C4Line

CrossPower C4L5200-ETH

Ethernet-to-Powerline Bridge Manual

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C4Line guarantees that every CrossPower C4L5200-ETH Bridge and CrossPower C4L5200-USB Adapter will be free from physical defects in material and workmanship for one year from the date of purchase, when used within the limits set forth in the Specification section of this User Guide. If the product proves defective during this warranty period, call C4Line Technical Support in order to obtain a Return Process Information. BE SURE TO HAVE YOUR PROOF OF PURCHASE AND A BARCODE FROM THE PRODUCTS PACKAGING ON HAND WHEN CALLING. RETURN REQUESTS CANNOT BE PROCESSED WITHOUT PROOF OF PURCHASE. When returning a product, please include a copy of your original proof of purchase. All customers located outside of the United State of America shall be held responsible for shipping and handling charges.

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► FCC STATEMENT

The CrossPower C4L5200-ETH Bridge have been tested and complies with the specifications 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 according to 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 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 or devices
- Connect the equipment to an outlet other than the receiver's
- Consult a dealer or an experienced radio/TV technician for assistance

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

Caution : Any changes or modifications in construction of this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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1. Introduction

1.1 Overview

The CrossPower C4L5200-ETH is a plug-and-play Ethernet Bridge to network your computers through the existing 110/220 V electric power lines and share Broadband Internet connections, printers, transfer files, play games, and more. After successful installation of C4L5200-ETH Setup Utility Software, the powerline network behaves like a LAN for computers.

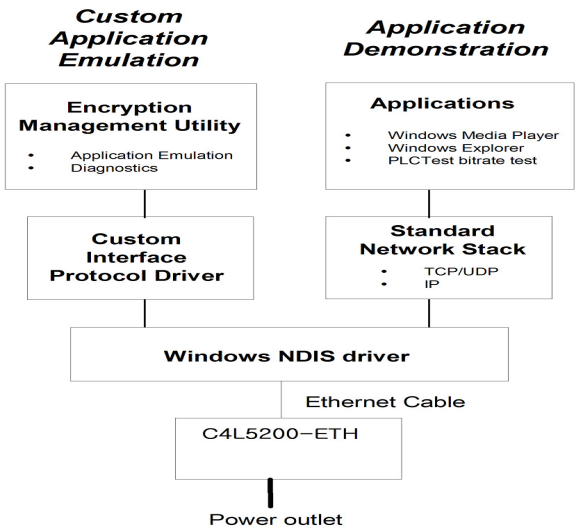
This unit offers up to 14Mbps network speed, and requires only 10/100Base-T network Interface adapter which is installed on the computer. By offering 56-bit DES encryption, it is also much more secure than other home networking technologies such as wireless Ethernet.

This manual is intended to provide basic information to help you understand how to successfully install C4L5200-ETH to meet your networking needs. With this guide, you should be known to

- Plan the configuration of C4L5200-ETH
- Install and configure C4L5200-ETH
- Test C4L5200-ETH performance

Using standard Windows applications, the user can conduct high-speed audio and video streaming demonstrations over the powerline between 2 or more systems equipped with C4L5200-ETH devices.

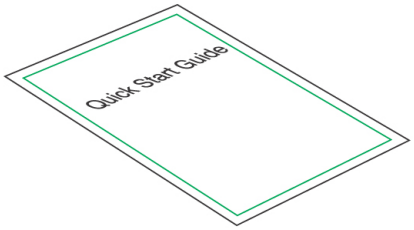
Figure details the different use configurations of the C4L5200-ETH system.



1.2 Package Contents

Your package includes the following ;

CrossPower C4L5200-ETH



Quick Start Guide

CAT5 Cable

CD-ROM(Containing Manual, Setup and Configuration Utilities Software)

1.3 System Requirements

- Computer with an available ETH interface
- At least one other powerline-enabled device (HomePlug 1.0 Compliant)
- Windows 98SE, ME, 2000 or XP
- Additional router may be required to connect multiple users

1.4 Applications

- Shared broadband internet access
- Audio and video streaming and transfer
- Expanding the coverage of wireless LANs
- Voice Over IP calls
- PC files and application sharing
- Printer and peripheral sharing
- Network and online gaming

1.5 Usage

The C4L5200-ETH is to be wall mounted as shown.

The description of LED's are shown in the table below.

C4L5200 - ETH

LED Function

DS1 POWERLINE/ETH COLLISION ▪ ON - Collision ▪ OFF - No Collision
DS2 POWERLINE ACTIVITY ▪ ON - PowerLine activity, transmit or receive ▪ BLINKING - looking for more PowerLine devices ▪ OFF - Device is in reset or device is not attached to AC power
DS3 POWERLINE LINK ▪ ON - Another PowerLine device has been detected ▪ OFF - No other PowerLine devices have been detected
DS4 ETHERNET LINK/ACTIVITY ▪ ON - Ethernet Port Link ▪ BLINKING - Ethernet activity ▪ OFF - No Ethernet Port Link

2.Installation Guide

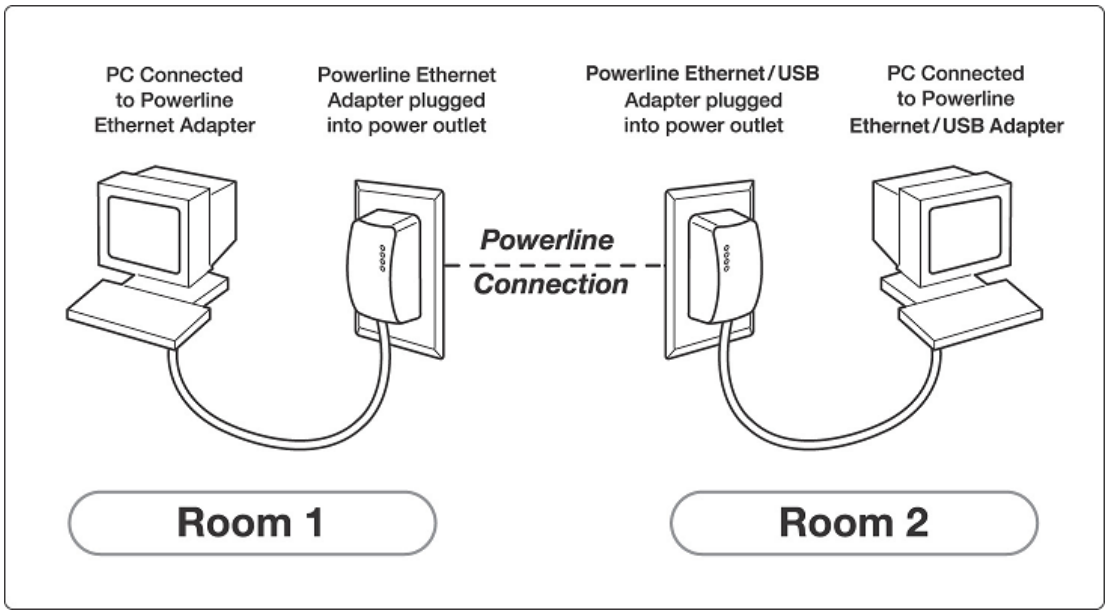
To install

Important : After receiving the C4L5200-ETH, check for any shipping damages on the carton and the system unit before proceeding with any installations. Inspect the cartons for any obvious damage before unpacking.

