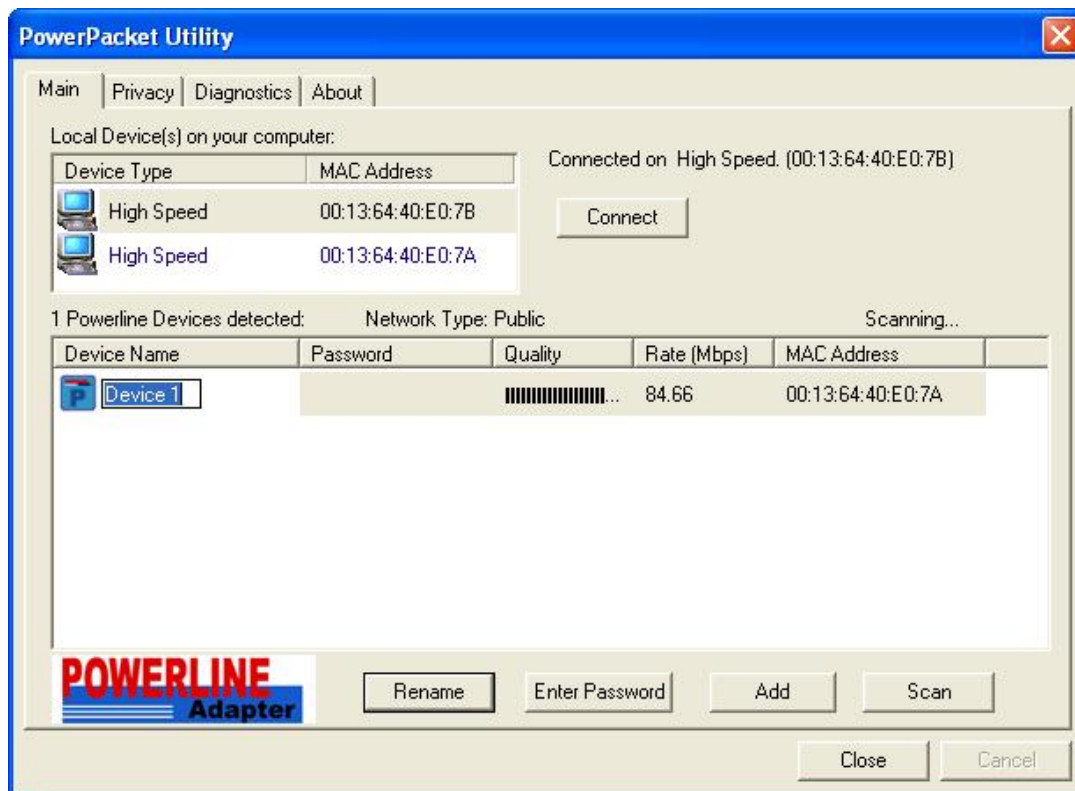

☑ **Local Device(s) on your computer:** This shows all local Ethernet Powerline Adaptor found connected to the computer's LAN card. In most cases, only one device will display in this panel. Click and select the local device shown on the screen then click **"Connect"** tab to manage the Ethernet Powerline Adaptor. 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 Adaptor 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 Adaptor found on the current logical network. **"x"** shows the number of remote Ethernet Powerline Adaptor 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 Adaptor.

    ■   **Quality:** Shows the quality of the Ethernet Powerline Adaptor connection.

    ■   **Rate (Mbps):** Shows the current transmission rate of the selected Ethernet Powerline Adaptor.

    ■   **MAC Address:** Shows the Ethernet Powerline Adaptor's MAC address.

☑ **Rename:** Click to change the name of the selected Ethernet Powerline Adaptor.

