

# EVOLVE

## PL200M

200Mbps powerline adapter



**EN**

**User Manual**

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# 1 Introduction

EVOLVE PL200M (also called “the device” hereinafter) is a low power consumption PLC device. It can transmit network data in the household powerline. The device is compatible with the latest requirements of the EUP Directive. When the device enters the lower power consumption mode, the consumption is less than 0.5W. The device can detect 200Mbps PLC-Ethernet bridge devices in the powerline network, measure data rate performance, ensure the security of the powering network, and perform system diagnosis.

## 1.1 System Requirements

<b>Operating System</b>	Windows 98SE, Windows 2000, Windows ME, Windows XP 32/64 bit and Windows Vista 32/64bit
<b>CPU</b>	Intel Pentium III or higher and clock rate faster than 2.0 GHz are recommended.
<b>RAM</b>	At least 128 MB
<b>Screen Resolution</b>	Any resolution
<b>Free Disk Space</b>	At least 20 MB
<b>Network Interface</b>	At least one fast Ethernet (100 Mbps) network interface card (NIC) and one Ethernet cord

## 1.2 Packing List

- 1 x x Mini-PLC Devices
- 1 x CD-ROM
- 1 x RJ45 Ethernet cables

## 2 Safety Precautions

This device is intended for connection to the AC powerline. For installation instructions, please refer to the installation section of this guide. The following precautions should be taken when using this product.

- Follow all the warnings and instructions marked on the product.
- Unplug the device from the wall outlet before cleaning. Use a damp cloth for cleaning. Do not use liquid cleaners or aerosol cleaners.
- Keep the device away from a radiator or heat register.
- Do not use an extension cord between the device and the AC power source.
- Only professional technicians should service the device. Opening or removing covers may result in exposure to dangerous voltage points or other risks.
- Unplug the device from the wall outlet and refer to professional service personnel for the following conditions:
  - If liquid has been spilled into the product
  - If the device has been exposed to rain or water
  - If the device does not operate normally when the operation instructions are followed.
  - If the device exhibits a distinct change in performance

## 3 Getting to Know the Adapter

### 3.1 Ethernet Port

**Ethernet:** Ethernet port. Connect one end of an Ethernet network cable to PLC's Ethernet port and the other end to your computer or other Ethernet-enabled network device.

### 3.2 Buttons



Figure 1: Side panel of the device

**Security/Reset:** Set the status of the device members or restore the factory default settings.

- **Factory Reset:** Press and hold the **Security/Reset** button for 10 seconds.
- **Exit the existing AVLN:** Press and hold the **Security/Reset** button for 5-8 seconds, and then release it.
- **Make the adapter a member of the existing AVLN:** Press and hold the **Security/Reset** button for 1-3 seconds. For more details, see Chapter 6.

### 3.3 LEDs

There are 3 LEDs on the front panel to indicate the adapter status.



Figure 2: Top view

The following table describes the LEDs on the device.

LED	Color	Behavior	Description
Power	Green	On	The adapter is supplied with power and running normally.
	Green	Blink	System is in the process of security setup.
	Orange	Blink every 4 seconds	System enters the standby mode.
	-	Off	The adapter is powered off.
Ethernet	Green	On	The adapter is connecting to other devices via the Ethernet port but not communicating with them.

	Green	Blink	The adapter is receiving or transmitting data via the Ethernet port.
	-	Off	The device is not connecting to other devices via the Ethernet interface.
Data	Green/ Orange/ Red	On	The device has connected to the power line network.
	Green/ Orange/ Red	Blink	The Data LED color varies with the physical rate. <ul style="list-style-type: none"> <li>● Green: Link Rate &gt; 40 Mbps</li> <li>● Orange: 20 Mbps &lt; Link Rate &lt;40 Mbps</li> <li>● Red: Link Rate &lt; 20 Mbps</li> </ul>
	-	Off	The adapter has not found any other compatible powerline devices that use the same encryption key.


**Note:**

The Power, Ethernet and Data indicators blink on and off when the device is powered on. At that moment, the Ethernet indicator is green, and the Power and Data indicators are orange

## 4 Installing Powerline Utility

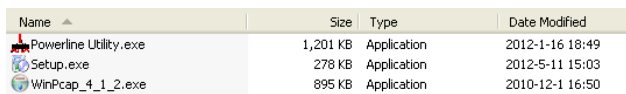
Powerline Utility is a configuration management tool for BCM60321-chip devices developed based on HomePlugAV and Xtendnet™. It can trace and scan GGL devices and BCM60321-chip devices in the same network.

Before installing Powerline Utility of PL200M, uninstall other Powerline Utility on your computer.

To properly run Powerline Utility, first install WinPcap. For more information about WinPcap, visit <http://www.winpcap.org>.

Do as follows to install Powerline Utility:

- Step 1** Insert the CD into the CD drive. Open the **PLC 200M Utility Installation** folder and double-click **Setup.exe** to start installing Powerline Utility.



