COMTREND CORPORATION

PowerGrid 903
User Manual

Version A2.1, September 11, 2008

Introduction

This user manual provides practical information for the installation, operation and application of the device. It is suitable for those with little or no networking experience, although some advanced topics are also covered.
A glossary of acronyms is included in Appendix A for reference.

Protect Our Environment

This symbol indicates that when the equipment has reached the end of its useful life, it must be taken to a recycling centre and processed separate from domestic waste.

The cardboard box, the plastic contained in the packaging, and the parts that make up this router can be recycled in accordance with regionally established regulations. Never dispose of this electronic equipment along with your household waste. You may be subject to penalties or sanctions under the law. Instead, ask for disposal instructions from your municipal government.

Copyright

NOTE: This document is subject to change without notice.

Table of Contents

CHAPTER 1 - INTRODUCTION 3

CHAPTER 2 - BASICS 4

2.1 DEVICE LAYOUT 4

2.2 FRONT PANEL 5

2.3 DEFAULT SETTINGS 6

CHAPTER 3 - QUICK SETUP 7

3.1 INTERNET CONNECTION 7

3.2 COMPUTER CONNECTION 8

3.3 STANDBY MODE 10

CHAPTER 4 - NETWORK PERFORMANCE 11

CHAPTER 5 - WEB USER INTERFACE 12

5.1 IP CONFIGURATION 12

5.1.1 Fixed IP 12

5.1.2 Isolation 15

5.2 LOGIN SCREEN 16

5.3 WUI HOMEPAGE 17

5.4 FURTHER INFORMATION 19

5.5 CHANGE CONFIGURATION 24

CHAPTER 6 - HELP 35

6.1 TROUBLESHOOTING 35

6.2 FAQ 37

APPENDIX A - ACRONYMS 39

Chapter 1 - Introduction

This user guide provides details concerning the installation, configuration and application of COMTREND Corporation's PowerGrid 903 Powerline adapter. The PowerGrid 903 is the physical link between Powerline and Ethernet (10/100M) networks.

The front panel of the PowerGrid 903 has two buttons and three LEDs that allow the user to configure a secure PLC network without the use of a computer. The Status LED shows the available level of data throughput in the application layer.

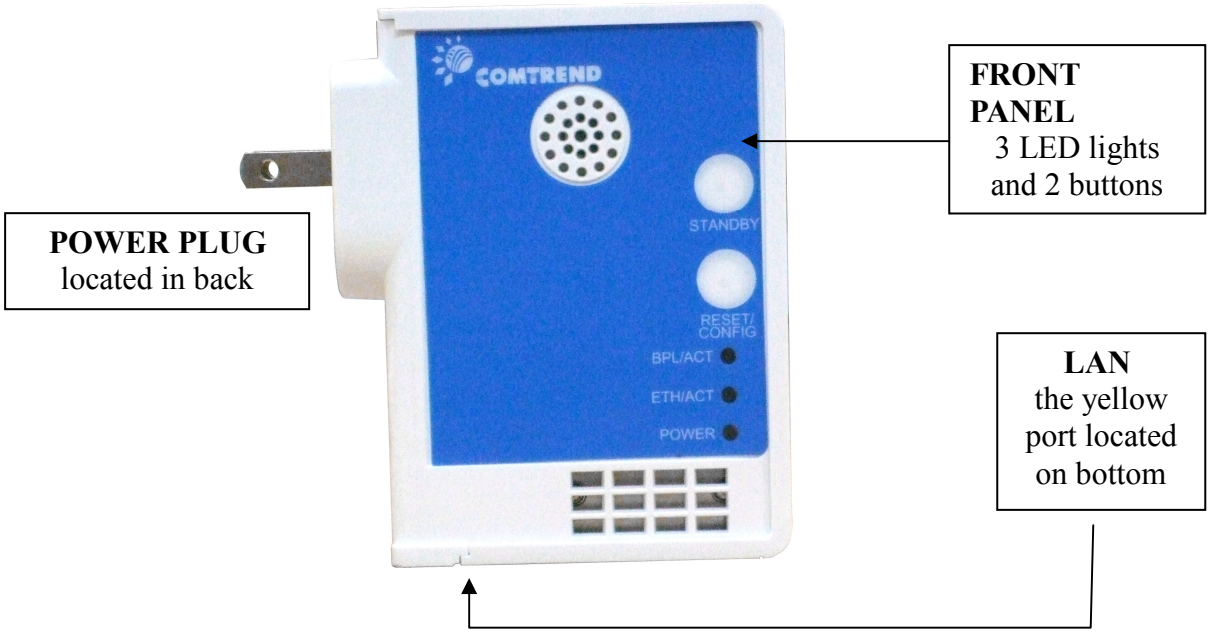
SPECIAL FEATURES

- **One Button Security Setup** - Automatic generation of an Encryption Key and Network Identifier by pressing a single button!
- **Throughput Indicator** - A tri-color Status LED that shows estimated data throughput in the application layer

Chapter 2 - Basics

2.1 Device Layout

The following figure shows the physical layout of the PowerGrid 903 adapter.



2.2 Front Panel

These two tables provide descriptions of the front panel buttons and LEDs.

Button	Function
RESET/CONFIG (Security Setup / Factory Reset)	Press for "One Button Security Setup". Holding down the button for a period (over 5 seconds) will result in a "Factory Reset".
STANDBY (Power ON / Standby button)	Used to switch the adapter between **ON** and **STANDBY** (Power Saving) modes. Turning off the adapter will also set the "Ethernet" LEDs to "off" & the "BPL/ACT" LED will blink twice every 5 seconds

LED	Function
BPL/ACT *	• Off: The unit is without link with other. • Red: The current connection is less than Threshold Low. • Orange: The current connection is greater than Threshold Low and less than Threshold High. • Green: The current connection is greater than Threshold High. • Blinking: Data transmitting/receiving via powerline. Threshold High and Threshold Low is configurable, please refer to Section 5.5 • When in PowerSaving mode (see section 3.3 Standby Mode) the BPL/ACT LED will blink twice every 5 seconds and the ETH/ACT LEDs will be off.
ETH/ACT	• Green On: LAN connection established. • Off: LAN connection is not established. • Blinking: Data transmitting/receiving via Ethernet.
POWER	• Green (steady): EP (End Point) mode. • Green (blinking): Fixed AP is searching. • Orange (steady): Fixed AP (access point) mode. • Off: No AC power supply to the PowerGrid 903 • Blinking orange: fixed AP in searching mode. • 3 Flashes: EP has exchanged keys with AP.

* see Chapter 4 & Section 5.5 for more details.

* "**BPL/ACT**" for PowerGrid903, PowerGrid903cs PLC/PLC switchable model

* "**COAX/ACT**" for PowerGrid903c coaxial model.

2.3 Default Settings

The factory default settings are presented below.

- Username = admin
- Configuration password = paterna
- Factory Reset password = betera

- IP Configuration is Fixed IP
- Fixed IP address = 10.10.1.69
- Fixed IP subnet mask = 255.255.0.0
- Default Gateway IP address = 192.168.1.105

NOTE:	These configuration settings can be customized using a web browser. For further instructions, see Chapter 5 - Web User Interface. To return the adapter to factory default settings, follow the **FACTORY RESET** procedure in the Troubleshooting section of this manual.

Chapter 3 - Quick Setup

PowerGrid 903 units are able to configure in pairs to create a secure private network (with a unique network identifier and encryption key). You simply need to plug the paired units into power outlets and connect them to your devices, as described in the Quick Start Guide.

However, if you encounter problems with the procedure in the Quick Start Guide, you should follow the instructions described below. These instructions describe how to manually secure your network using only the front panel buttons.