☑ **Enter Password:** Shows the supplied Ethernet Powerline Adaptor's password (Initially left blank). To set the Ethernet Powerline Adaptor 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 Adaptor to your network that is not on the lower panel displayed list. You will advice to locate the passwords for all Ethernet Powerline Adaptor 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 Adaptor 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 Adaptor. Click and select the Ethernet Powerline Adaptor 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 Adaptor's password, click and select the Ethernet Powerline Adaptor 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 Adaptor 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 Adaptor device could not be located, a warning message will be shown.
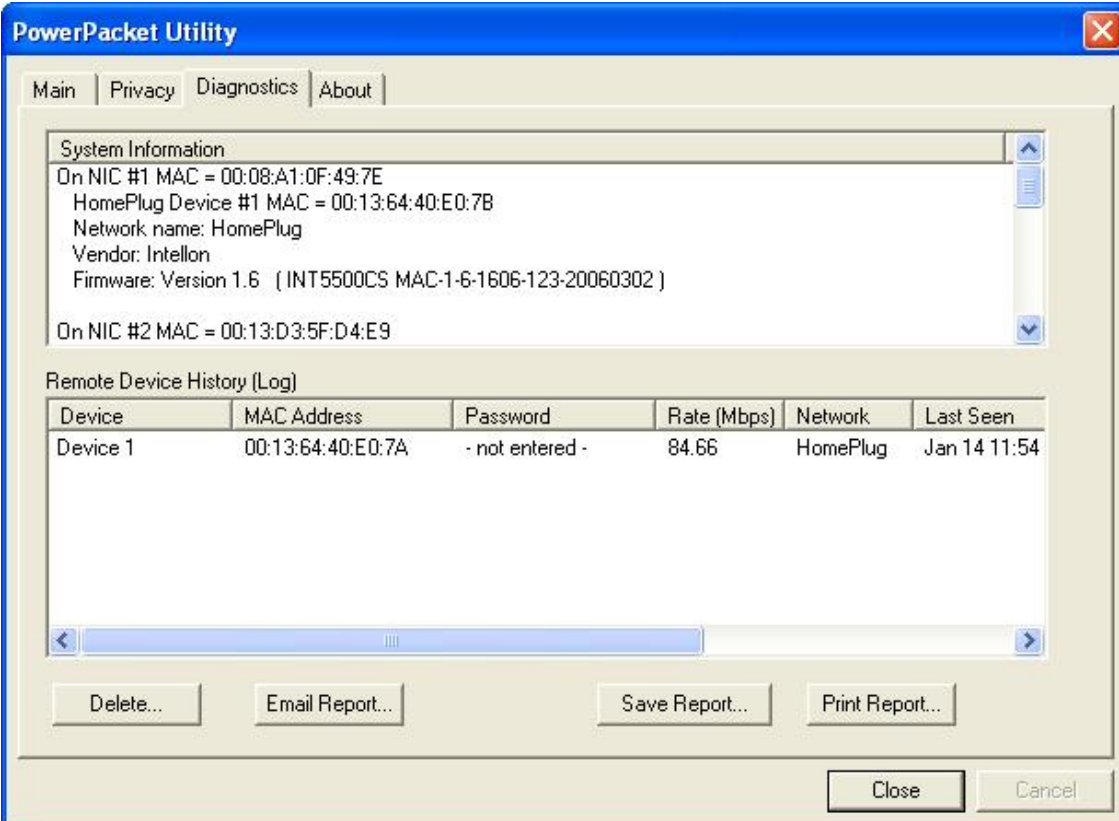
4.1.3 Add Device

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 Adaptor 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.
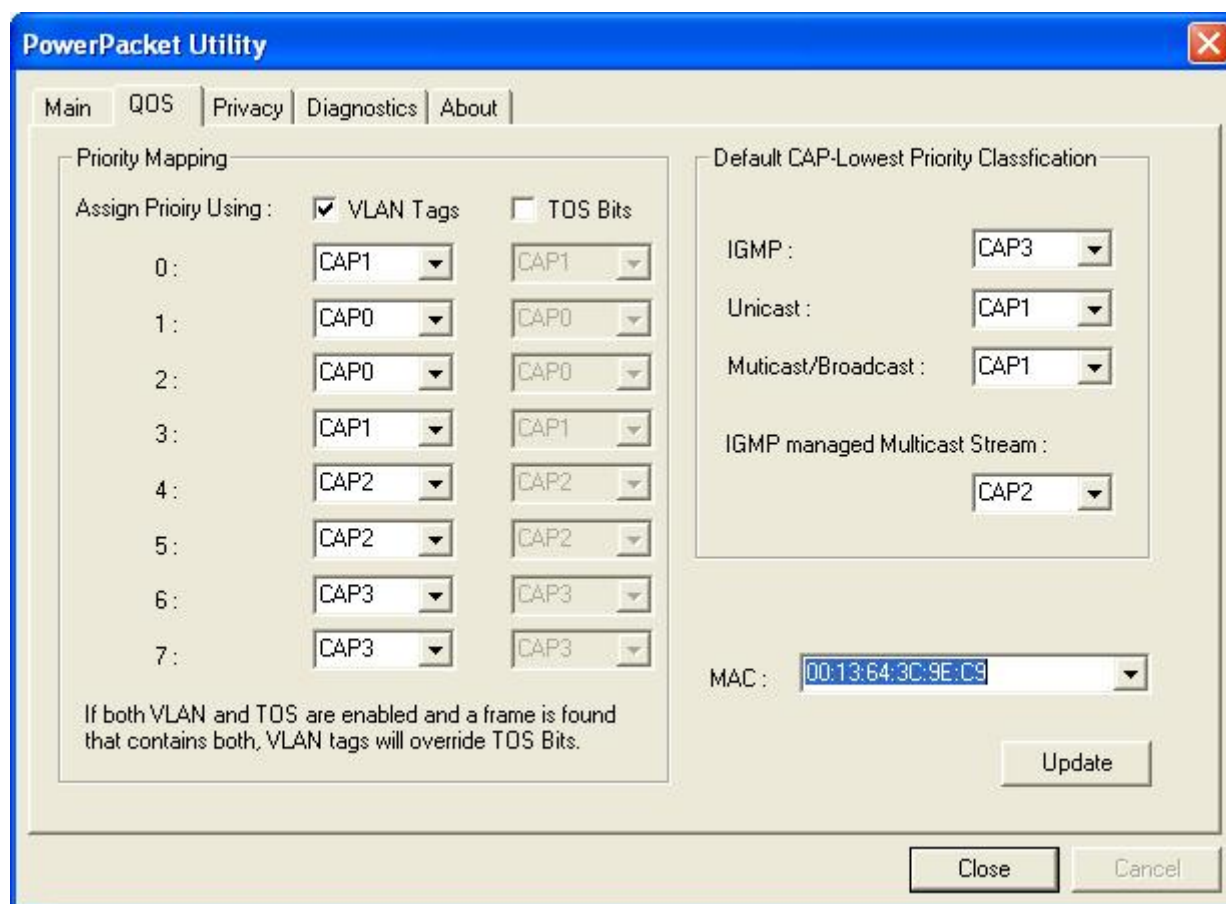
4.2 QOS