Name	Size	Type	Date Modified
Powerline Utility.exe	1,201 KB	Application	2012-1-16 18:49
Setup.exe	278 KB	Application	2012-5-11 15:03
WinPcap_4_1_2.exe	895 KB	Application	2010-12-1 16:50

Figure 3: Open the CD folder

- Step 2** If your computer has not been installed with WinPcap, WinPcap will automatically be installed first. Click **OK** to start install WinPcap. See the following figure.

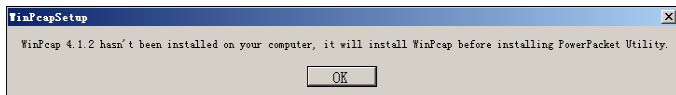


Figure 4: Prompt for installing WinPcap

If your computer has been installed with the latest WinPcap, Powerline Utility will be installed directly. Proceed to step 11.



Step 3 Click Next to continue installation.

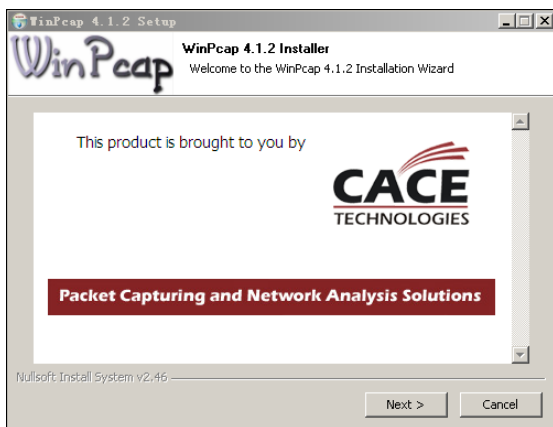


Figure 5: WinPcap installer

Step 4 Click Next to continue installation.

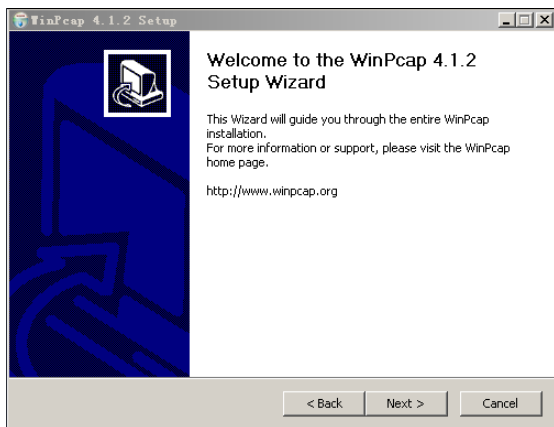


Figure 6: Setup wizard

**Step 5** Click **I Agree** to accept the license agreement of WinPcap.

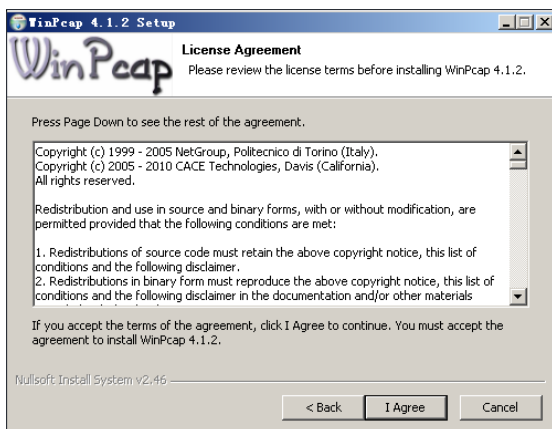


Figure 7: License agreement

**Step 6** Click **Install** to install WinPcap 4.1.2.

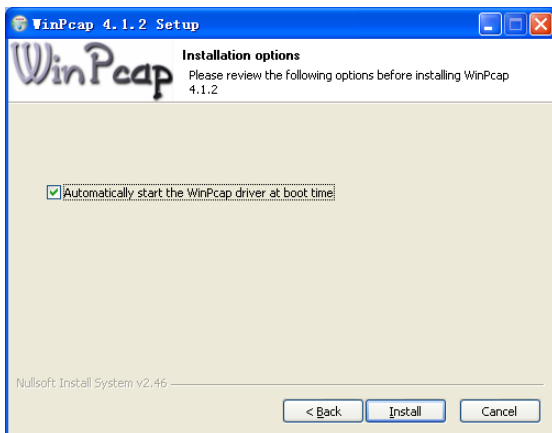


Figure 8: Install WinPcap 4.1.2

**Note:**

If WinPcap of an earlier version has been installed in your computer, the system notifies you to uninstall the earlier version when you try installing WinPcap included in the CD.

- Step 7** If WinPcap of an earlier version has been installed in your computer, the system notifies you to uninstall the earlier version when you try installing WinPcap included in the CD. Click **Yes**.