NOTE:	You will need a single PowerGrid 903 unit and Ethernet cable for each computer, or other device, that you wish to connect to the Internet.

3.1 Internet Connection

The steps below show how to connect a PowerGrid 903 unit to your modem.

1. Turn on your modem and wait for the Internet connection to become active.

2. Plug a PowerGrid 903 unit into the power socket closest to the modem. The BPL/ACT LED on the front panel of the unit should light up **RED**.

3. Connect the PowerGrid 903 unit to the LAN port of the modem with an Ethernet cable. The ETH/ACT LED on the unit should light up **GREEN**.

AP UNIT CONFIGURATION

A PowerGrid network consists of one AP (Access Point) unit connected to multiple EP (End Point) units. The AP unit controls access to the Internet and connects the EP units to the network. Follow step 4 (below) to configure the AP unit.

4. Press the RESET/CONFIG button on the PowerGrid 903 unit. Wait for the POWER LED to start blinking and then release it. Wait another thirty (30) seconds until it stops blinking and check the POWER LED.

If the POWER LED is now **ON**, then setup was successful and you can now proceed to section 3.2, where you will configure the EP unit. If POWER LED is now **OFF**, or just keeps blinking, you must first press the RESET/CONFIG button for 5 seconds to reset the unit and repeat step 4.

After several attempts, if the POWER LED does not stay **ON**, then disconnect the PowerGrid 903 unit from the modem and the power socket, choose another unit and repeat the process from step 2.

If all else fails, contact your supplier or service provider for further assistance.

3.2 Computer Connection

The steps below show how to connect a PowerGrid 903 unit to your computer.

1. Turn on your computer.

2. Plug a PowerGrid 903 unit into the power socket closest to the computer. The BPL/ACT LED should light up **GREEN**.

3. Connect the PowerGrid 903 to the computer with an Ethernet cable. The ETH/ACT LED on the unit should light up **GREEN**.

EP UNIT CONFIGURATION

As previously discussed, a PowerGrid network can have only one AP unit. This unit was configured in section 3.1. All other units must be set as EP units.

To do so, follow these steps:

4. Press the RESET/CONFIG button on the **AP unit** until the POWER LED starts blinking and then release it. You now have thirty (30) seconds to complete the EP set up.

5. Before the **AP unit** POWER LED stops blinking, press the RESET/CONFIG button on the PowerGrid 903 that you wish to configure as an **EP unit**. Wait for its POWER LED to start blinking and then release the button. After a few seconds, the POWER LED should flash three times quickly in **Green** and then steady in Green.

If the POWER LED of the **EP unit** is now **OFF**, then proceed to step 6. If the POWER LED of the **EP unit** keeps blinking, you must press RESET/CONFIG for 5 seconds to factory reset and then return to step 4.

After several tries, if the POWER LED of the EP unit does not remain **GREEN**, then disconnect it from its power socket and from the computer, or other device. Select another EP unit, if possible, and repeat the process from step 2.

If all else fails, contact your supplier or service provider for further assistance.

6. After adding the **EP unit** to the PowerGrid network, check that the POWER LED on the **AP unit** has stopped blinking and remains **ON**, as in figure 7.

   If the POWER LED on the **AP unit** just keeps blinking, you must first reset the unit and then try again. To reset the unit, press RESET/CONFIG for 5 seconds. Then return to step 4 in section 3.1 and repeat section 3.2 for every device you wish to add to the network.

   After several tries, if the POWER LED on the **AP unit** does not stay **ON**, then disconnect it from the modem and its power socket, choose another unit to be the AP unit and repeat the entire process starting from section 3.1, step 2.

   If all else fails, contact your supplier for further assistance.

7. If the POWER LED on the **AP unit** is now **ON**, then you have completed the setup successfully.

CONGRATULATIONS!

You can now either:

- Add another computer to the network by repeating steps 1-6

OR

- Stop here and start enjoying your secure PowerGrid network!

3.3 Standby Mode

To save power, put these units into Standby mode when not in use. To do so, press and release the **STANDBY** button on the front panel of each unit. These units also have a PowerSaving mechanism that will put the unit into Standby mode automatically. This will occur if there is no Ethernet Link detected within a 15 minute period, and assuming that the unit is not required for Powerline routing.

For greater power savings, you can also unplug each PowerGrid 903 unit. You may want to do this, if you are going on holiday or a business trip for an extended period. These units keep their network security settings even after losing power, so that you do not need to worry about losing network settings. This feature is especially useful when moving networked devices or even after a power outage!

Chapter 4 - Network Performance

The BPL/ACT LED shows the estimated available level of throughput in the application layer.

There are three levels of throughput indicated by three different LED colors. A particular adapter shows, with one color, the throughput level with reference to the adapter sending the most data to it. In the case of a network consisting of two adapters, they always show the level of throughput with reference to the other. However, in the case of a network of three or more adapters, each one internally measures the amount of bytes received from the other adapters in the network and only shows the level of throughput with reference to the one that is sending the most data.

A throughput estimator also keeps track of the number of neighboring networks since available bandwidth will be divided between them when sharing the PLC channel. The thresholds for these levels of throughput are configurable, please refer to Section 5.5 Change Configuration, LED Threshold Configuration.

LED	STATUS
RED	Estimated Throughput < Threshold Low
ORANGE	Threshold Low < Estimated Throughput < Threshold High
GREEN	Estimated Throughput > Threshold High

Chapter 5 - Web User Interface

The web-based user interface (**WUI**) provides information about your PowerGrid 903 units and can also be used to configure or reset their settings.

The WUI is accessed using a web browser, such as Microsoft Internet Explorer. The instructions that follow assume the PowerGrid network has been configured correctly (i.e. according to the instructions in Chapter 3 or the QIG) and that the host computer is running Windows XP.

NOTE:	The process described in the following sections will work for any operating system (OS), but the specific steps will need to be adjusted to match your particular computing environment.

5.1 IP Configuration

Before using the WUI, you first need to adjust the IP configuration of the host PC. This is a two-step process addressed in subsections 5.1.1 and 5.1.2.

