



USER GUIDE



**EZ Connect Powerline™
200Mbps HomePlug AV Adapter
with 3 Fast Ethernet ports**

SMCHPAV-ESW

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EN 60950-1: 2006
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EN 61000-3-3 : 1995+A1:2001+A2:2005
EN 55024: 1998+A1:2001+A2:2003
EN 55022: 1998+A1:2000+A2:2003



The official CE certificate of conformity can be downloaded by selecting the relevant model/
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1.Introduction

The SMCHPAV-ESW is a wallmount Powerline (PLC) adapter with 3 Fast Ethernet ports for transmitting data with up to 200 Mbit/s across the in-house power network, turning every power outlet into three Ethernet network connections. The adapter is suitable for use in a wide range of both residential (home) and commercial (offices, apartments, hotels, warehouses) applications, enabling the user to create high-speed local area networks (LAN) that support video, voice and data. Best of all, no new cables and no drilling are required.

1.1 System Requirements

For Configuration Utility, computer with

Operating System	Microsoft Windows 7, Vista 32-bits/64-bits, XP or 2000
CPU	Intel Pentium III or better, clock rate faster than 2.0GHz recommended
RAM	At least 128MB
Free Disk Space	At least 20MB
Network Interface	At least one Fast Ethernet (10/100Mbps) network card

For Hardware Installation

- At least 2 HomePlug AV devices
- Available power outlet
- Available Ethernet port with RJ-45 connector on each computer or networking device

1.2 Package Contents

- 1 SMCHPAV-ESW HomePlug AV Powerline Adapter
- 1 CD-ROM with software utility and user manual
- 1 RJ-45 Ethernet cable
- 1 Quick Installation Guide
- 1 Warranty Information Card

2 Safety Notice:

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

- Read all instructions before installing and operating this product.
- Follow all 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.
- Do not operate this product near water.
- This product should never be placed near or over a radiator or heat register.
- Do not use an extension cord between the device and the AC power source.
- Only a qualified technician should service this product. Opening or removing covers may result in exposure to dangerous voltage points or other risks.
- Do not plug the device into a power strip or surge protector because these devices may consist of filter and impair signal.
- Avoid plugging the device right next to noisy sources such as cell phone charger, Halogen light, noisy desktop computer, vacuum cleaner, etc. otherwise it may result in poor transmission speed.
- Unplug the device from the wall outlet and refer the product to qualified service personnel for the following conditions:
 - 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 shows a significant change in performance

3 Getting to Know the Adapter

3.1 The Ethernet Interface

Ethernet 1~3: The Ethernet port connects to an Ethernet network cable. The other end of the cable will connect to your computer or other Ethernet-enabled network device.

3.2 The Adapter's Buttons

Reset: The button can restore the factory defaults and reset the device.

Pressing and holding the RST button for 0.3 to 3 seconds to restore the factory defaults;

Security: The button is used to set the private network name.

- Pressing and holding the NMK button for more than 10 seconds randomizes the NMK value.
- Pressing and holding the NMK button for 0.5 to 3 seconds makes the adapter a member of the existing Powerline network.

Note: For more information about the security button please see chapter 6.

3.3 The Adapter's LEDs

All adapters' LEDs are located on the front panel; there are 5 LEDs to indicate the adapter's status.

Ethernet 1~3:

- **Green LED:** The Ethernet connection is ready.
- **Blinking:** The Ethernet connection is transmitting or receiving data.
- **OFF:** No Ethernet network activity.

Power:

- **Green LED:** Power on.
- **OFF:** Power off.

Data:

- **Blinking:** The Powerline connection is transmitting or receiving data.
- **Red LED:** Low link speed (Data rate is slower than 30Mbps)
- **Yellow LED:** Normal link speed (Data rate is between 30-50Mbps)
- **Green LED:** Excellent link speed (Data rate is faster than 50Mbps)
- **OFF:** No Powerline network activity



4 How to Installation Utility

- Before installing the configuration utility from Windows 7/Vista/XP/2000, please make sure that there is no any other Powerline Utility installed on your computer. If there is another utility installed, please uninstall it and restart your computer.
- Insert the Utility CD-ROM into the computer's CD-ROM drive. Select **SMCHPAV-ETH2 Utility Installation** and double-click **Setup.exe**. Follow the on-screen instructions to install the utility. No password or CD-Key is needed.