Step 1 > Plan the installation of your powerline network

Note : You will need at least two powerline adapters in order to build a powerline network connection.

1. **To connect two computers together in an isolated network you will need the following;**
   - CrossPower C4L5200-ETH adapter(Node mode) for each PC with an Ethernet port
     or
   - CrossPower C4L5200-USB adapter(Node mode) for each PC with USB port



To set up files to be sharing, two things must be done.

- The computer with files to be shared must be set up for file sharing.
- The other computer on the network must be connected to that computer.

To setup a computer to share its files:

Window 98: File sharing is by default switched off. Enable file sharing by highlighting the network adapter in the list of adapters in the "Control Panel"-> Network list. Click the 'File and Print sharing' button and select file sharing. This may require your Windows 98 installation CD.

Now to share a folder, navigate to the folder using Windows Explorer or My Computer, right click on the folder to share, select 'properties' and click on the 'Sharing' Tab. Click 'Shared As' and select the type of sharing.

Window2000: Find the folder to share using Windows Explorer. Right click on the folder and select 'sharing', select 'Share this folder'.

Window XP: File sharing is by default switched off. Enable file sharing by running the 'Network Setup Wizard'(Start->All Programs->Accessories->Communications->Network Setup Wizard).
Follow the instructions in the wizard and the computer will allow file sharing.

To actually share a folder, open 'My Computer' and navigate to the folder to share, right click on the folder and select 'Sharing and Security'. Click the checkbox saying 'Share this folder on the network' and click 'OK'.

To access other computers shared files:

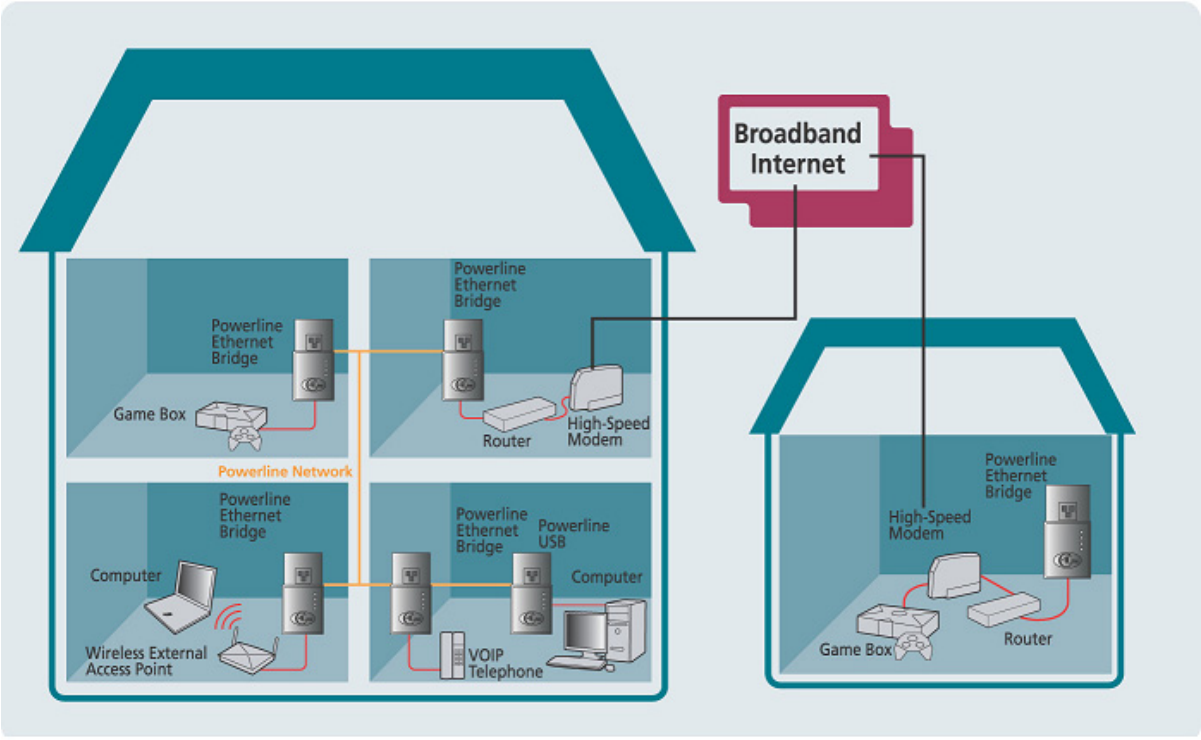
Window 98SE: In Windows Explorer, open up 'Network Neighborhood' in the folder tree and navigate to the desired folder.

Window 2000: In Windows Explorer, open up 'My Network Places' in the folder tree, click on 'Computers near me' and navigate to the desired folder.

Window XP: In the Start menu, select 'My Network Places'. Click 'Add Network Place' in the left margin. Follow the wizard for adding the folder to look at. In the location box where the network place is typed, type \\ name of computer to share\ folder to share (replace names with the actual computer name and folder name, but keep the backslashes)

2. To share a cable or DSL connection between PCs in different rooms you will need the following ;

- Cable or DSL modem
- Broadband sharing router
- CrossPower C4L5200-ETH adapter (Bridge mode)connected to the broadband sharing router
- CrossPower C4L5200-ETH(Node mode) / C4L5200-USB(Node) adapter for PCs, Game Boxes and peripherals you want to share the broadband connection



Using the CrossPower C4L5200-ETH(Bridge & Node mode) and C4L5200-USB(Node) to play game remotely, to share Broadband Internet access through the whole house and to extend the WiFi network as follows.

- Check the router manual and setup of the broadband connection.
- Connect the Ethernet cable between a LAN port on the router and C4L5200-ETH.
- Plug C4L5200-ETH into a power outlet.
- Check the ETH-LNK/ACT is on, both on the router and powerline device.
  If not, check power and connections in details.
- Follow the installation procedure for the powerline adapters.

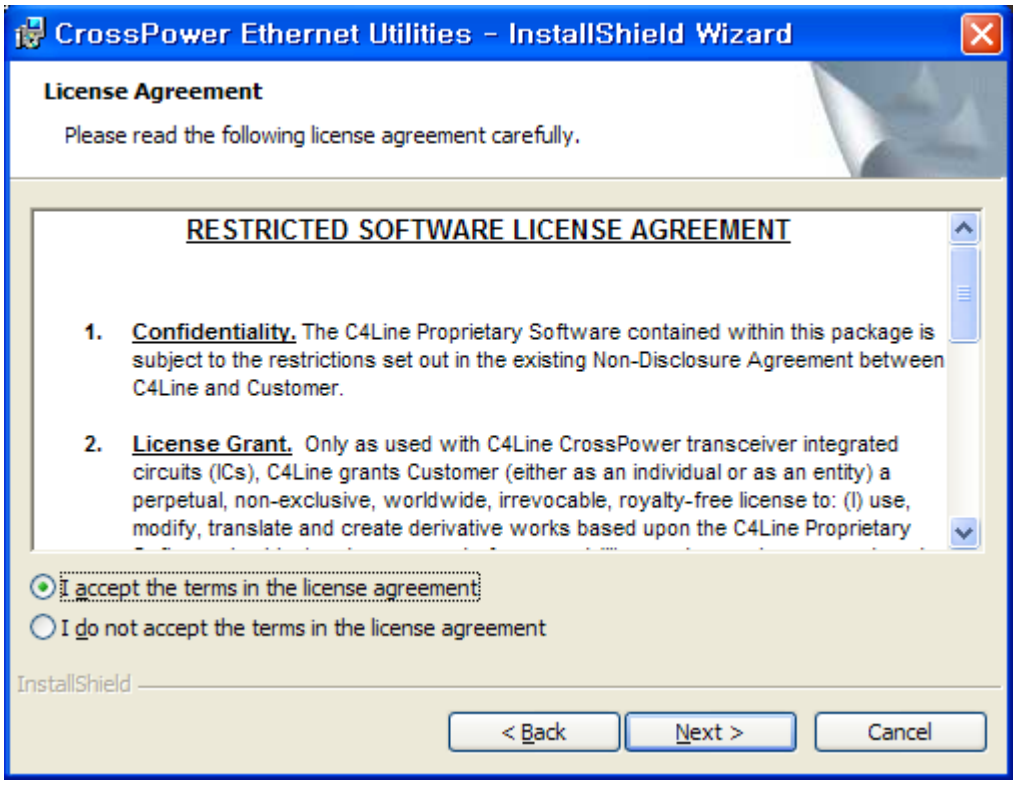
Step 2 > Installing Setup Utility Software