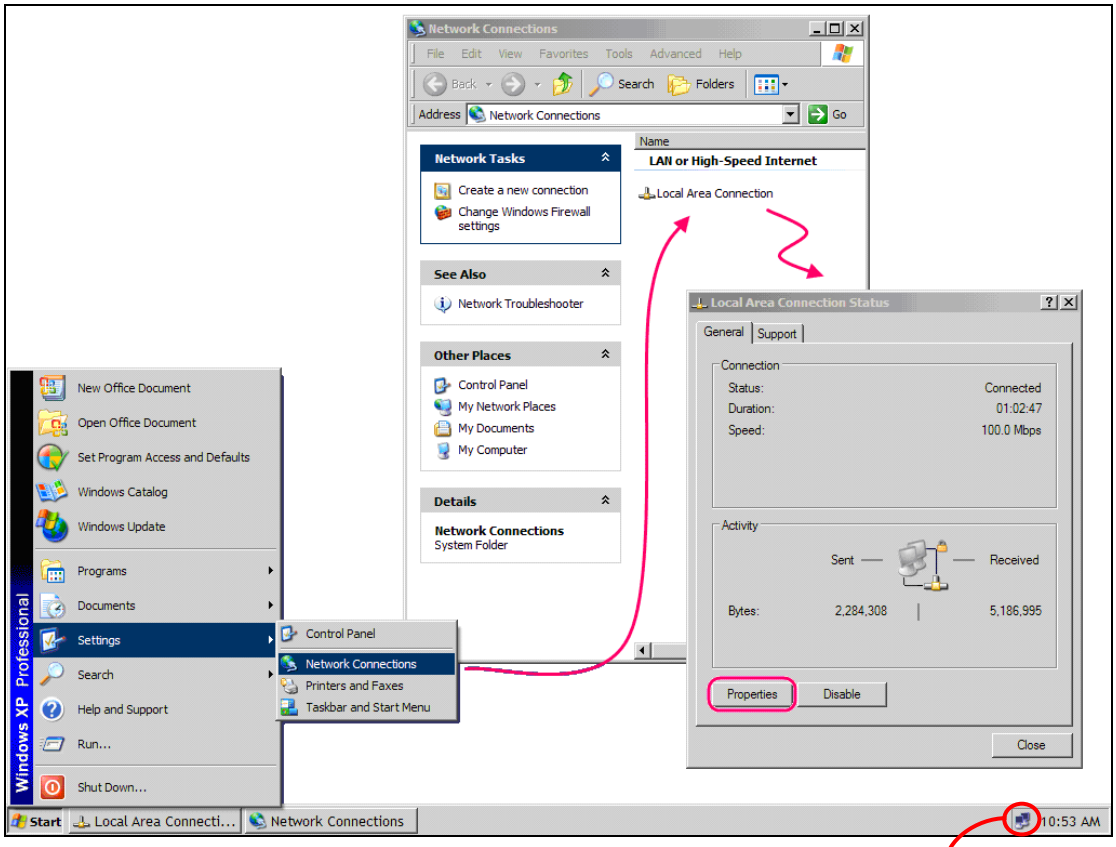
FYI:	The IP configuration defines the location of your computer within the network using Internet Protocol (**IP**) addressing. Your computer needs an IP address so it can receive and send information on the network. In **Fixed IP** mode you assign this IP address yourself; while in **DHCP** mode it is assigned automatically by a DHCP server.

5.1.1 Fixed IP

The following instructions describe how to change the IP configuration of your computer to **FIXED IP** mode, so that you can access the WUI.

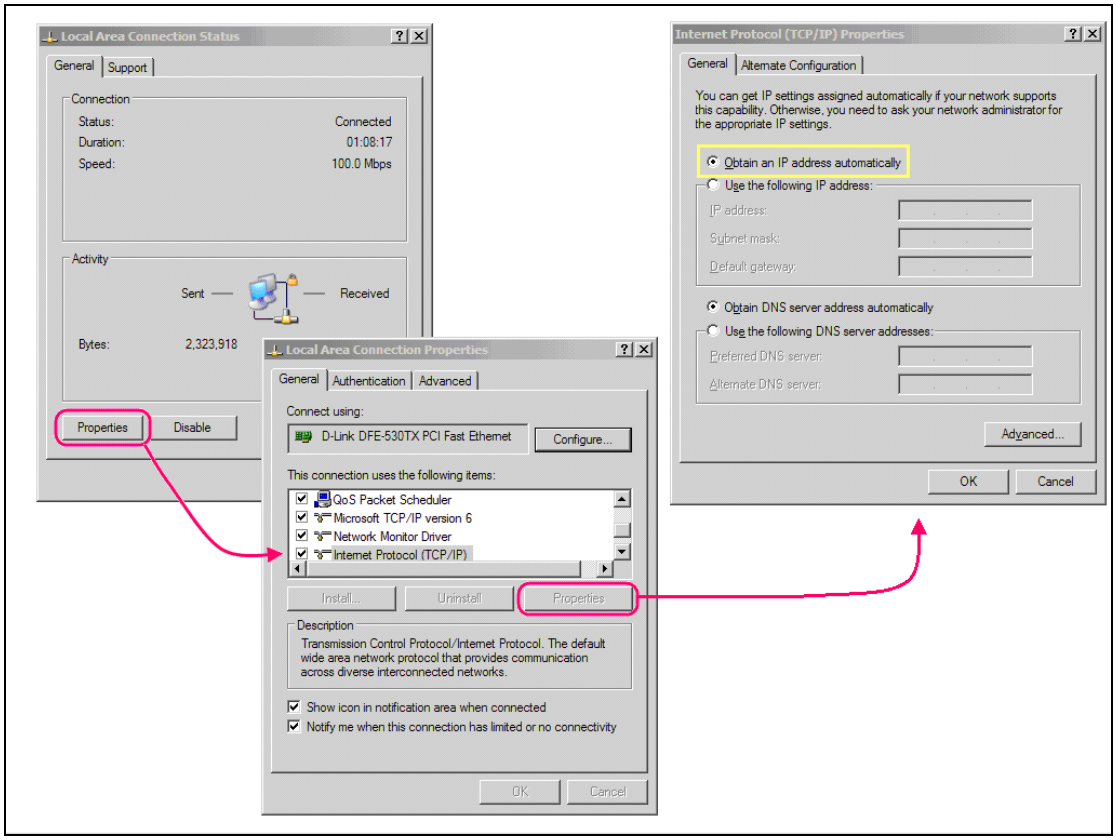
STEP 1: Turn on your computer (and login, if necessary).

STEP 2: **F**rom the desktop (as shown below), click on the **Start** button and select **Network Connections.** Next, double-click **Local Area Connections** to open its window and then click the **Properties** button.



NOTE: You may also access this window by double-clicking the Local Area Connection icon on your taskbar.

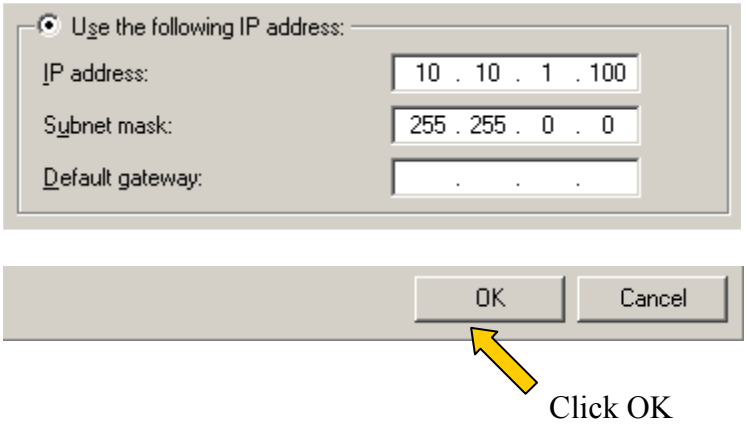
STEP 3: Select **Internet Protocol (TCP/IP)** and click the **Properties** button.



STEP 4: Check the settings in the **Internet Protocol (TCP/IP) Properties** dialog box (shown on the far right in the figure above). Make sure to record all the settings you see here, as you will need to reset them later.