The Installation Utility similar to the one shown in Figure 4-1. Click the Next button to continue.

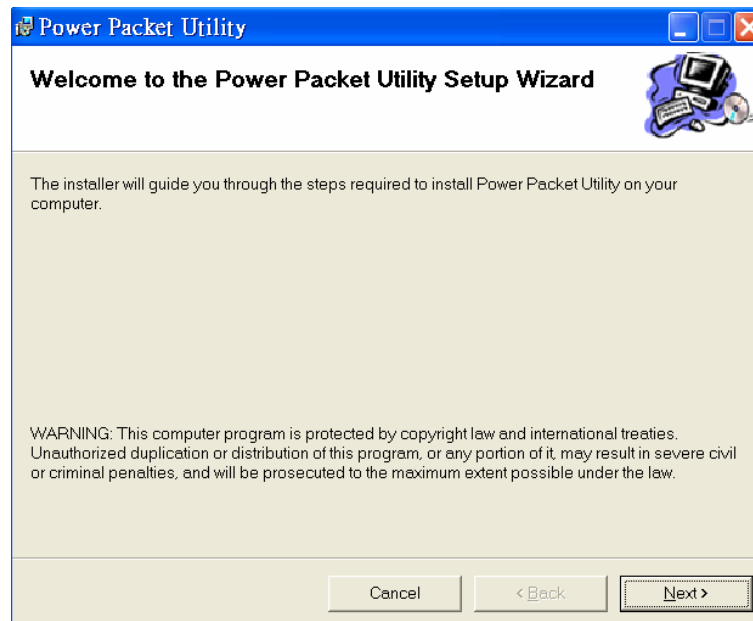


Figure 4-1 Setup Wizard

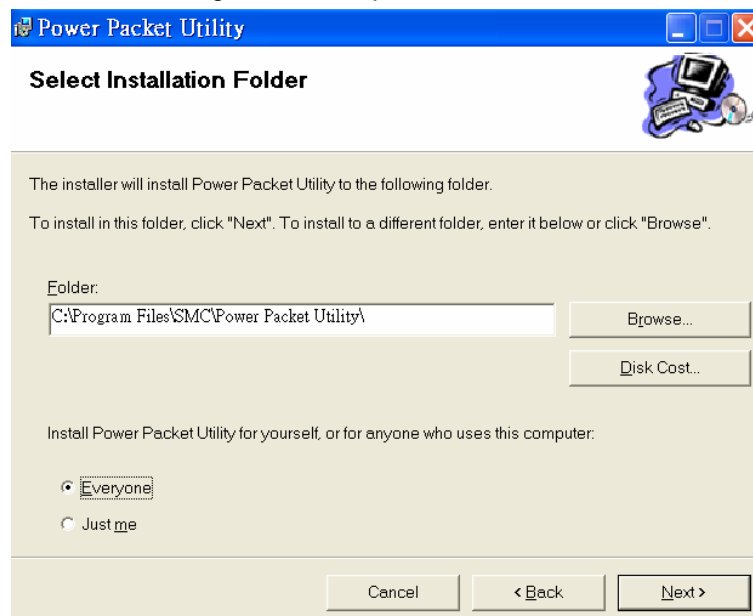


Figure 4-2 Select Installation Folder

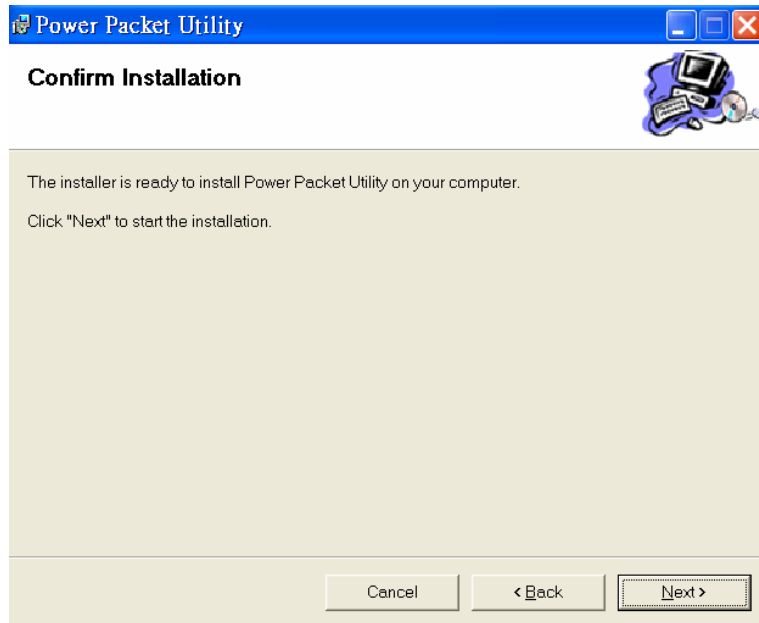


Figure 4-3 Installation Complete

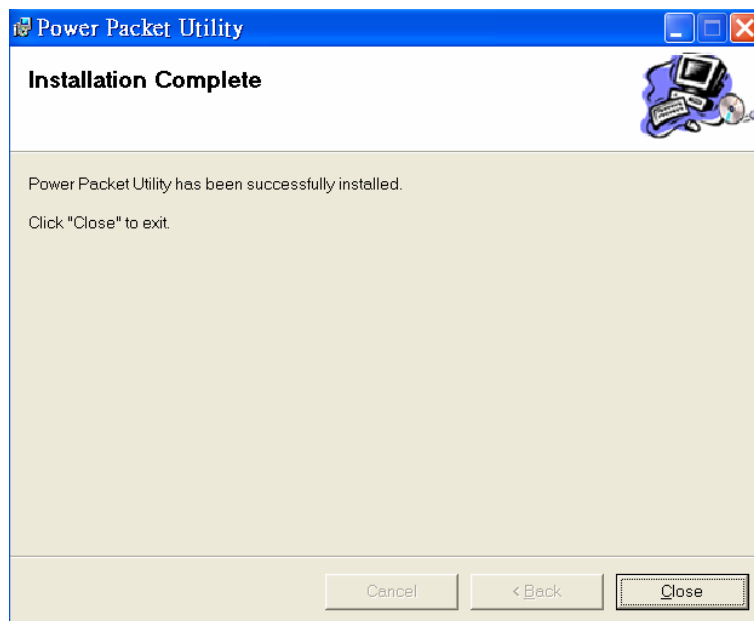


Figure 4-4 Installation complete

Click "Close" to complete installation.

5 How to Use the Utility Software

5.1 Main Tab

The **Main** screen provides a list of all HomePlug AV devices logically connected to the computer when the utility is running on.

The **top panel** shows local HomePlug AV devices connected to the computer's NIC (Network Interface Card). The user can click the Connect button to its right. Once connected to the local device, the utility