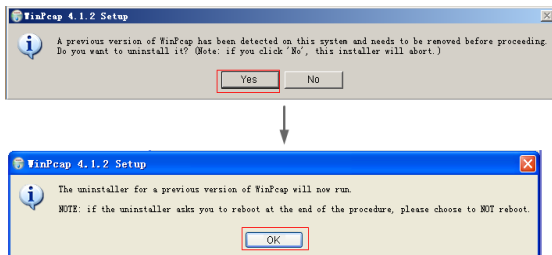


Figure 9: Dialog box for uninstalling earlier WinPcap

- Step 8** Click **Uninstall** to start uninstallation.

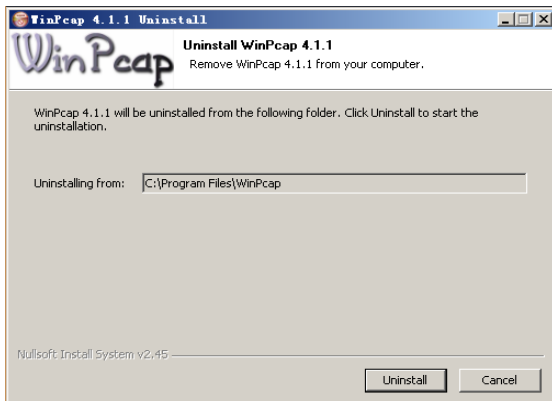


Figure 10: Uninstalling earlier WinPcap

**Step 9** Click **Finish** to complete uninstalling earlier WinPcap.

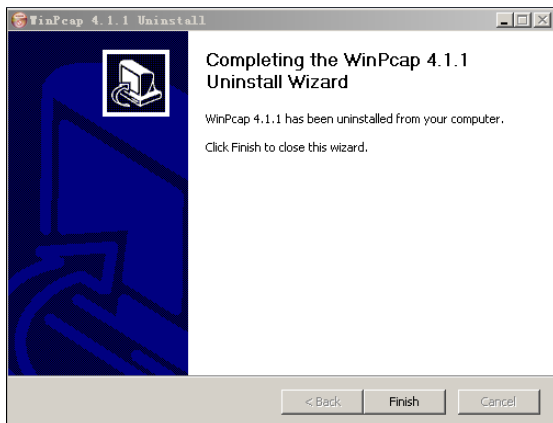


Figure 11: Complete uninstalling earlier WinPcap

**Step 10** Click **Finish** to complete installing WinPcap and start to install Powerline Utility.

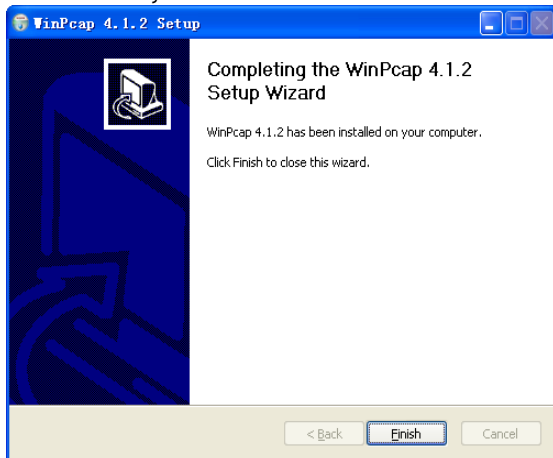


Figure 12: Complete installing WinPcap

**Step 11** Click **Next** to follow Powerline Utility setup wizard.

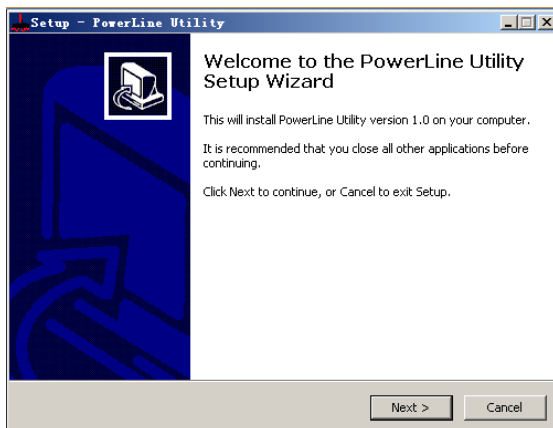


Figure 13: Setup Wizard for Powerline Utility

**Step 12** Select **I accept the agreement**. Click **Next** to continue installation.

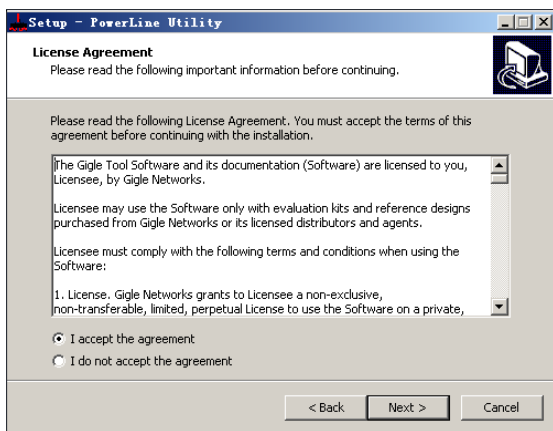


Figure 14: License agreement

- Step 13** Click **Browse...** to change the path for installing Powerline Utility. The default installation path is C:\Program Files\Powerline Utility. Click **Next**.