Please verify that no other Powerline Utilities are installed before installing this product. If other utilities are installed, uninstall them and restart before installing this software.

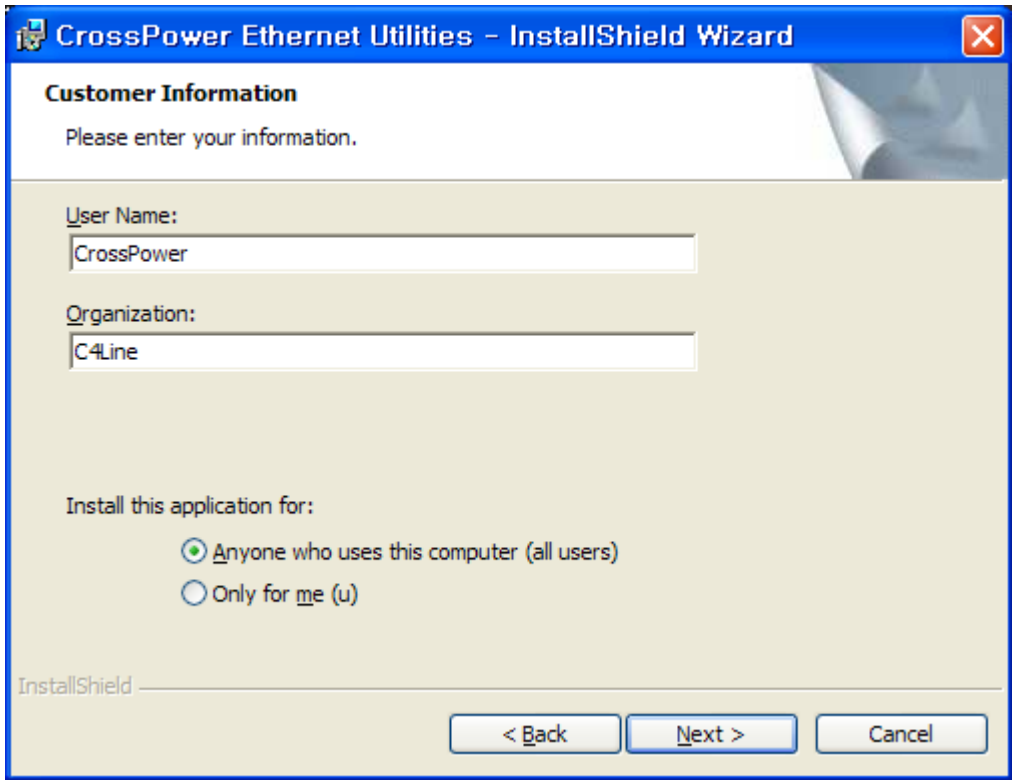
● Insert the Setup utility CD-ROM into the computer's CD-ROM drive. The setup utility should run automatically. If it doesn't, click the **Start** button and choose **Run**. In the box that appears, enter D:\setup.exe (Where D is the letter of your CD-ROM drive).