will automatically scan the power line periodically for any other HomePlug AV devices. If no local HomePlug AV devices are discovered, the status bar displays **NO HOMEPLUG ADAPTERS DETECTED**.

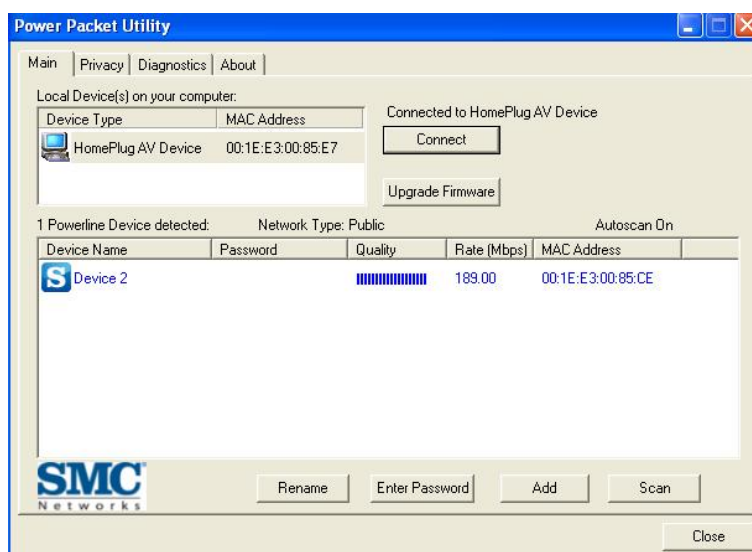


Figure 5-1: Main Tab information

The **lower panel** displays all the HomePlug AV remote devices, discovered on the current logical network. The total number of remote devices connected on the same network can be found on top of the Remote device panel. The Network type (Public or Private) is also displayed based on the network status of the local device. The scan status option is displayed on the top right corner above the Remote devices panel showing whether the Autoscan functionality is turned ON and active. The following information is displayed for all devices that appear in the list.