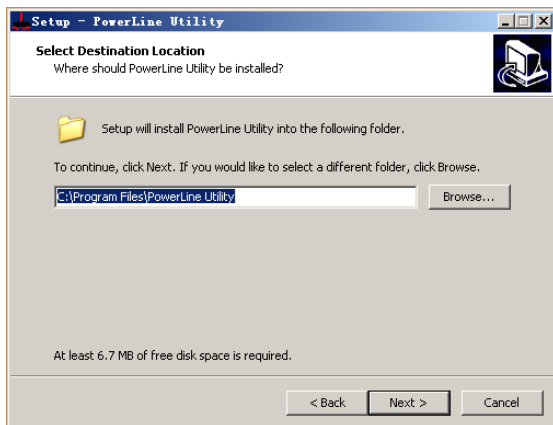


Figure 15: Select an installation path

- Step 14** Create a shortcut in the Start Menu folder. Click **Browse...** to select a folder to place the shortcut. Click **Next** to continue the installation.

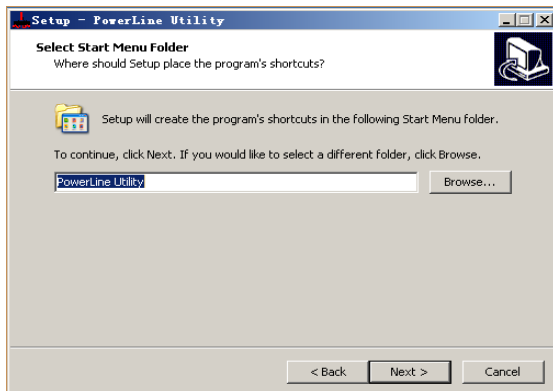


Figure 16: Select a folder to place the shortcut

- Step 15** Select Create a desktop icon or Create a Quick Launch icon if necessary. Click Next..

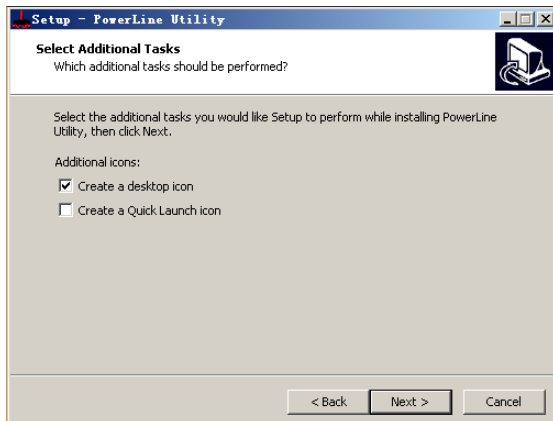


Figure 17: Select additional tasks

- Step 16** Click Install to start installing Powerline Utility.

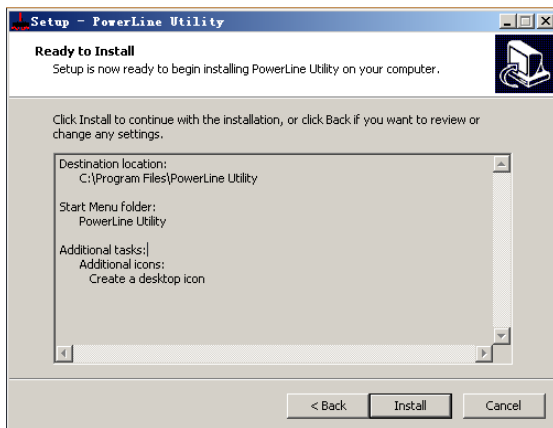


Figure 18: Ready to install

- Step 17** Click **Finish** to complete installing Powerline Utility. If you select **Launch Powerline Utility**, Powerline Utility is automatically run after it is successfully installed.

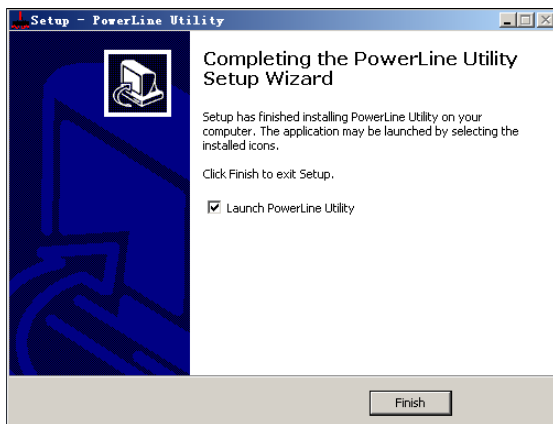


Figure 19: Complete the installation

## 5 How to Use Powerline Utility

Click the icon in the desktop or quick launch bar to open Powerline Utility.