☞ The InstallShield Wizard will launch the Setup utility similar to that shown

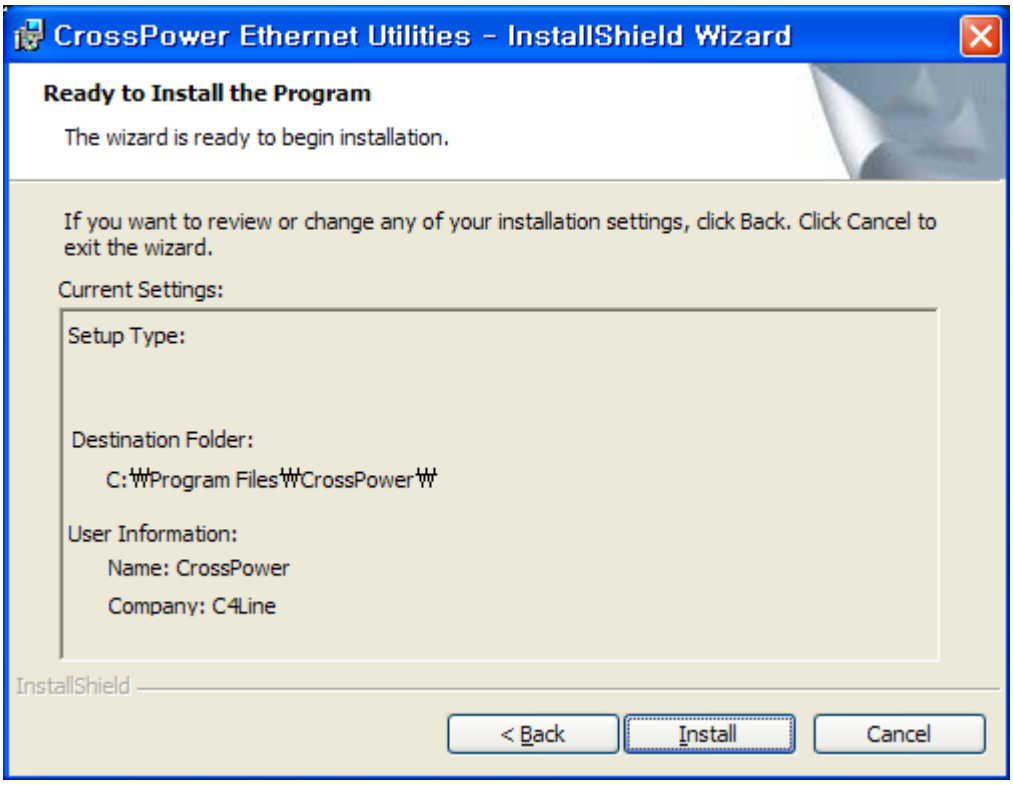
Click the **Next** button to continue



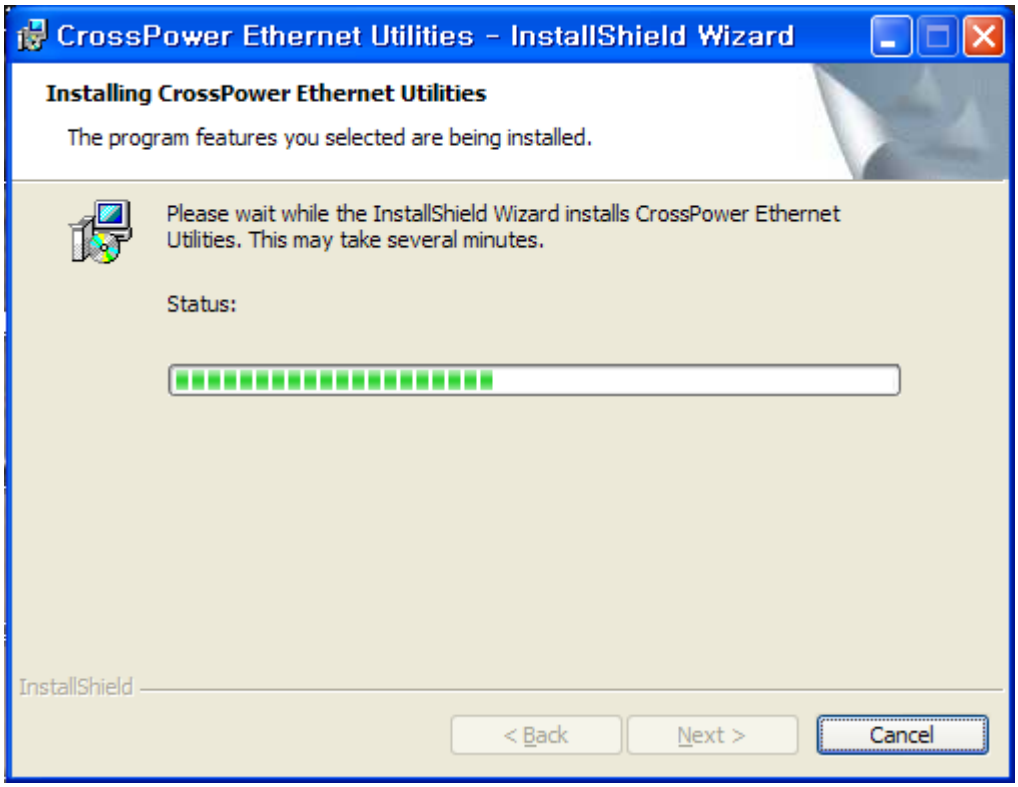
Click the **Next** button to continue



Enter a Username and Organization, then click the **Next** button to continue



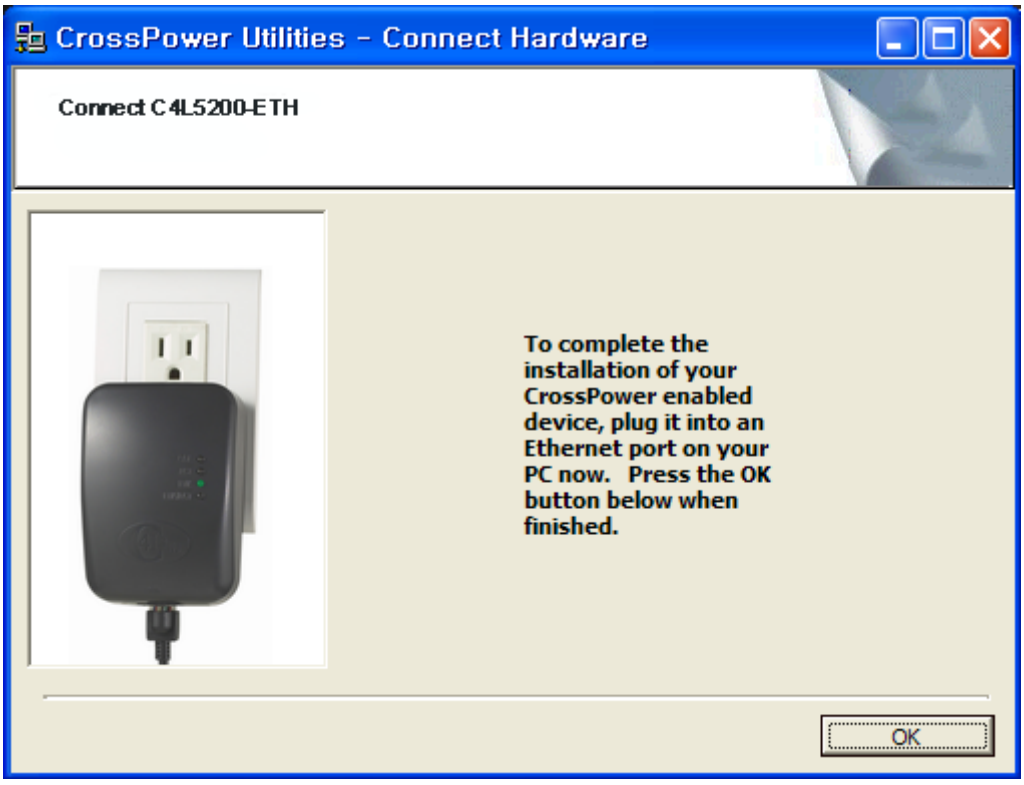
Click **Install.**



When prompted by the Install Utility, Plug in the C4L5200-ETH.

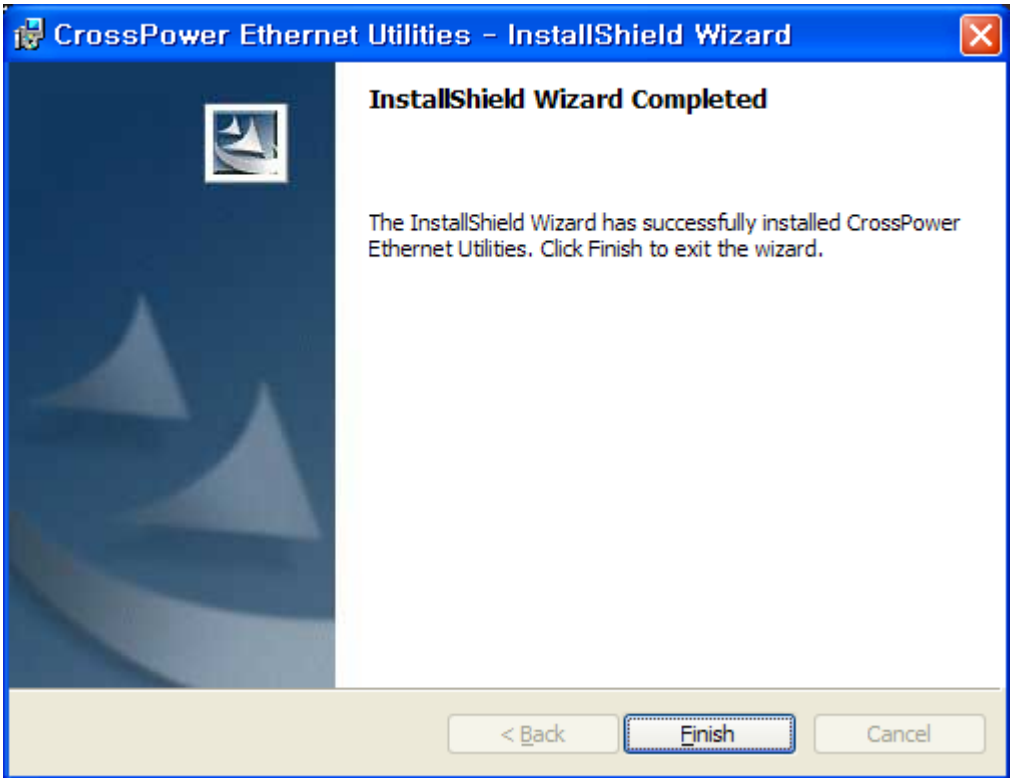
To plug in the C4L5200-ETH, you need to:

- Plug the C4L5200-ETH into an AC outlet.
- Plug the supplied ETH cable into the C4L5200-ETH and an available ETH port on your PC.