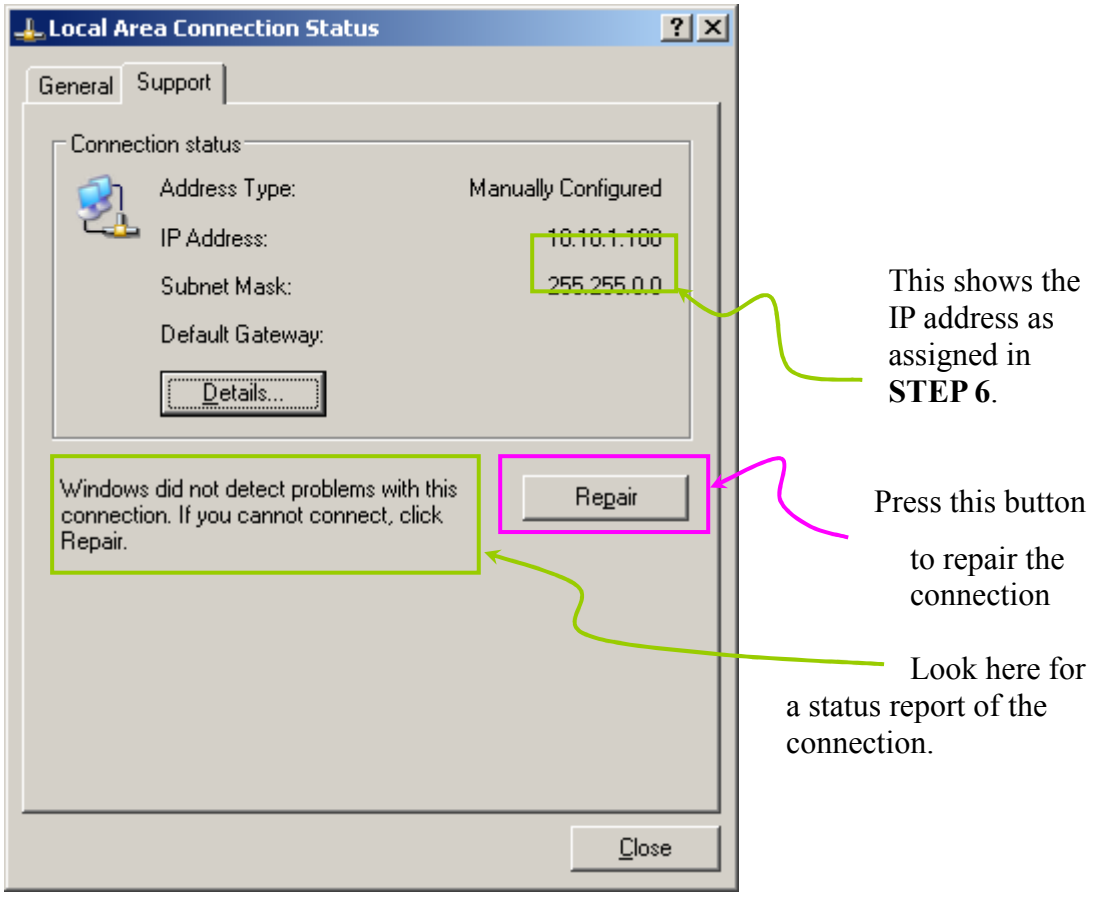
STEP 5: If the "Obtain an IP address automatically" radio button is selected, then your PC is configured in **DHCP** mode. In this case you should select the "Use the following IP address" radio button instead.
If it is not selected then your PC is already in **FIXED IP** mode.

STEP 6: Change the **IP address**, **Subnet Mask** and **Default Gateway** to match those values shown in the figure below and click the **OK** button**.**



STEP 7: Close the previous two windows. Since you made changes, click **OK**, but not **Cancel**! You then must wait for the LAN connection to reset.

After the connection recovers, you should check the connection status on the support tab of the **Local Area Connection Status** dialog box, as shown below.



5.1.2 Isolation

Now that the IP configuration of the computer is complete, we will proceed by isolating the PowerGrid 903 unit you wish to access. This is required since every unit on the network is configured by default with the same Fixed IP address.

STEP 1: Move the PowerGrid unit you wish to access to a power jack close to your computer. Connect the ETHERNET cable from your computer or network hub to this PowerGrid unit.

STEP 2: Remove every other PowerGrid unit from the network by placing them in Standby mode (press the STANDBY button and release) **OR** to be certain, you can simply unplug every unit from its power jack.

STEP 3: Press the **Repair** button on the **Local Area Connection Status** dialog box shown above. This resets the network so you can access the WUI.

When you have finished using the WUI, return the PowerGrid 903 unit to its previous location, reset the IP configuration of the host computer, and press the **Repair** button again to return your system to its previous condition.

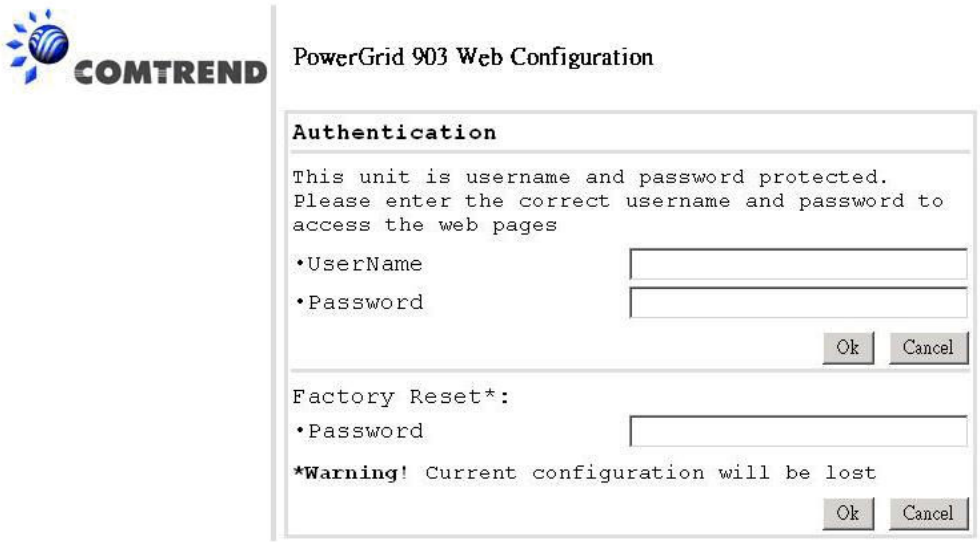
5.2 Login Screen

Perform the following steps to login to the WUI:

STEP 1: Start the Internet browser and enter the IP address as a HTTP link in the URL address field and press **Enter**. For the default IP address of 10.10.1.69, you must enter "http://10.10.1.69", as shown below.