Device Name

This column shows the default device name, which may be modified. To change the name of a device, select the device and click **Rename** or click the name and edit it in the list.

MAC Address

This column shows the Remote device's MAC address.

Password

By default, this column is blank. You can select a device and click **Enter Password** to change it (see below).

The password is necessary to activate security in the Powerline network and to control all HomePlug AV devices from one computer. To activate security you need to create a so-called "private network" by changing the private network

name in all HomePlug AV devices. This will only be possible after entering the password for all these devices.

The procedure for setting the password of the device (required when creating a private network) is as follows:

- Click the device name to select the device in the lower panel.
- Click **Enter Password**. A dialog box appears, showing the device name, MAC address and a field to enter the password. See Figure 5-2.



Figure 5-2: Set Device Password

- Enter the password (typically a number and letter code in groups of four, separated by dashes, to be found on the backside of the device or the packaging) and click **OK** to verify the password. The password field accepts the device password in any format, with or without dashes.

A confirmation box appears if the password was entered correctly. If a device was not found, a message appears, providing suggestions to solve the problem.

Add

This button is used to add a remote device to the existing network by entering the device password of the device. A dialog box will appear as shown below in Figure 5-3. Enter a device name and the password to add the device.

A confirmation box will appear if the password was entered correctly and if the device was found in the powerline network. If a device was not found, the user will be notified and suggestions to resolve common problems will be provided.



Figure 5-3: Add Remote Device

⚠ Note: The device must be in the Powerline network (plugged in), so that you can confirm the password and add the device to the network. If the device is not located, a warning message appears.

Scan

This button is used to perform an immediate search of the HomePlug devices connected to the Powerline network. By default, the utility automatically scans every few seconds and updates the displayed information accordingly.

5.2 Privacy Tab

In the **Privacy** screen, you can maintain security for the logical network and select the devices that should be able to communicate in the same network. See Figure 5-4.

Out-of-the-box, all HomePlug devices are pre-configured to be used in a public network with “HomePlugAV” as network name. In the **Privacy** screen, you can create a private network by changing the private network name of the relevant devices. Only devices with the same private network name will be able to communicate.

Click **Use Default (Public Network)** or enter **HomePlugAV** as network name, to change from a private network back to a public network..

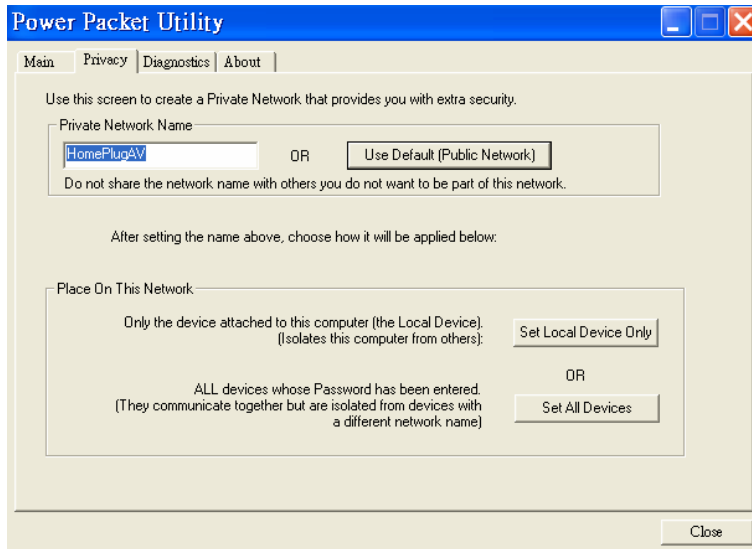



Figure 5-4: Privacy Screen

 *Note: Changing the network name to anything other than HomePlugAV will show the network type on the main screen as Private.*

Set Local Device Only

This button is used to change the private network name of the local device only. If a new private network name (other than **HomePlugAV**) is entered, all the devices that appeared in the lower panel of the **Main** screen will disappear, effectively isolating the local device from the other devices in the logical network. Only devices that were previously set up with the same private network name still appear in the device list.

Set All Devices

This button is used to change the private network names of all the devices that appear in the lower panel of the **Main** screen and whose password has been entered. For these devices a dialog box appears, indicating successful operation. For devices whose passwords has not been entered, a dialog box appears indicating operation failure.