### 5.1 Main tab

The Main screen provides a list of all powerline devices logically connected to the computer. The top panel shows the local HomePlugAV devices connected to the network interface card (NIC) of the computer or remote devices that pass verification.

Click **Connect**, and Powerline Utility automatically scans the powerline periodically for other HomePlugAV devices connected to it. If no local HomePlugAV device is discovered, the screen displays "0 device(s) found".



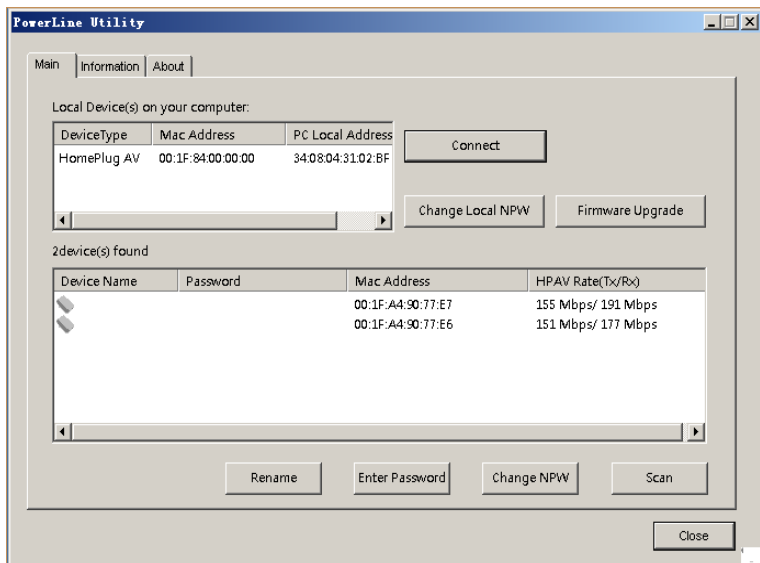


Figure 20: Main tab

**Note:**

Usually, only one HomePlugAV device will be detected and displayed on the top panel of the screen. However, more than one HomePlugAV devices will be detected if your computer has multiple NICs.

The lower panel displays all the HomePlugAV remote devices discovered in the current logical network. The total number of remoter devices connected in the same network is displayed above the remote device panel.

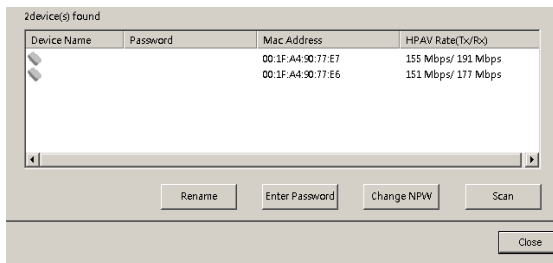


Figure 21: Lower panel of the Main tab

The following information is displayed for all the devices that appear in the lower panel.

#### Device Name

This column shows the default device name, which may be modified. To change the name, click **Rename**.

#### Mac Address

This column shows the MAC addresses of the remote devices.

#### Password

By default, this column is blank. You can click **Enter Password** to enter it. For some operations (for example, changing network passwords), you must first get devices' password verified by entering correct passwords.

The steps for entering the password of the device are as follows:

- Step 1** Click the device name to select the device in the lower panel.
- Step 2** Click **Enter Password**. A dialog box appears, showing the device name and password. The default password (**DEK**) is printed on labels on the bottom of devices.



Figure 22: Change the device's password

**Step 3** Click **OK** to verify the password.

This process might take a few seconds to get completed. If the password is entered correctly, the device's password shows in the Password column on the lower panel. If a device is not found, a message appears, suggesting trying again.

### Change NPW (Network Password)

The Change NPW button is used to remove a remote device from its existing network by changing the NPW for the remote device. All devices are shipped with a default NPW ("HomePlugAV"). Devices with the same NPW are located in the same network.

**Note:**

Only devices that have their password verified can be removed from a network by clicking **Change NPW**. Before changing a device's NPW, click **Enter Password** to enter the device's password to achieve verification.

If the device is found and has its password entered correctly, enter a new NPW different from the existing network in the **Set Network Password** dialog box displayed. Then, the device is successfully removed from the network.

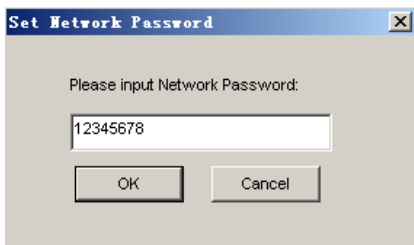


Figure 23: Change the network password

If a device does not have its password entered, a “Not change!” message appears. You need to click **Enter Password** to enter the device's password to achieve verification first.