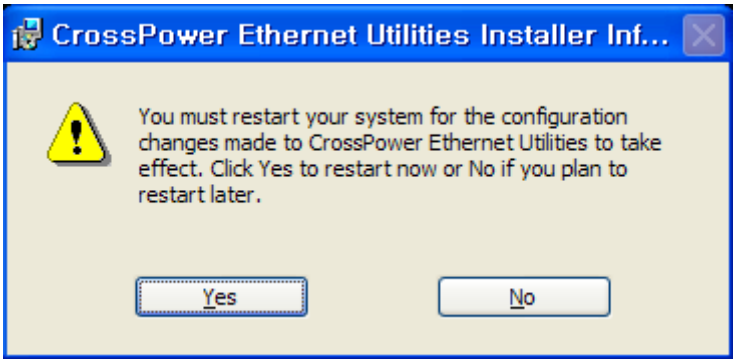
Click **OK**

Important : Because the C4L5200-ETH sends data over the powerline, it is recommended that you plug its power cord directly into a power outlet. Do not plug the device into a UPS or power strip with surge protection. The C4L5200-ETH has its own power filter for protection against surges.



Click the **Finish** button to exit the Setup Utility Software.

You may be asked to restart your computer. Click the **Yes** button to restart now, or click the **No** button to restart later



The installation of the C4L5200-ETH is complete.

Step 3 Using CrossPower C4L5200 Configuration Utility Software

The CrossPower™ Configuration Utility for C4Line™ CrossPower C4L5200 products enables the user to find C4L5200 devices on the powerline network, measure data rate performance and ensure privacy by setting a user defined network private password. This utility gives you the capability to set up a network password on the local device connected to the computer where the utility is running. It gives you as well, through the advanced option, the capability to set up a network password remotely on other C4L5200 devices through the power line.

It is recommended that the same PC chosen for initial execution of this utility remain the PC of choice for subsequent network encryption updates. Network setup information is stored on the PC and is used to facilitate follow-on network encryption sessions.

Before running this utility, make sure that a C4L5200 device is properly installed and connected to your computer.

Running the utility

To run the utility, double click the **C4Line CrossPower™ Configuration Utility** icon on your desktop.

The wizard has five different dialog screens options accessible through the following **tabs** : **Device**, **Network**, **Security**, **Advanced** and **About**. In the coming sections, we will explain the purpose and the functionality of each of them.

NB: As a general rule that applies to dialog screens, pressing:

The **OK** and **Cancel** buttons means " exit utility "

► Device dialog screen

The **Device** dialog screen provides a list of your C4L5200™ devices connected to the computer where the utility is running and average data rate performance of your powerline network.

Initially, the wizard starts the **Device** dialog screen.

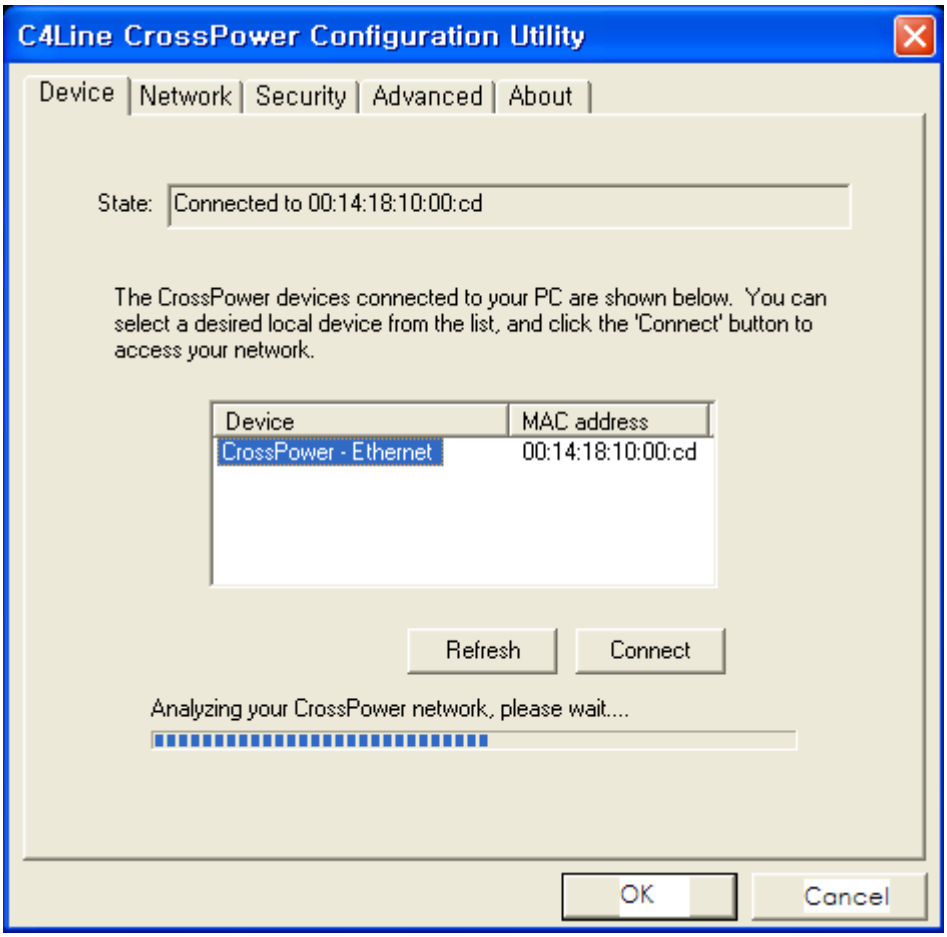


Figure. Initial screen when wizard is started

State shows the MAC address of the device that your computer is connected to.

Referesh scan for the Powerline Adapter that is connected directly to your computer.

Connect can select the device when your computer is connected to multiple Powerline Adapters directly. You would like to configure by highlighting it in the device window and click Connect.

Once the analysis is done, a screen similar to Figure appears as below.

In the text list box, it reports back all C4L5200™ devices found that are locally connected to the computer where the utility is running.

In most cases, one device only is listed.

In case you have more, click on one of them and hit **Connect**. Make sure that the **State** box indicates that your PC is connected to the same device. Now you are ready to manage the powerline network connected to this device, ensure its privacy and measure its data rate performance.

Press **Refresh** button to refresh the search of the powerline devices connected to your computer.

The progress bar will change into a status bar indicating the network average data rate.