Note: Before clicking “Set All Devices” please make sure that the password for all HomePlug AV devices that should join the private network has been entered . If you skip this step and you lose connectivity to some devices, please reset the private network name to default, click on “Set All Devices” and start all over.

5.3 Diagnostics Tab

The **Diagnostics** screen shows the system information and a history of all devices that appeared in the network over a period of time. See Figure 5-5.

The **Upper panel** shows technical data about the software and hardware of the host computer where the utility is running on. It includes 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
- HomePlug chipset manufacturer name
- MAC Firmware Version
- MAC addresses of all devices connected locally to the host
- Version of the Configuration Utility
- Vendor name

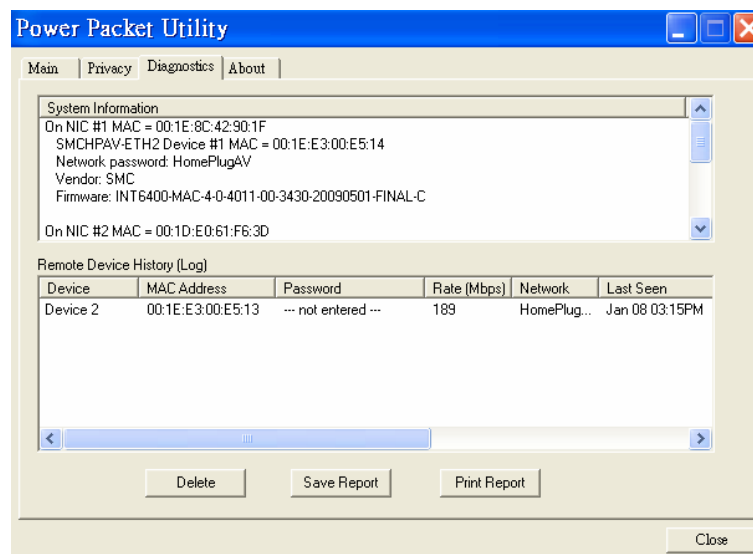


Figure 5-5: Diagnostics Screen

The **Lower panel** displays the history of all devices that appeared on the computer over a certain period of time. All the devices and the parameters of the devices on the powerline network are listed. Devices that are active on the current logical network show a transfer rate in the rate column. Devices on other networks, or devices that no longer exist are shown with a "?" in the rate column. The following remote device information is available from the diagnostics screen:

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

The displayed diagnostics information can be saved to a text file for later use, or be printed for reference for a technical support call. Click **Delete** to delete the devices which are no longer part of the network. A dialog box will pop up with a confirmation message if you want to delete a device whose password has been entered.

5.4 About Tab

The **About** screen shows the software version and provides an HTML link to a website, such as *www.smc.com*. Clicking the web address, will open the website in your web browser.

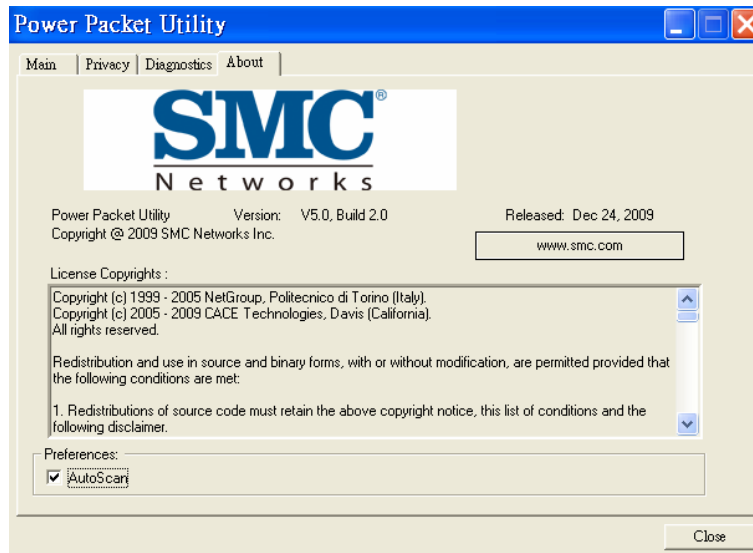


Figure 5-6: About Dialog Tab

Preferences

The lower part of the panel may display options for turning the auto-scan feature on or off.