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'. HomePlug TURBO 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, packets 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 packet has both VLAN and TOS in it, VLAN will override TOS.

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

- IGMP - (efault 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.
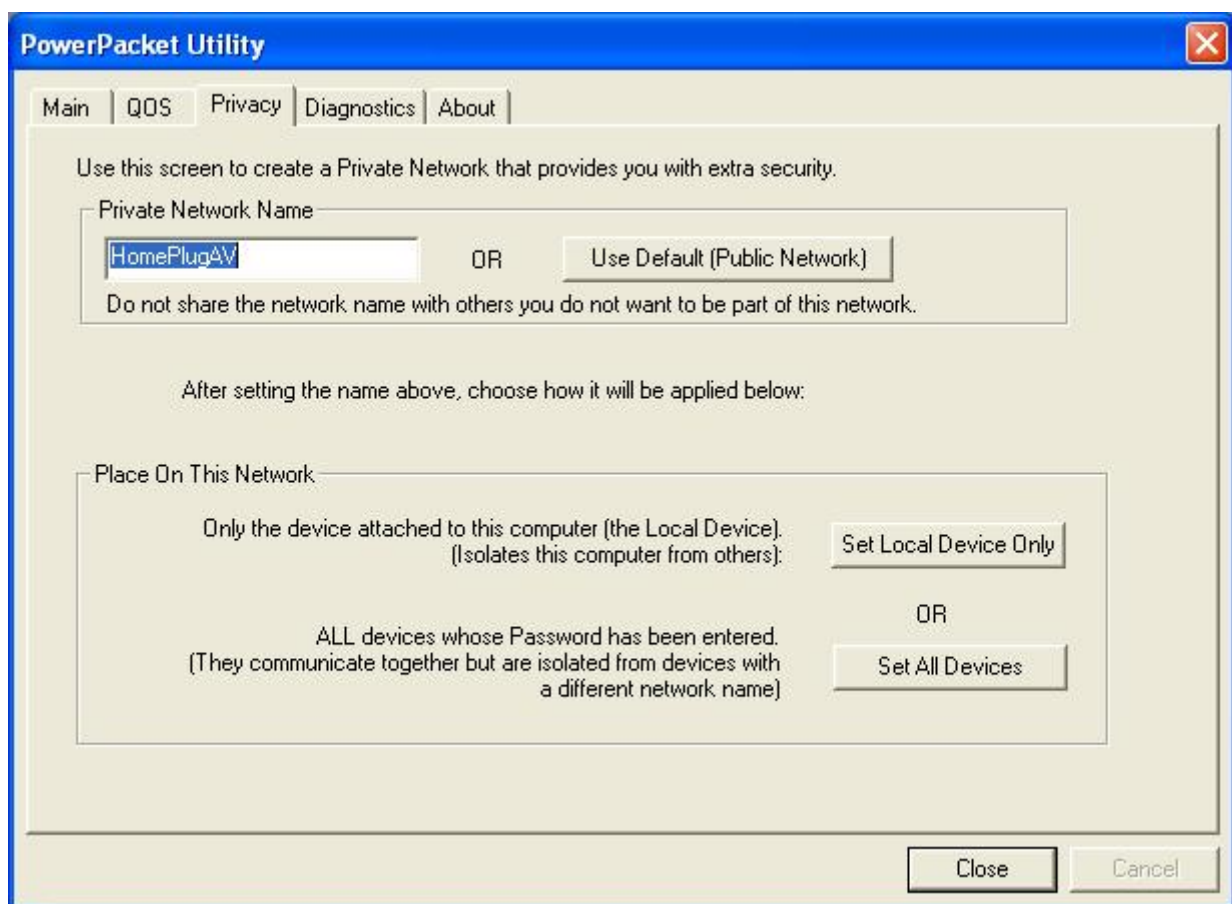
4.3 Privacy