The color of the bar reflects the average performance of the powerline network :

Green : Excellent performance

Yellow : Fair performance

Red : Poor performance

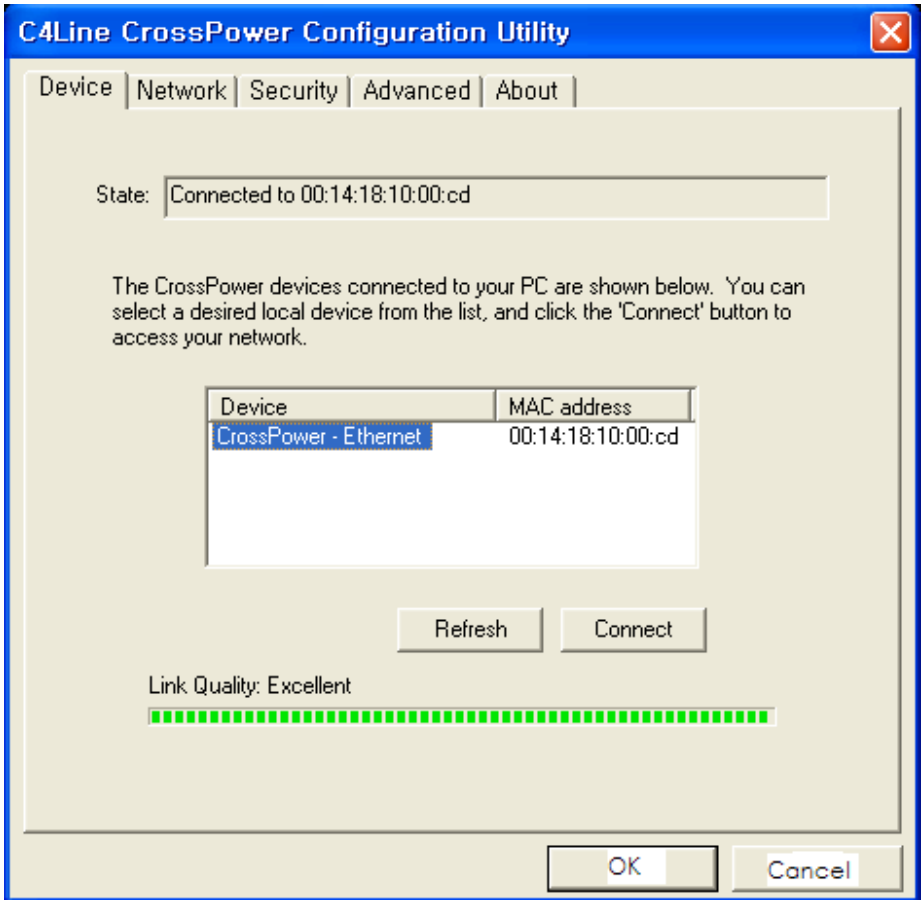


Figure. Device Dialog screen

► Network dialog screen

The **Network** dialog screen provides detailed information about your powerline network.

The text list box shows all C4L5200 devices found on your powerline network identified by their MAC addresses. A second column indicates their data rate measurements in Mbps.

Press **Scan Powerline Network** button to refresh the listed information.

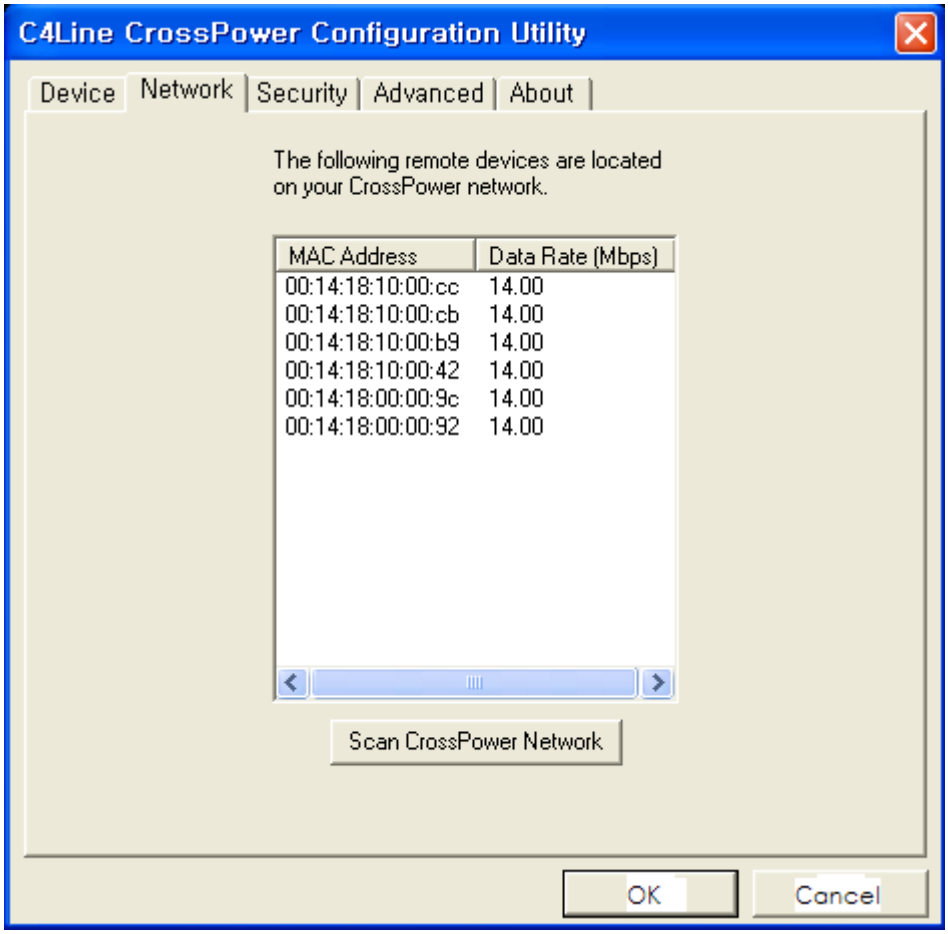


Figure. Network dialog screen

Important : In case a C4L5200™ device in your home is not listed in the screen above, make sure that its network password has not been made private previously with a different password than your current private network password.

You can always reset a C4L5200™ network password to the universal one by running the C4Line **CrossPower™ Configuration Utility** on the PC attached to this device and choose "**HomePlug**" as the network password.

The same password needs to be written into all devices on the powerline network, there are two ways of doing this.

1. Run the CrossPower C4L5200 Configuration Utility on all computers connected to them and set the password on the **Security dialog screen** as below. A powerline adapter connected to a router or network printer etc. must be temporarily moved to a computer to set the local password.
2. Set the password remotely by selecting the **Advanced dialog screen** as shown in the following phrase.

► Security dialog screen

All C4L5200™ devices are shipped using **"HomePlug"** as a network password. The **Security** dialog screen allows you to change this network password and set your own private password and apply it to the C4L5200™ device connected to the computer where the utility is running.

Hit **Restore Default** button to restore the original network password **"HomePlug"** and apply it locally.

Hit **Set Local** button to change the network password locally.