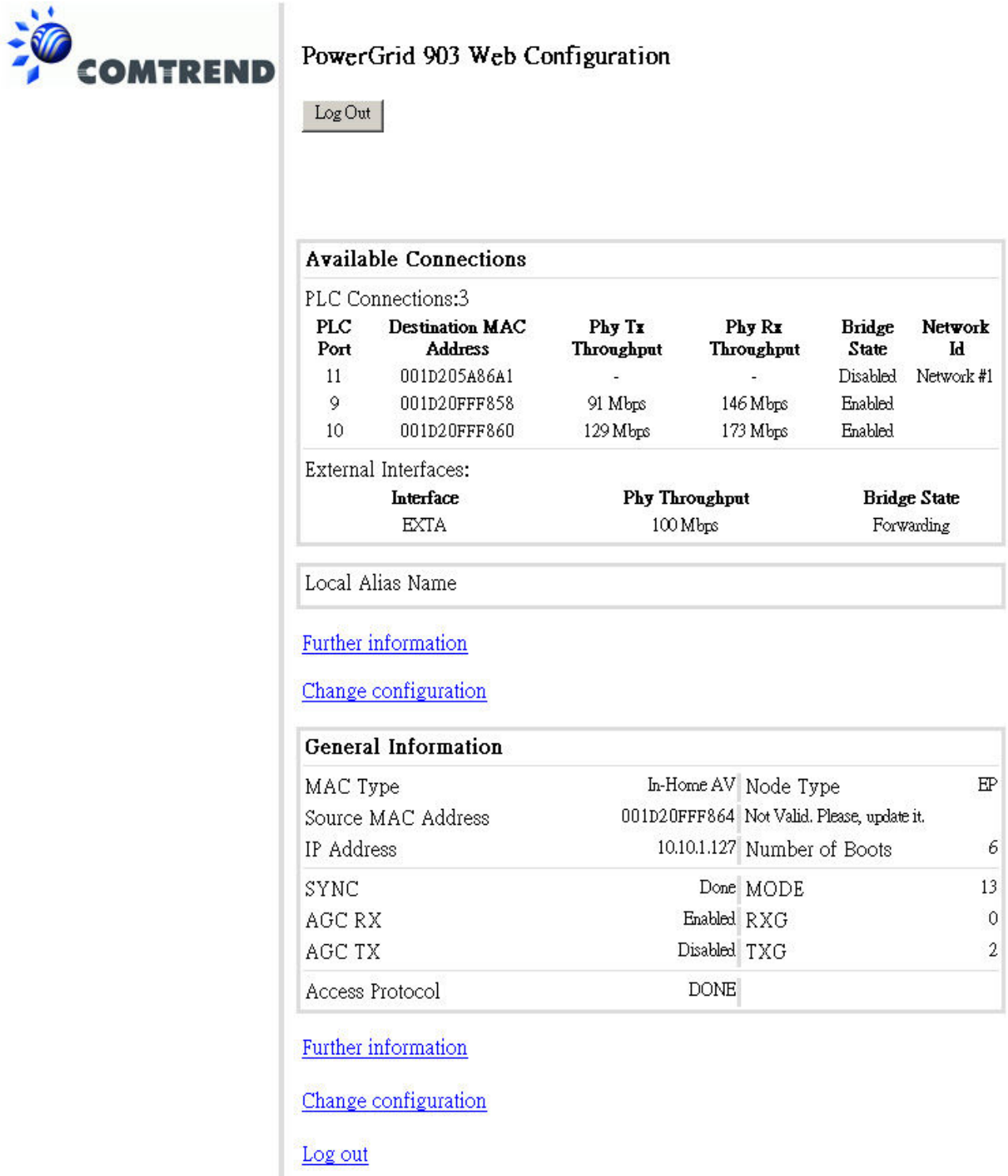
STEP 2: The login screen should appear, as shown below. Enter the login password in top section and click **OK** to continue. To perform a factory reset on the device you must enter the factory reset password in the bottom section and click **OK**. The WUI login password and other default settings can be found in section, 2.3 Default Setting.

.



5.3 WUI homepage

If login is successful, you will arrive at the WUI homepage. This screen provides summary information concerning the PowerGrid unit and its connections. It also provides access to the **Further Information** and **Change Configuration** screens. These screens are discussed in section 5.4 and section 5.5.



See the table below for details.

PLC Connections	
PLC Connections	Available PLC units, it show the total numbers of PLC which connects in the power line loop.
PLC PORT	The PLC data connection port
Destination MAC Address	This is a code that identifies all remote devices connected to this unit.
Phy Tx/Rx Throughput	Physical Transmission / Reception Throughput is a measure of network bandwidth. Available data transmission capacity is roughly half this value.
Bridge State	Enabled indicates there is a data connection. Disabled indicates no data connection.
Network Id	Network ID is used for network security. If present, it means the remote device is on the same network.
External Interfaces	
Interface	EXTA = Ethernet
Phy Throughput	Physical Throughput = Data Transmission Capacity
Bridge State	Forwarding = Active

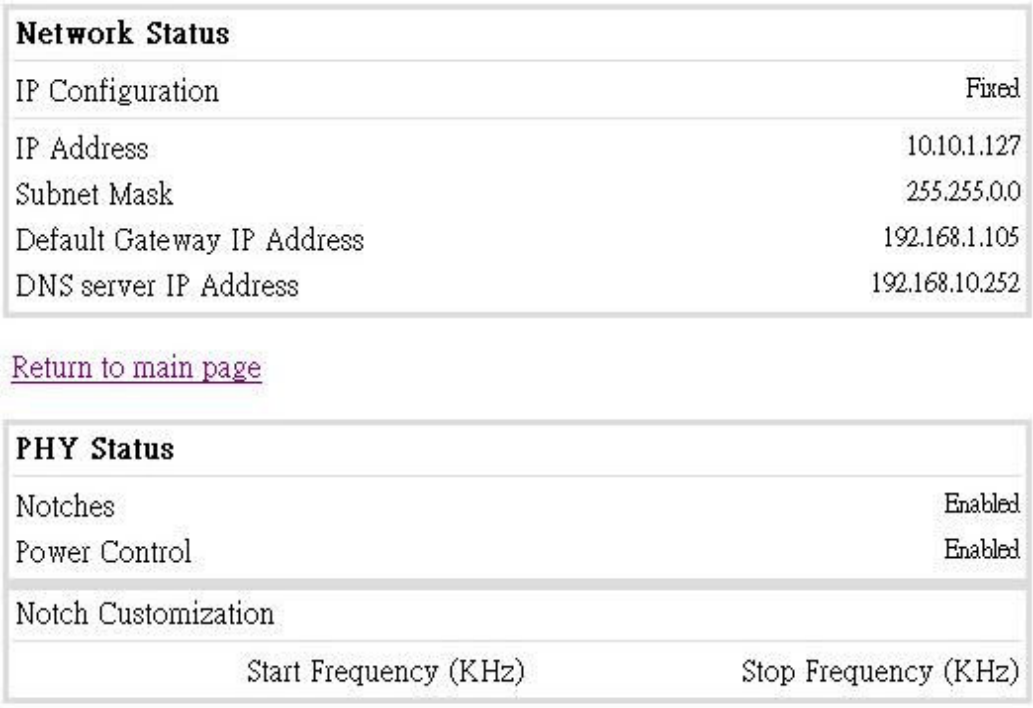
General Information	
MAC Type	The MAC Address shown above is an In-Home AV type.
Source MAC Address	This is a code that identifies all Powerline devices connected to this unit.
IP Address	The IP Address defines the location of the PowerGrid unit on the local area network.
Node Type	This will show as Fixed AP, EP or AP.
Number of Boots	The number of times this PowerGrid unit has been rebooted since the last Factory Reset.
NOTE: The remaining fields are advanced settings used for technical support.	

5.4 Further Information

This screen provides more detailed information concerning your network. It is divided into various sections with each section divided by a link back to the WUI homepage entitled "**Return to main page**".
The tables below provide details about each section.

System Information	
Uptime	This shows the length of time the PowerGrid unit has been on.
Firmware Version	This shows the PowerGrid 903 installed firmware version

MAC Status	
This section provides information for identification of the PowerGrid unit by MAC Address, in addition to PowerGrid network encryption details.	
MAC Address	This is a code that identifies each PowerGrid unit.
MAC Type	In-Home AV is the only option at this time.
Node Type	This will show as Fixed AP, EP or AP.
Network Identifier	This field is used to identify the network. It can be up to 20 ASCII characters long.
Encryption Key	This key is used to encrypt the network. It is encoded in either ASCII or HEX format.
Encryption Type	The possibilities are 168 bit *3DES* or *128/256* bit *AES.*



Network Status	
IP Configuration	Fixed
IP Address	10.10.1.127
Subnet Mask	255.255.0.0
Default Gateway IP Address	192.168.1.105
DNS server IP Address	192.168.10.252

Return to main page

PHY Status	
Notches	Enabled
Power Control	Enabled
Notch Customization	
Start Frequency (KHz)	Stop Frequency (KHz)

Return to main page

Network Status	
This section shows the current IP configuration.	
IP Configuration	Either DHCP (Automated) or FIXED IP (Manual)
IP Address / Subnet Mask	These values define the location of the PowerGrid unit on the local area network.
Default Gateway IP Address	The IP address of the router that forwards traffic to a destination that is out of reach of the PowerGrid 903unit.
DNS server IP Address	The IP address of the server that provides Domain Name System (DNS) services such as hostname IP lookup.