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 HomePlug 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 Adaptor 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 Adaptor 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
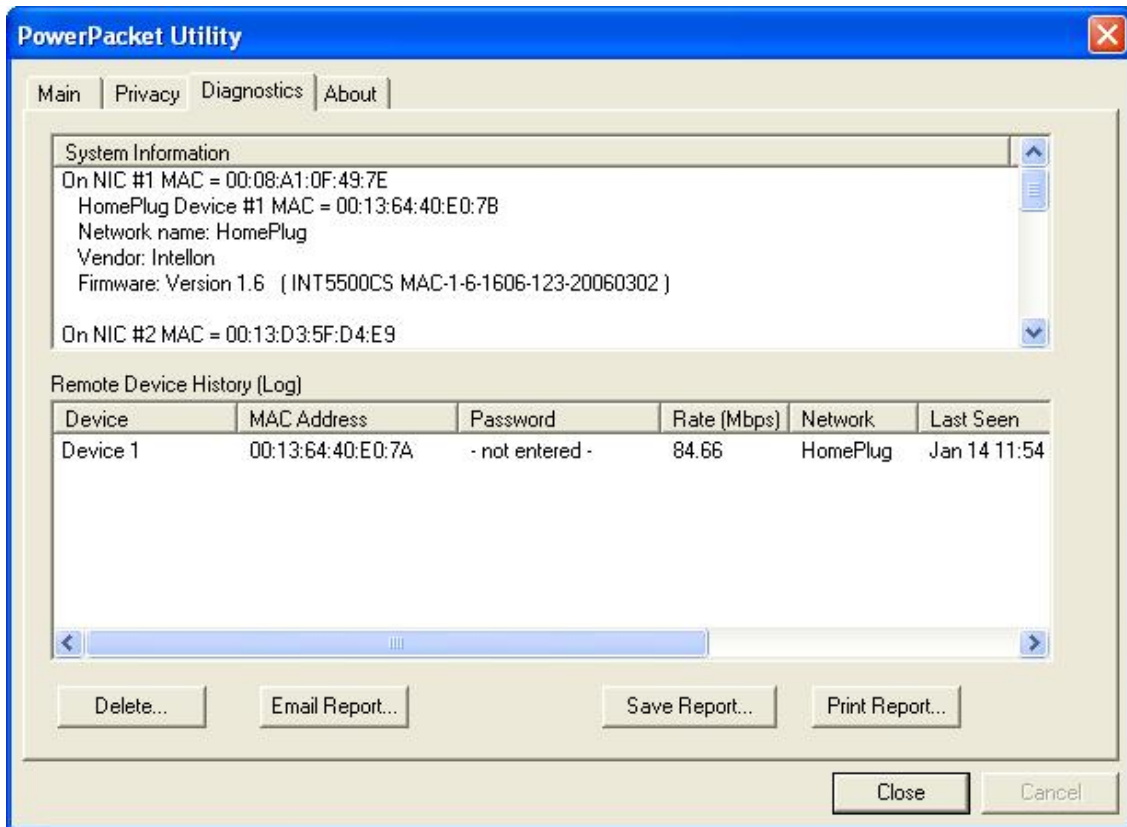
Main configuration screen as **"Private"**.