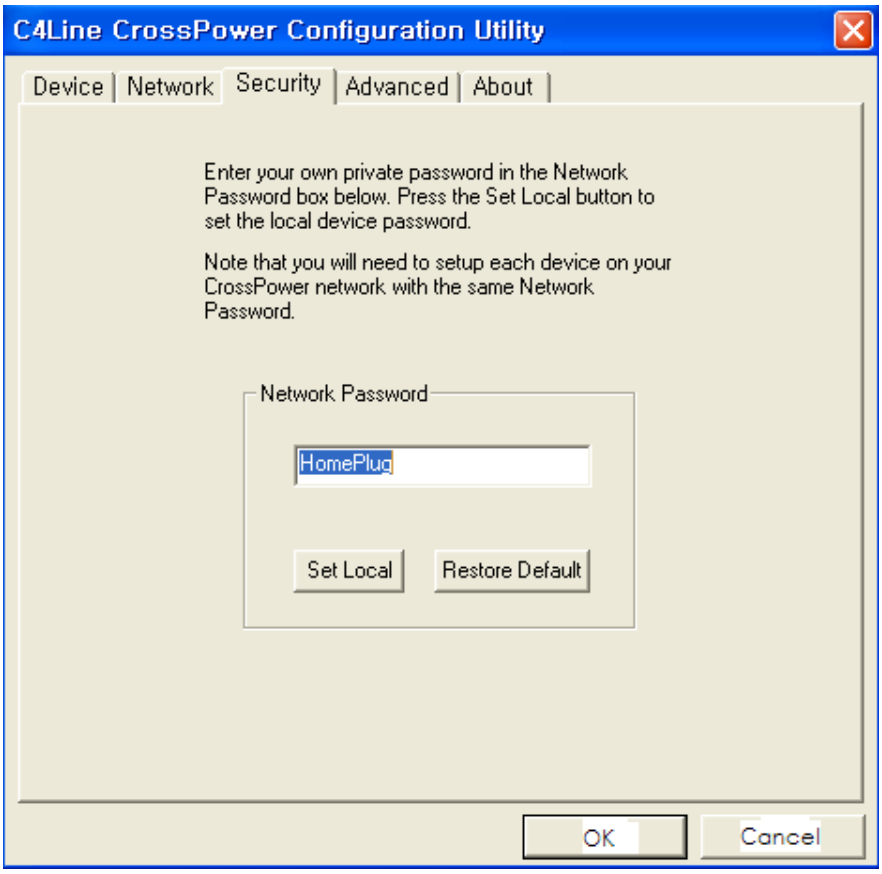


Figure. Security Dialog screen

Important : Your private network password must have between 4 and 24 characters. The password is case sensitive. The password can include any letters of the alphabet, numbers or punctuation marks. Remember this password as it will be needed when adding other devices to the network later.

► Advanced dialog screen

The **Advanced** dialog screen allows you to set up a network password remotely on other C4L5200™ devices through the powerline.

Type your private network password into the **Network Password** text box.

The other devices on the network with CrossPower™ capabilities will have a different password printed on either the box itself. It normally is of the form xxxx-xxxx-xxxx-xxxx.

Find the passwords for all devices you want to manage and type them one by one into the **Device Password** text box and hit **Add**. This will add the passwords to **Remote Passwords** text list box and set them to the currently defined Network Password.

Note: The device must be present on the powerline in order for the password to be confirmed and added to the Remote Passwords list.

The **Status** indicates whether each device is successfully set to the **Network Password.** "**OK**" indicates success while "**Fail**" indicates a failure.

Hit **Set All** to apply your private network password to all devices that are listed in the **Remote Passwords** text list box and to your local device connected to the computer where the utility is running as well.

☞ Select a password and Hit **Remove** to remove it from the list.

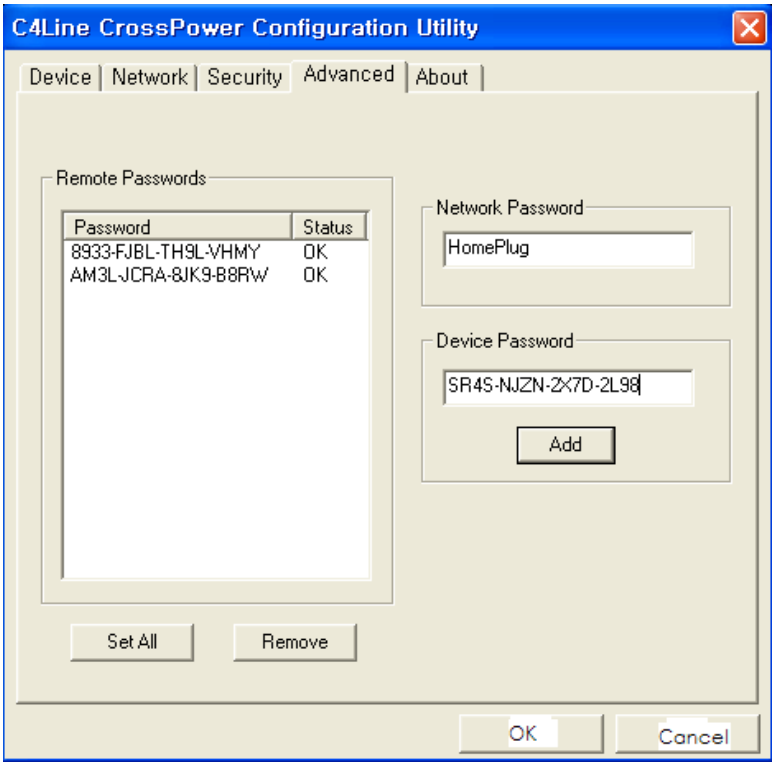


Figure. Advanced dialog screen

► About dialog screen

The **About** dialog screen shows the software version and provides a hot key to access the C4Line website

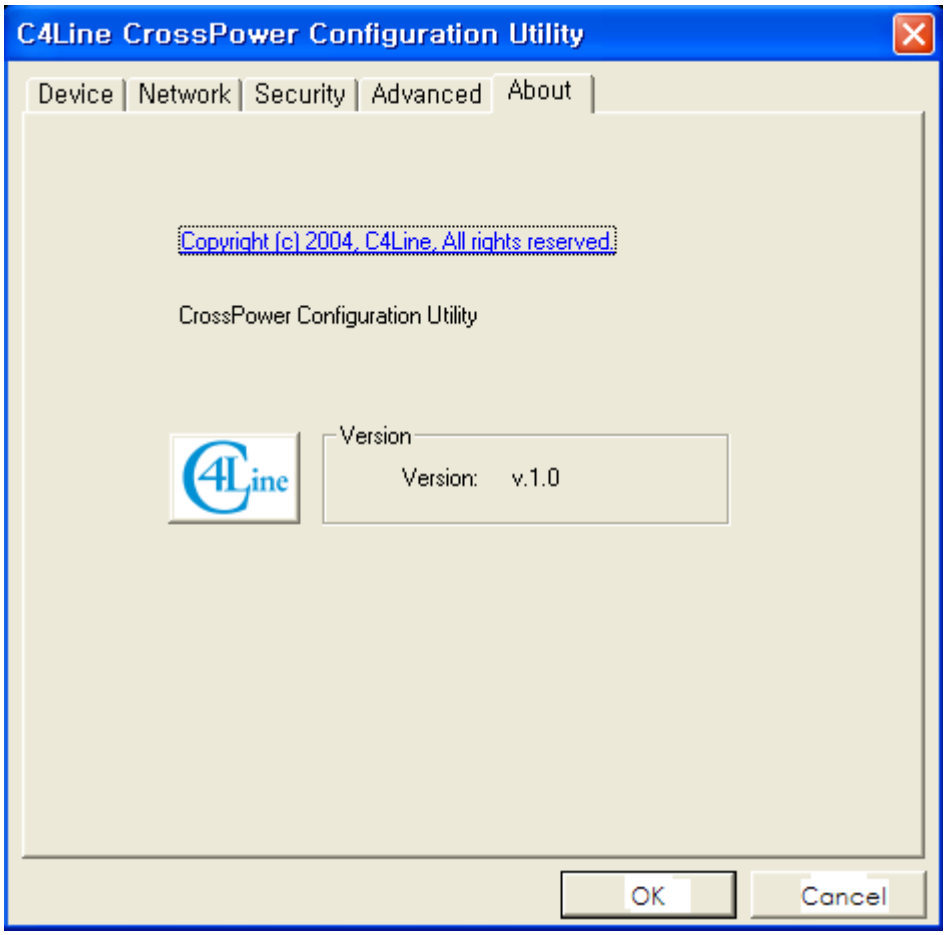


Figure. About dialog screen

After completing the installation successfully through Setup & Configuration Utility Software, you may need to perform additional steps to ensure that your Powerline network is fully functional. These steps consist of setting the IP addresses correctly, testing the setup and running the Encryption Management Utility to secure your network.