PHY Status	
This section summarizes the physical parameters of the network.	
Notches	Enabled by default.
Power Control	This function minimizes the transmission power of each PowerGrid unit while maintaining data throughput performance. Enabled by default.
Notch Customization	Any customized notches will be listed here.

LLTD Status	
LLTD (Link Layer Topology Discovery) is a protocol supported by Windows Vista. LLTD enables applications to discover the topology of a network and includes optional QoS Extensions that applications can use to diagnose problems.	
Link Layer Topology Discovery (LLTD)	Enabled by default. When enabled, Multicasting is limited to either IGMP or MLD Aware Multicast Syndication (i.e. only one can be enabled).

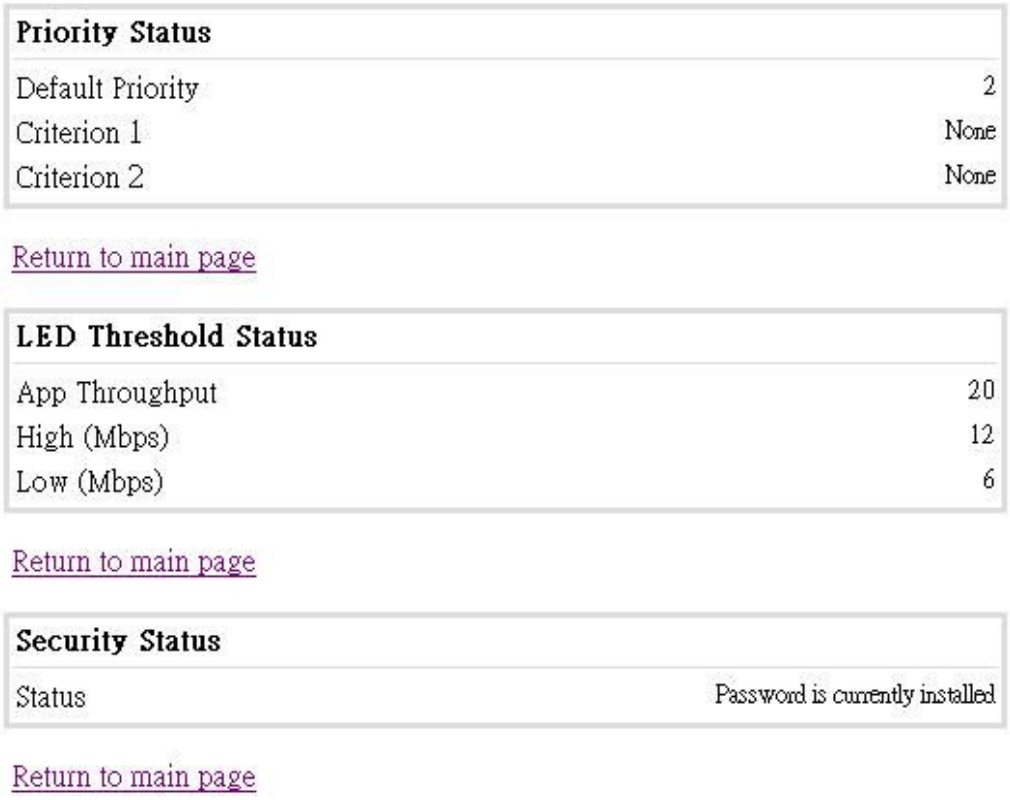
Multicast Status	
IGMP (Internet Group Membership Protocol) and MLD (Multicast Listener Discovery) are protocols used by IP hosts to report their multicast group memberships to any neighboring multicast routers.	
Automatic Multicast	Disabled by default. When Enabled, it will enable or disable IGMP and/or MLD Aware Multicast Syndication.
IGMP Aware Multicast Syndication (IPv4)	Disabled by default. (See LLTD description above)
MLD Aware Multicast Syndication (IPv6)	Disabled by default. (See LLTD description above)

Return to main page

Return to main page

PowerSaving mechanism	
This function activates a low power mode when the PowerGrid unit is inactive.	
PowerSaving mechanism	Enabled = PowerSaving On Disabled = PowerSaving Off
Hysteresis time (Ethernet Link)	PowerSaving mode becomes active when it is Enabled and there is no Ethernet Link for {*x*} number of seconds, where {*x*} is the Hysteresis time. It is inactivated when an Ethernet Link is detected.
NOTE: PowerSaving mode will not activate if the PowerGrid unit is assigned as a master or repeater within the Powerline network.	

VLAN Status	
With this function an 802.1Q VLAN Tag is added to the data packet header. This enables a physical LAN to be divided into several discrete virtual LANs. Data packets are given priority based upon their VLAN Tag and VLAN Priority settings.	
VLAN Configuration	Enabled = VLAN Tagging - On Disabled = VLAN Tagging - Off
VLAN Tag	A number in the range from 2 to 4094.
VLAN Priority	A number between 0 and 7 (7 is highest priority).



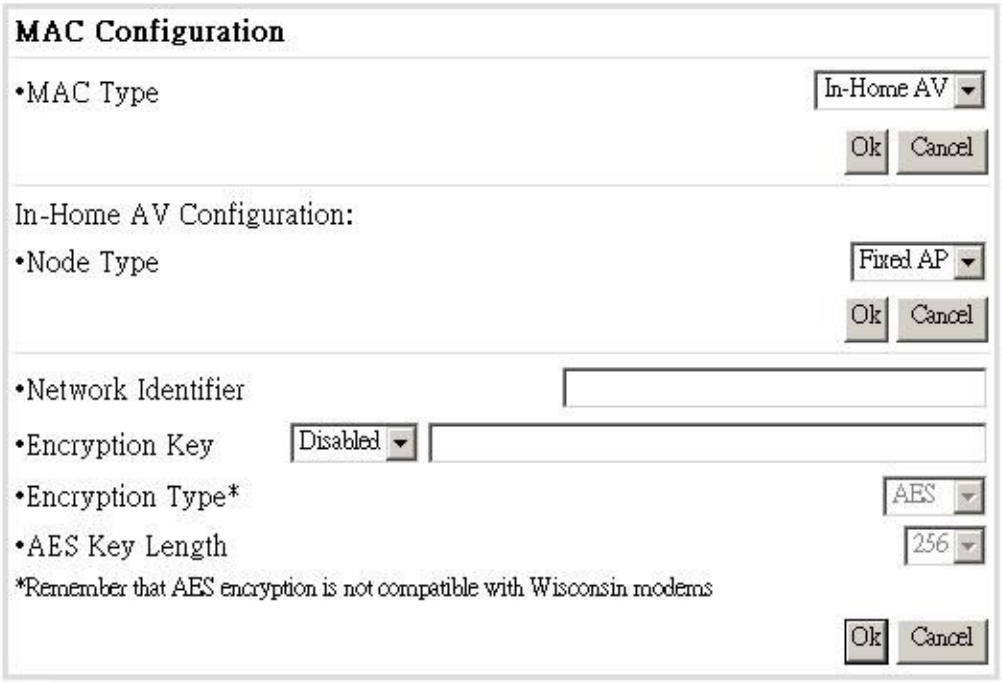
QoS Status (Priority Status)	
Improve the end-user experience by prioritizing audio, video and voice traffic and optimizing the way shared network resources are allocated among applications.	
Default Priority	2 is the default priority
Criterion 1	None (default) or Custom
Criterion 2	None (default) or Custom

LED Threshold Status	
This section allows you to check the configurable LED Threshold.	
App Throughput	The currently reachable throughput.
THRESHOLD High (Mbps)	The Higher Threshold of BPL/ACT LED
THRESHOLD Low (Mbps)	The Lower Threshold of BPL/ACT LED