☑ **Set Local Device Only:** Click this tab to change the network name of the local Ethernet Powerline Adaptor device only. All Ethernet Powerline Adaptor 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 password's 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 Adaptor 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 Adaptor devices no longer part of the network.
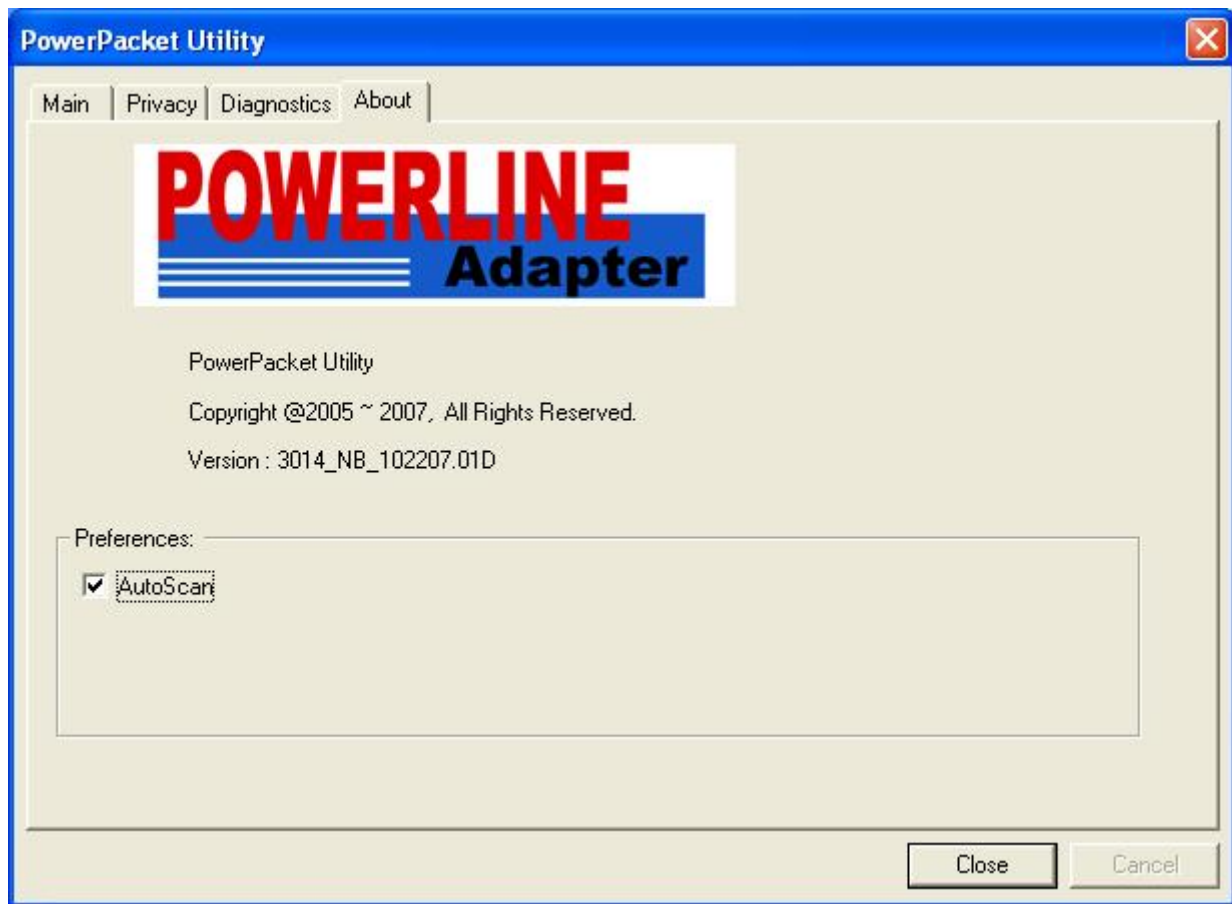
The **Lower Panel** contains a history of all remote Ethernet Powerline Adaptor devices seen on the computer over a certain period of time. All devices that were on the powerline network are listed here along with a few other parameters. Ethernet Powerline Adaptor devices that are active on the current 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 Adaptor 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 Adaptor 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 Adaptor devices on the local network every few seconds and updated the scanning information on the **Main** configuration homepage.

Appendix A: Troubleshooting Guide

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

1.   The Power LED does not light up.

Ans. Check the following:

1. Make sure that the Ethernet Powerline Adaptor is properly plugged into a power outlet.
2. Make sure the power outlet is active (working) by plugging another electric device into it.
3. Re-plug the Ethernet Powerline Adaptor 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 Adaptor'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 you 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 lights 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 Adaptor on your power line network.
2. Try to plug a second Ethernet Powerline Adaptor 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 lights up after the above procedures.