Figure 24: Not Change message

## Change Local NPW

The **Change NPW** button is used to remove a local device from its existing network or add a local device to another network by changing the NPW for the local device. All devices are shipped with a default NPW (“HomePlugAV”). Devices with the same NPW are located in the same network.

**To remove a local device from its existing network:**

**Step 1** Select a local device in the top panel and click **Change Local NPW**.

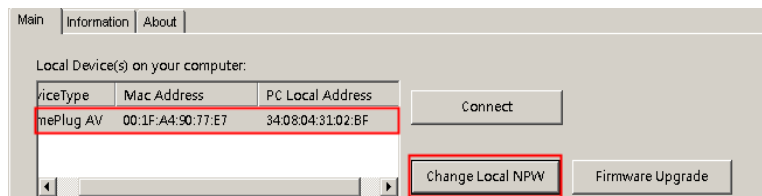


Figure 25: Select a device name

**Step 2** In the screen displayed, set a network password different from that of the local device’s existing network.



Figure 26: Set a new network password

**Step 3** Click **OK**.

After the network password for the local device is changed successfully, this local device is removed from its existing network. Previous devices displayed on the lower panel will disappear and devices with the same NPW as this local device will appear on the lower panel.

To add a local device into a network:

**Step 1** Select a local device in the top panel and click **Change Local NPW**.

**Step 2** In the screen displayed, set the network password the same as that of the network this device is to add into.

**Step 3** Click **OK**.

After the network password for the local device is changed successfully, this local device is added into the target network. Previous devices displayed on the lower panel will disappear and devices in the target network will appear on the lower panel.

## Scan

The **Scan** button is used to perform an immediate search for HomePlugAV devices connected to the powerline network. By default, Powerline Utility automatically scans every a few seconds and updates the displayed information.

## Firmware Upgrade

The **Firmware Upgrade** button is used to upgrade the device firmware.

### Note:

Only devices that have their password verified can achieve firmware upgrade by clicking **Firmware Upgrade**.

The steps for upgrading firmware are as follows:

**Step 1** Select a local device from the top panel.

**Step 2** Click **Firmware Upgrade**.

**Step 3** Click **Browse** to choose a configuration file (**fw\_upgrade**, **bin-upgrade**, or **paramconfig**).

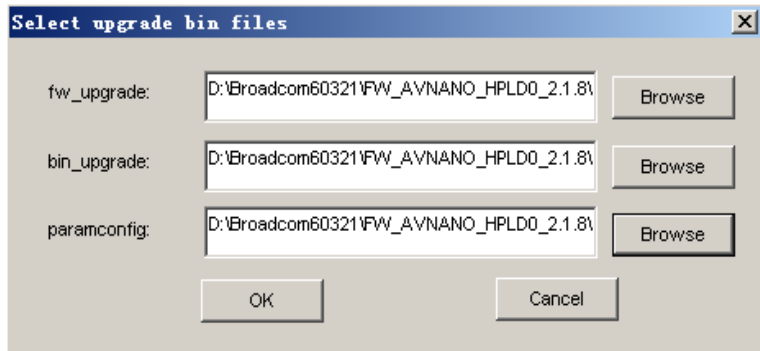


Figure 27: Upgrade the device

**Step 4** Click **OK**.

It takes several minutes to complete firmware upgrade. Do not interrupt the upgrade process.

## 5.2 Information Tab

The Information screen shows the system information and the firmware version. The upper panel shows technical data concerning software and hardware on the host computer that are used to communicate through HomePlug on the powerline network. It includes the following:

- M AC address of all NICs connected to the host
- MAC address of all devices connected locally to the host
- network Name (NPW) of local devices
- Software version
- Firmware version (including release date and SVN date)
- Vendor name

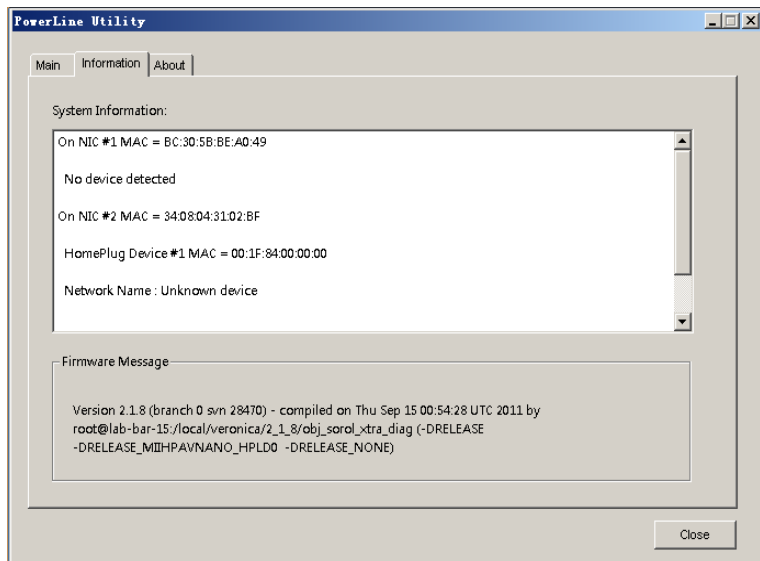


Figure 28: Information tab (two NICs)

### 5.3 About Tab

The **About** screen shows the software version and provides an html link to a website, such as <http://www.powerline.com>. Clicking the Web address, you can visit the website.