Security Status: *Indicates whether WUI password login is required*	
Status	Password is currently installed / No password installed

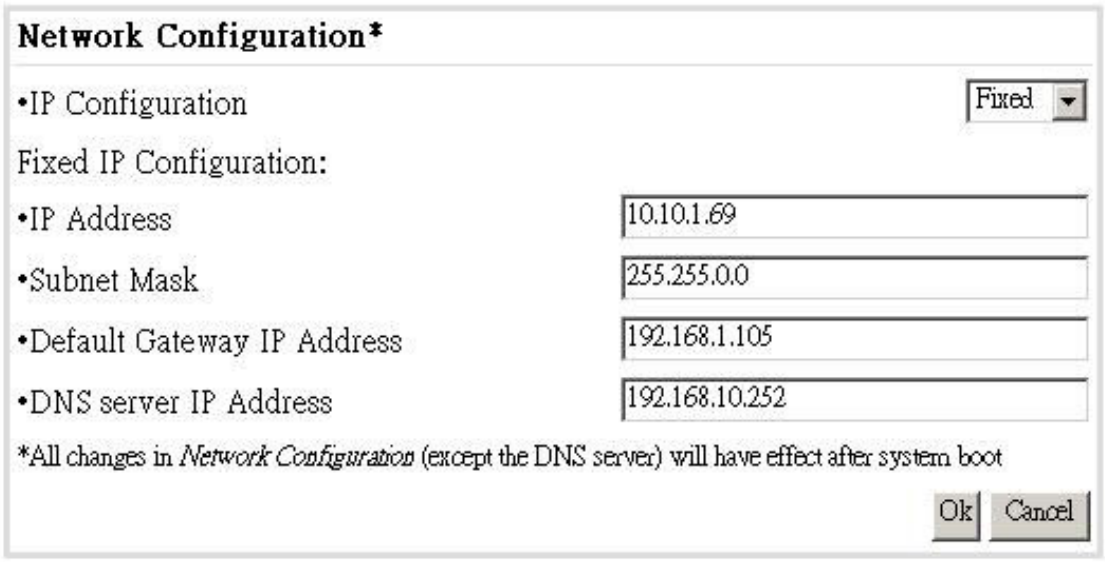
5.5 Change Configuration

This submenu provides various configuration options with each section divided by a "**Return to main page**" link to the WUI homepage.

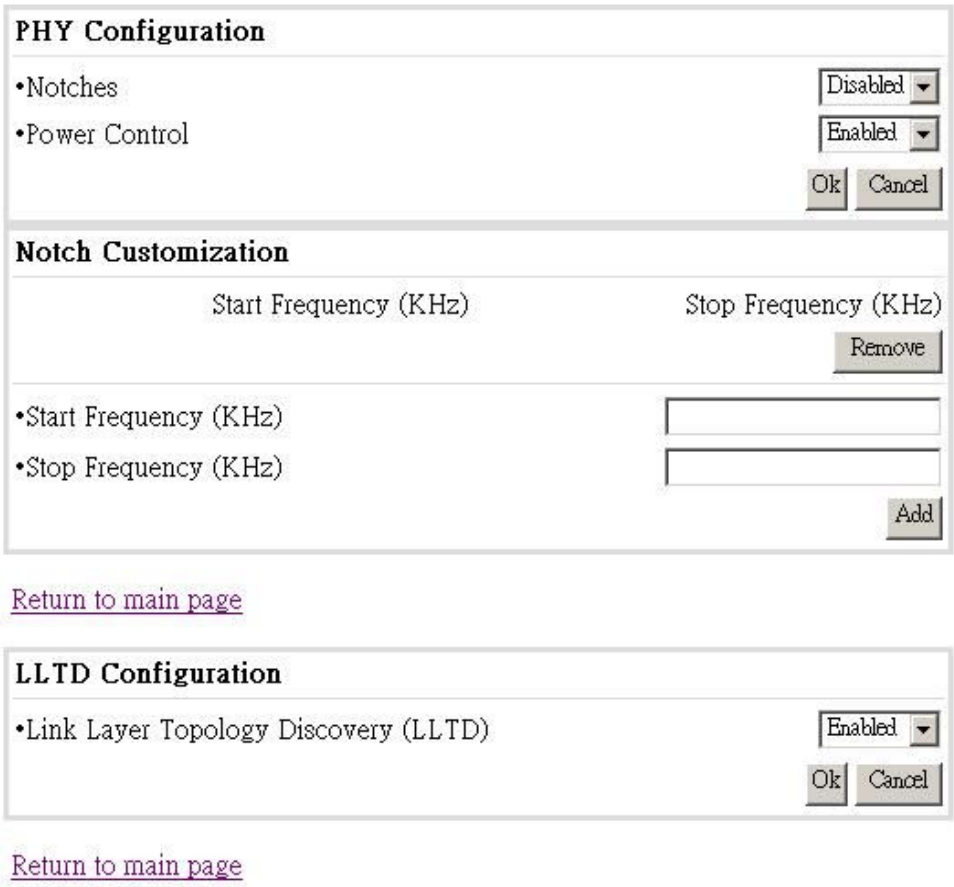


The tables below provide details about each configuration section.

MAC Configuration	
This section provides options to configure the PowerGrid unit MAC characteristics and network encryption mode.	
MAC Type	In-Home AV is the only option at this time.
Node Type	Choose Fixed AP or EP.
Network Identifier	This field is used to identify the network. It can be up to 20 ASCII characters long.
Encryption Key	This key is used to encrypt the network. It is encoded in either ASCII or HEX format.
Encryption Type	The possibilities are *168 bit 3DES* or *128/256* bit *AES*.
AES Key Length	AES encryption can be set as 128 or 256 bit strength.
NOTES: *In 3DES mode, the Encryption Key can be up to 24 ASCII characters or 42 hexadecimal numbers. In AES mode, it can be up to 36 ASCII characters or 64 hexadecimal numbers (256 bit mode). Hexadecimal encryption is stronger.*	