Setting the IP Address

Windows defaults to setting up your network device to automatically select an IP address. To change the IP address in Windows 2000, follow these steps :

① Open 'Control Panel' – 'Network and Dial up connections'
② Right click on the Local Area Connection corresponding to the ETH device and select 'Properties'.
③ On the 'General' tab, select Internet Protocol (TCP/IP) and click 'Properties'
④ Select 'Use the following IP address'
⑤ Enter an IP address on the same subnet as the other Powerline devices.
⑥ Enter a Subnet mask of 255.255.255.0
⑦ Click OK
⑧ Click OK to exit the 'Properties' window.

Testing the setup

To verify the Powerline network is working correctly, use the standard "Ping" utility program.

① Ping the IP address of the Powerline node using the same computer that the node is connected to. If this fails, there is a problem with the network interface.
② Repeat the same process with the other Powerline nodes on the network.
③ If all nodes can ping themselves, try pinging another Powerline node on the network. If this fails, verify that your IP addresses are on the same subnet. If this is correct, then make sure that the advanced setup and encryption keys are set properly. If this is correct, then most likely, there is a problem with connections on the powerline. Try a different AC outlet.

To uninstall

To uninstall the software, follow these easy steps :

① Insert the Setup utility CD-ROM into the computer's CD-ROM drive. The setup utility should run automatically.
② It will detect the existing software on your machine and ask you whether you want to modify, repair or remove the software. Select **Remove**.
③ Click **Yes** when the utility asks you to reboot the machine.

3. Specifications for C4L5200-ETH

Connectors

- RJ-45 Data Port(MDI/MDIX)
- Power Outlet

LED Function

DS1 POWERLINE/ETH COLLISION ▪ ON - Collision ▪ OFF - No Collision
DS2 POWERLINE ACTIVITY ▪ ON - PowerLine activity, transmit or receive ▪ BLINKING - looking for more PowerLine devices ▪ OFF - Device is in reset or device is not attached to AC power
DS3 POWERLINE LINK ▪ ON - Another PowerLine device has been detected ▪ OFF - No other PowerLine devices have been detected
DS4 ETHERNET LINK/ACTIVITY ▪ ON - Ethernet Port Link ▪ BLINKING - Ethernet activity ▪ OFF - No Ethernet Port Link

Data Rate
- Up to 14Mbps

Access Methods
- CSMA/CA

Operating Frequency
- 25MHz

Frequency Band
- 4.3 to 20.9 MHz

Modulation
- OFDM(Orthogonal Frequency Division Multiplexing) with automatic Channel adaptation and FEC(Forward Error Correction)

Encryption
- 56bit Data Encryption with Key Management
- Software works on Windos OS Platform only

Standards
- IEEE 802.3
- IEEE 802.3U
- HomePlug 1.0 compliant

Topology
- Star(Ethernet) Bus(Powerline)

Power Source
- 100-240V AC, 0.1A, 50/60Hz

Dimension(LxWxH)
- 9.5x6.5x4cm

Weight
- 0.5 lbs

Safety & EMI
- UL, FCC part 15

Operating Temperature
- 32°F to 131°F (0°C to 55°C)

Storage Temperature
- -4°F to 158°F (-20°C to 70°C)

Operating Humidity
- 10% to 85% Non-condensing

Storage Humidity
- 5% to 90% Non-condensing

Appendix A： Troubleshooting

This appendix provides possible solutions to problems regarding the installation and operation of the C4L5200-ETH. If you can't find an answer here, check the C4Line website at **www.c4line.com.**

1. The Link LED for C4L5200-ETH device does not light up on the 10/100 Base-T

● When the C4L5200 detects a LAN connection, the Link LED will light up. Check the C4L5200-ETH device on your computer to see if the connection and device are working properly. Make sure you are using a straight-through UTP Category 5 cable to connect the 10/100 Base-T to your computer.

● For use with a router, connect a straight-through UTP Category 5 cable to the uplink port of the router, or connect a crossover UTP Category 5 cable to a LAN port on the router.

2. I can't connect to other computers on my powerline network or to the Internet.

● Make sure the IP address and TCP/IP protocol are set up correctly for all the powerline networked computers. For more information on IP address, see "Setting the IP address" section.

● Make sure all devices on the powerline network have been configured using the Security of Configuration Utility. The network password must be the same for all devices in order for them to communicate with each other. See the security dialog screen of Using CrossPower C4L5200 Configuration Utility Software.

Appendix B: Bridges and Nodes

The C4L5200 devices have more advanced capabilities for operation in complex networks. These capabilities relate to the number of bridge devices and node devices allowed in a network.

The C4L5200-ETH can operate in two modes: node mode and bridge mode.
As a node, only one computer is attached to an adapter.
As a multi-device bridge, a switch, router, cable modem, DSL modem, or cluster of devices can be connected to an adapter.

The C4L5200-USB connected to a PC is a node.

An Ethernet device plugged into a PC with no software installed is a bridge. With software running, it can be converted to a node. Without software running, an Ethernet device plugged into a PC (or other single MAC address device) is simplified case of a bridge known as a single-device bridge. As per the maximum limits of the HomePlug 1.0.1 Specification, each C4L5200 can communicate with 15 simultaneous (bridge or node) devices at full speed. Each entry in the simultaneous device list is aged every 10 seconds. All other devices will connect in ROBO mode when they are not taking their turn as full speed connections. As a bridge or a node each C4L5200 device can communicate with an unlimited number of other Intellon PowerPacket bridge or node devices.

Table 1. Capabilities of C4L5200.

Item	Capabilities
Max ROBO mode device connections	Large
Max simultaneous connections	15
Max simultaneous (full speed non-ROBO) multi-device bridges	15
Max simultaneous single-node bridges with no multi-device bridges	15
Max simultaneous single-node bridges with 1 multi-device bridges	14
Max simultaneous single-node bridges with 2 multi-device bridges	13
Max simultaneous devices behind any single bridge	16
Max simultaneous total devices behind all allowed bridges	64
Max simultaneous total devices connected at	79

non-ROBO	

Notes.

1. "Large" is theoretically the MAC address space 2^48, or 280 trillion.
2. 'Simultaneous" is defined as each device communicating over the powerline with the full rate adaptive speed enabled by a valid tone map.
3. ROBO mode device connections are those that communicate at 1Mbps using the ROBO-mode tonemap.

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