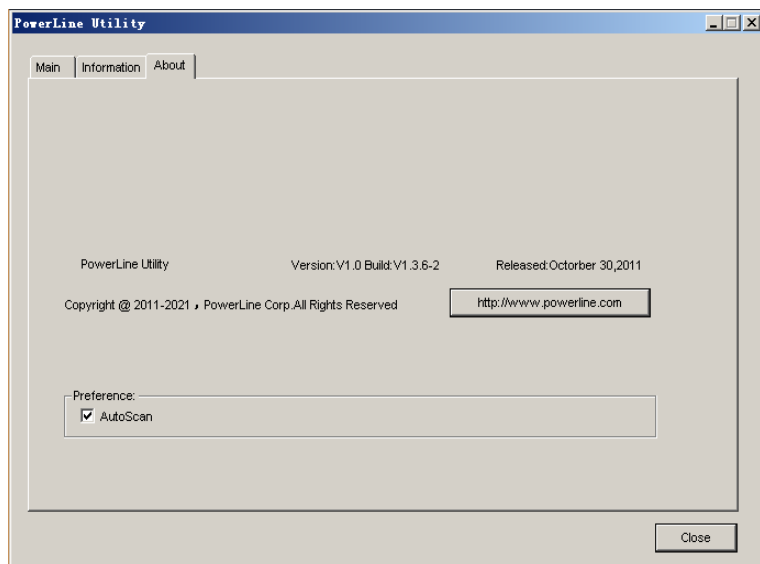


Figure 29: About tab

## Preferences

The lower panel displays options for turning the autoscan function on or off.

## 6 How to Use the Security/Reset Pushbutton

This chapter describes how to use the **Security/Reset** pushbutton to add new devices into or remove devices from a HomePlug AV logical network (AVLN).

You can monitor the operation progress and results by observing the Power LED status.

### 6.1 Forming a HomePlug AV logical network

#### Scenario:

Devices A and B with different NPW values are connected to the same powerline. Users want to use them to form a logical network.



Figure 30: Form a HomePlugAV network

Do as follows to form a logical network:

- Step 1** Press the **Security/Reset** pushbutton on device A or B for 5-8 seconds. The device will reset and restart with a random NMK.
- Step 2** Press the **Security/Reset** button on device A for less than 3 seconds.
- Step 3** Within 30 seconds, press the **Security/Reset** button on device B for less than 3 seconds.
- Step 4** Wait for connection to complete.

The power indicator on both devices will flash evenly at 1 second intervals until the operation succeeds or fails. If the connection succeeds, the Power and Data indicators on both devices illuminate steadily. If the connection fails, the Power indicators on both devices keep steady on, but the Data indicators on both devices are off. In that case, repeat steps 1-4.

## 6.2 Joining a Network

### Scenario:

Devices A and B are located in network N. Users want to add device C (the joiner) into network N. Any devices on network N can become the 'adder'.

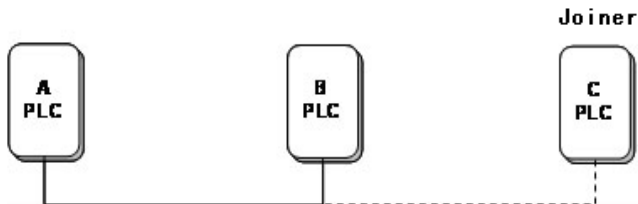


Figure 31: Join a HomePlugAV network

Do as follows to add device C to network N using the **Security/Reset** button:

- Step 1** Press the **Security/Reset** pushbutton on device C (the joiner) for 5-8 seconds. The device will reset and restart with a random NMK.
- Step 2** Press the **Security/Reset** button on device C (the 'joiner') for less than 3 seconds.
- Step 3** Within 30 seconds, press the **Security/Reset** button on device A (or device B) for less than 3 seconds.
- Step 4** Wait for connection to complete.

The power indicator on both devices will flash evenly at 1 second intervals until the operation succeeds or fails. If the connection succeeds, the Power and Data indicators on both devices illuminate steadily. If the connection fails, the Power indicators on both devices keep steady on, but the Data indicators on both devices are off. In that case, repeat steps 1-4.

## 6.3 Leaving a Network

### Scenario:

Device C is located in a network. Users want to remove device C (the 'leaver') from its network.