6 SYNC button Usage

This section describes how to add or remove devices from a Powerline network by using the SYNC button on the devices. This process allows to create a Powerline network without using the configuration utility for Windows and works independent from the operating system.

6.1 Creating a private network

When two devices with different SYNC values are connected to the same Powerline private network, they need to be synchronized to be able to communicate:

1. Press the SYNC button on device A for less than 3 seconds.
2. Press the SYNC button on device B for less than 3 seconds. The button on device B must be pressed within 1 minute.
3. Wait for the SYNC process to complete.

The Power LED on both devices will blink evenly at 1-second intervals until the operation succeeded or failed. If the connection succeeded, it illuminates steadily. If an error occurred, the Power LED on the 'adder' (Device B) blinks unevenly until the SYNC button on the 'adder' (Device B) is pressed again or the 'joiner' (Device A) is reset by pressing the SYNC button down for more than 10 seconds.

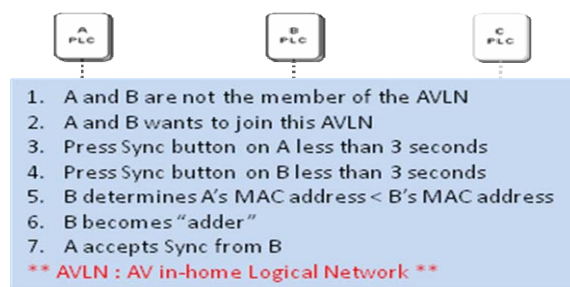


Figure 6-1: Creating a Homeplug AV private network

6.2 Joining a Network

In this scenario a Powerline private network exists and a new device, the 'joiner', should join the network. Any device on the existing Powerline network can become the 'adder'.

1. Press the SYNC button on the 'joiner' (new device) for at least 3 seconds.
2. Press the SYNC button on any network device for less than 3 seconds, making it the 'adder' (existing device). Please press this SYNC button within 1 minute.
3. Wait for the connection to complete.

The Power LED on both devices will blink evenly at 1-second intervals until the operation succeeded or failed. If the connection succeeded, it illuminates steadily. If an error occurred, the Power LED on the 'adder' blinks unevenly until the SYNC button on the 'adder' is pressed again or the 'joiner' is reset by pressing the RESET button down for more than 10 seconds.

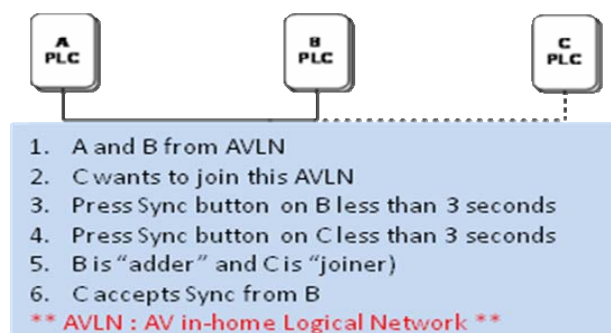


Figure 6-2: Joining a network

6.3 Leaving a Network

In this scenario a Powerline network exists and one device, the 'leaver', should be removed from the network. The user either wants to remove the device completely or have it join another logical network.

1. Press the **SYNC** button on the 'leaver' for at least 10 seconds. The device resets and restarts with a random SYNC.
2. Wait for the reset to complete.

The Power LED on the 'leaver' momentarily extinguishes during reset, blinks during restart, then illuminates steadily. No error occurs.

The user can disconnect the device from the medium or join it to another logical network on the same medium when the reset process is completed.