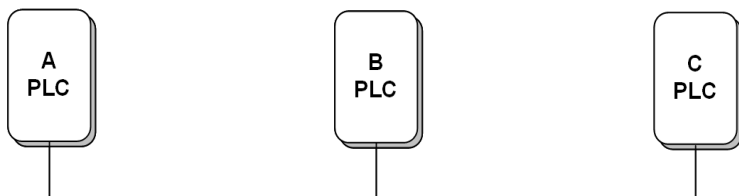


Figure 32: Remove a device from a network

Do as follows to remove device C from network N:

- Step 1** S Press the **Security/Reset** pushbutton on device C (the 'leaver') for 5-8 seconds. The device will reset and restart with a random NMK.
- Step 2** Wait for reset to complete

The Power indicator on device C momentarily extinguishes during reset, blinks during restart, and then illuminates steadily.

After device C is removed from its existing network, users can disconnect the device from the medium or join it to another logical network on the same medium.

## **7 How to Enter and Exit from the Standby Mode**

### **7.1 Entering the Standby Mode**

**To enter the standby mode:**

Pull out the Ethernet cable and wait for 10 minutes. The device enters the standby mode.

In the standby mode, the Power indicator blinks orange at an interval of 4 seconds.

### **7.2 Exiting From the Standby Mode**

After you plug in the Ethernet cable, the device system automatically detects signal and exits from the standby mode.

After the device exits from the standby mode, the power indicator is steady on.

## 8 How to Improve the Transmission Capacity

It is important to use the PLC product complying with the following "correct rules", because it can significantly improve the transmission capacity of the network. For the PLC device without a female socket, it is recommended to plug the device directly into a wall socket instead of a power strip.

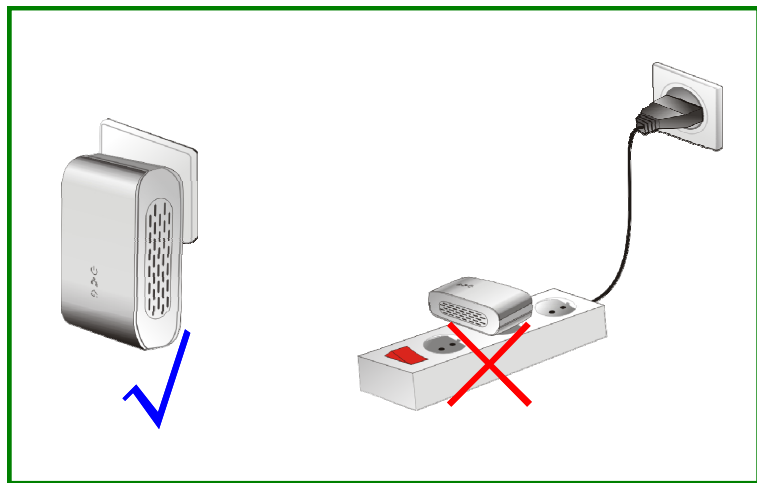


Figure 33: Connecting the PLC device without the female socket

## Appendix A Specifications

<b>Chipset</b>	BCM60321
<b>Protocol</b>	Compliant with HomePlugAV Compliance with IEEE 1901 standard
<b>System Support</b>	Windows 98SE, Windows 2000, Windows ME, Windows XP 32/64 bit and Windows Vista 32/ 64bit
<b>PLC Rate</b>	200 Mbps
<b>Modulation Band</b>	2MHz-28MHz
<b>Modulation Schemes</b>	Support QAM 1024/256/64/16/8, QPSK, BPSK and ROBO
<b>Encryption</b>	128 AES
<b>LED Indicators</b>	Power :Power on and off Ethernet: Ethernet link and activity Data: PLC link and activity
<b>Buttons</b>	Security/Reset
<b>Consumption</b>	3.25W
<b>Operating Temperature</b>	0°C-40°C
<b>Storage Temperature</b>	-20°C-70°C
<b>Operating Humidity</b>	10%-90%, non-condensing
<b>Storage Humidity</b>	5%-95%, non-condensing
<b>Power Supply</b>	100 V-240 V AC, 50Hz/60Hz
<b>Certifications</b>	CE, UL, FCC Part 15 Class B
<b>Green Standard</b>	RoHS
<b>Physical Characteristics</b>	L×W×H: 69 mm × 58 mm × 31 mm
<b>Weight</b>	80 g

**Appendix B Acronyms and Abbreviations**

<b>AVLN</b>	AV In-home Logical Network, the AVLAN is the set of STAs that possess the same network Membership key, every AVLN is managed by a single CCo
<b>CCo</b>	Central Coordinator, the CCo is a superset of a STA which includes terminal equipment identifiers and global link identifiers
<b>DEK</b>	Device Encryption Key
<b>IGMP</b>	Internet Group Management Protocol
<b>NPW</b>	Network Password
<b>PLC</b>	Power Line Communication