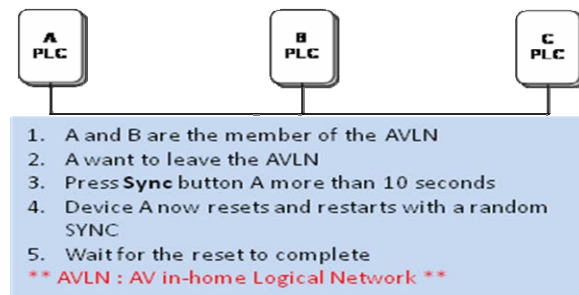
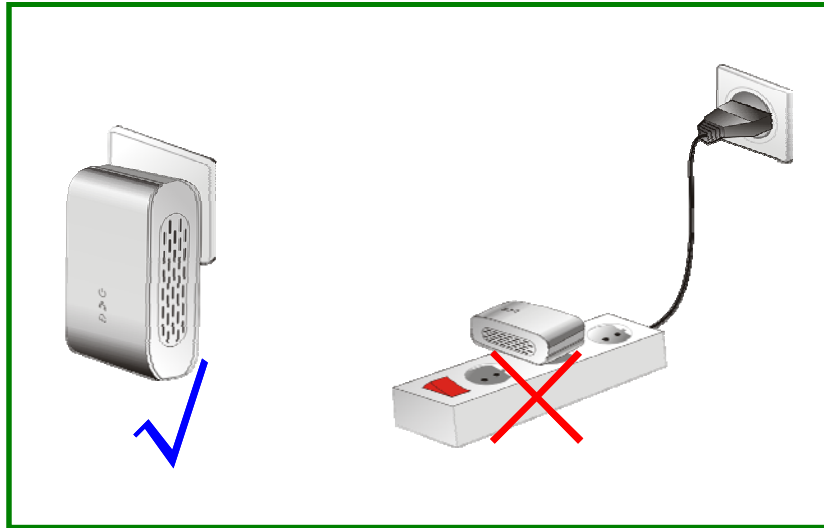


Figure 6-3: leaving a network

7 How to Improve the Transmission Capacity

For the SMCHPAV-ESW, it is recommended to plug the device directly into a wall socket, not into a power stripe. This can significantly improve the transmission capacity of the network.



Appendix A Specifications

Chipset	Intellon INT6400
Protocol	HomePlug AV 1.0 Co-exists with existing HomePlug 1.0
System Support	Windows, 2000, XP 32/64 bit and Vista 32/64bit
PLC Rate	Up to 200Mbps
Modulation Band	2-30MHz
Modulation Schemes	Supports 1024/256/64/16/8-QAM, QPSK, BPSK and ROBO
Encryption	128 AES
LED's	Power Ethernet 1~3: Ethernet Link and Activity Data: PLC Link and Activity
Push Button	Reset: Restore the default factory parameter Security: Set up network password automatically
Consumption	7W
Operating Temperature	0° to 40° C
Storage Temperature	-20 ° to 70 ° C
Operating Humidity	10% to 90% Non-condensing
Storage Humidity	5% to 90% Non-Condensing
Input Rating	100-240 VAC, 50/60Hz
Certifications	CE, UL, FCC Part 15 Class B
Green Standard	RoHS
Physical Characteristics	115(L)mm×42(W)mm×76(H)mm
Weight	170g

Appendix B Acronyms and Abbreviations

AVLN	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
CCo	Central Coordinator, the CCo is a superset of a STA which includes terminal equipment identifiers and global link identifiers
CSMA/CA	Carrier Sense Multiple Access / Collision Avoidance
DAK	Device Access Key
DM	Device Manager
IGMP	Internet Group Management Protocol
NEK	Network Encryption Key
NID	Network ID (Identification)
SYNC	Synchronize Device
PLC	PowerLine Communication
PIB	Parameter Information Block
STA	Station, a STA in the network with a connection to the Powerline network and being able to source or sink traffic
TDMA	Time Division Multiple Access
TEI	Terminal Equipment Identifier
TOS	Type of Service
VLAN	Virtual Local Area Network

Appendix C About QoS

The SMCHPAV-ESW allows 4 levels of Channel Access Priority (CAP, 0 – 3). 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 is used for voice and network management frames, CAP 2 is used for streaming video and music while CAP 1 and CAP 0 are used for data.

Default CAP

The Default CAP group allows default priority mapping of packets that do not have a VLAN tag. Settings are available for unicast (directed to a host).

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

The following are the factory default settings for VLAN Tags and TOS Bits:

VLAN Tag User priority	Default CAP Priority	TOS Bit User Priority	Default CAP Priority
0	CAP1	0	CAP1
1	CAP0	1	CAP0
2	CAP0	2	CAP0
3	CAP1	3	CAP1
4	CAP2	4	CAP2
5	CAP2	5	CAP2
6	CAP3	6	CAP3
7	CAP3	7	CAP3



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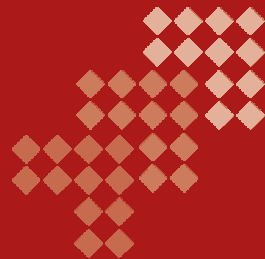
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