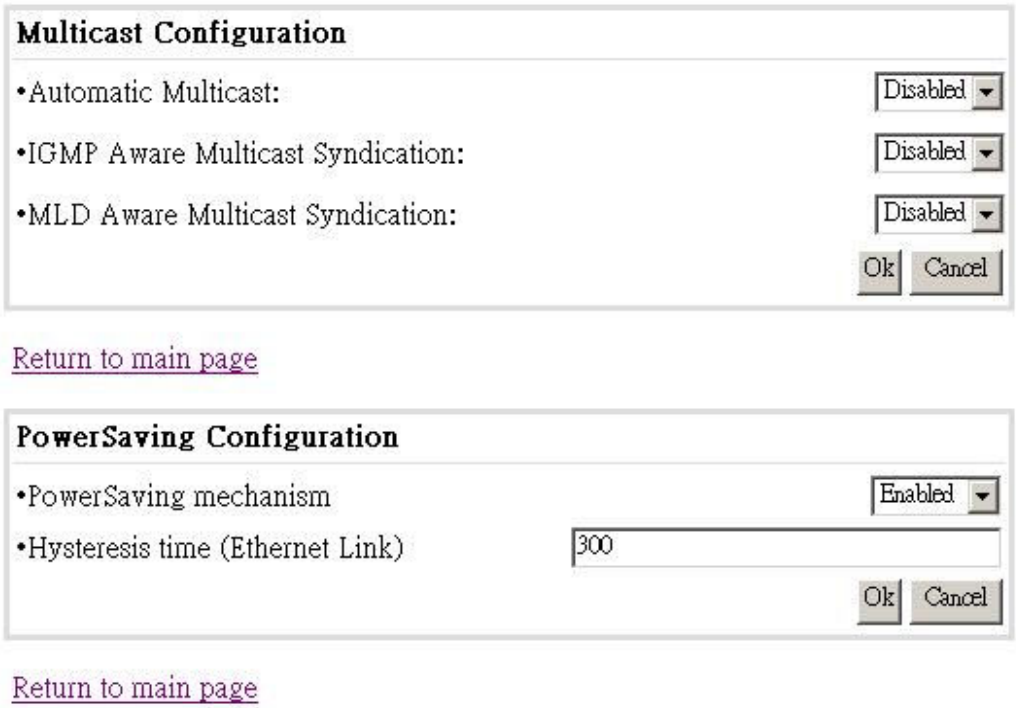


Network Configuration	
The section provides options to configure the IP configuration.	
IP Configuration	Either DHCP (Automated) or FIXED IP (Manual).
NOTE: *In FIXED mode the IP Address, Subnet Mask and Default Gateway IP Address can be set manually, while in DHCP mode they are assigned by a server. Changes do not become effective until after a reboot of the PowerGrid 903unit.*	
IP Address / Subnet Mask	These values define the location of the PowerGrid unit on the local area network.
Default Gateway IP Address	The IP address of the router that forwards traffic to a destination that is out of reach of the PowerGrid 903unit.
DNS server IP Address	The IP address of the server that provides Domain Name System (DNS) services such as hostname IP lookup.



PHY Configuration	
This section provides options to configure the physical parameters of the network	
Notches	Enabled by default.
Power Control	This function minimizes the transmission power of each PowerGrid unit while maintaining data throughput performance. Enabled by default.
Notch Customization	Customized notches can be added or removed here. Enter Start and Stop Frequencies and click the **Add** button to add a customized notch. To remove a customized notch, select it and click **Remove**.

LLTD Configuration	
LLTD (Link Layer Topology Discovery) is a protocol supported by Windows Vista. LLTD enables applications to discover the topology of a network and includes optional QoS Extensions that applications can use to diagnose problems.	
Link Layer Topology Discovery (LLTD)	Enabled by default. When enabled, Multicasting is limited to either IGMP or MLD Aware Multicast Syndication (i.e. only one can be enabled).



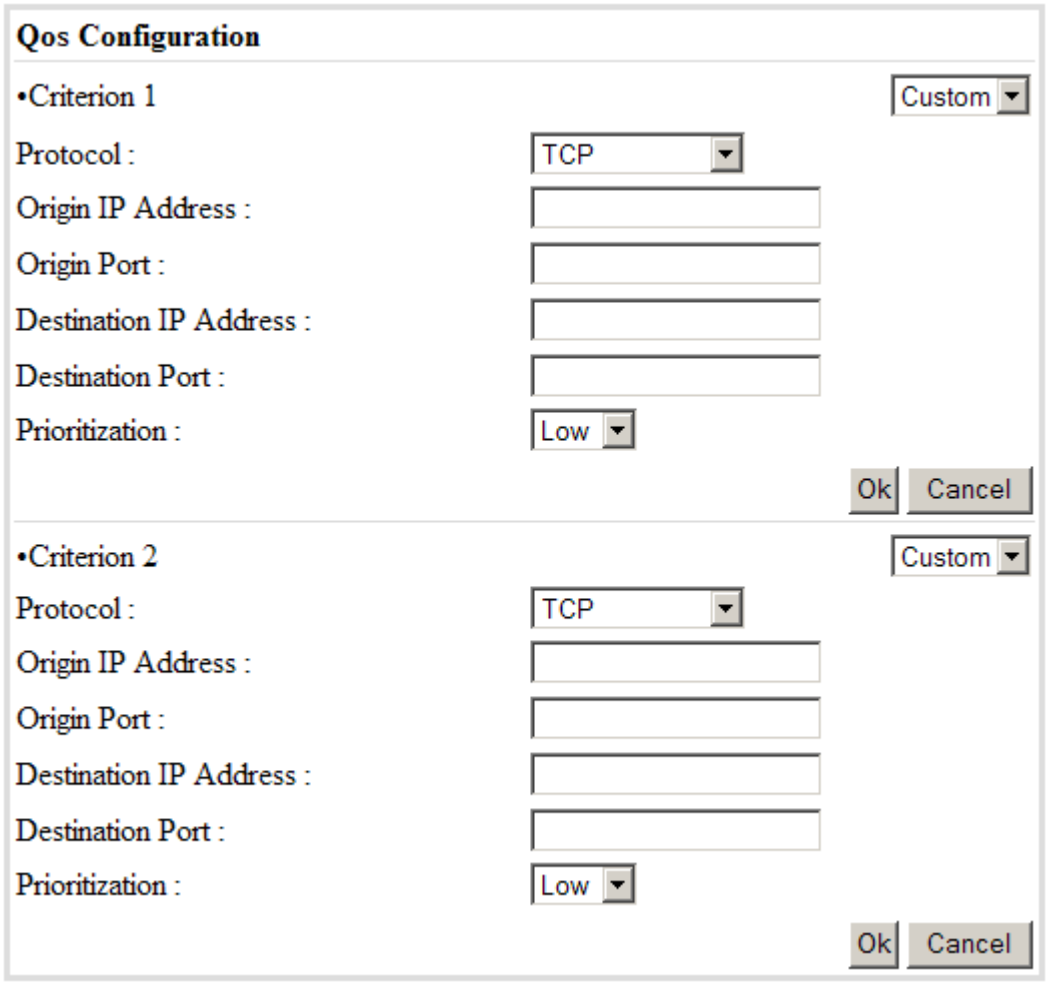
Multicast Configuration	
IGMP (Internet Group Membership Protocol) and MLD (Multicast Listener Discovery) are protocols used by IP hosts to report their multicast group memberships to any neighboring multicast routers.	
Automatic Multicast	Disabled by default. When Enabled, it will enable or disable IGMP and/or MLD Aware Multicast Syndication.
IGMP Aware Multicast Syndication (IPv4)	Disabled by default. (See LLTD description above)
MLD Aware Multicast Syndication (IPv6)	Disabled by default. (See LLTD description above)

PowerSaving Configuration	
This function activates a low power mode when the PowerGrid unit is inactive.	
PowerSaving mechanism	Enabled = PowerSaving On Disabled = PowerSaving Off
Hysteresis time (Ethernet Link)	PowerSaving mode becomes active when it is Enabled and there is no Ethernet Link for {*x*} number of seconds, where {*x*} is the Hysteresis time. It is inactivated when an Ethernet Link is detected.
NOTE: PowerSaving mode will not activate if the PowerGrid unit is assigned as a master or repeater within the Powerline network.	

VLAN Configuration	
With this function an 802.1Q VLAN Tag is added to the data packet header. This enables a physical LAN to be divided into several discrete virtual LANs. Data packets are given priority based upon their VLAN Tag and VLAN Priority settings.	
VLAN Configuration	Enabled = VLAN Tagging - On Disabled = VLAN Tagging - Off
VLAN Tag	Choose a number in the range from 2 to 4094.
VLAN Priority	Choose from 0 to 7 with 7 being the highest priority.

QoS Configuration	
Improve the end-user experience by prioritizing audio, video and voice traffic and optimizing the way shared network resources are allocated among applications.	
Default Priority	2 is the default priority
Criterion 1	None (default) or Custom
Criterion 2	None (default) or Custom
Easy Priority Configuration	Quick setup for priority with recommends value. Please refer to the screenshot below.

If custom criteria are chosen, the following (previously hidden) fields will appear:



The QoS criteria are applied as follows:

a) Criterion 1 is processed first and Criterion 2 second
b) If Criterion 1 is met, Criterion 2 will NOT be applied

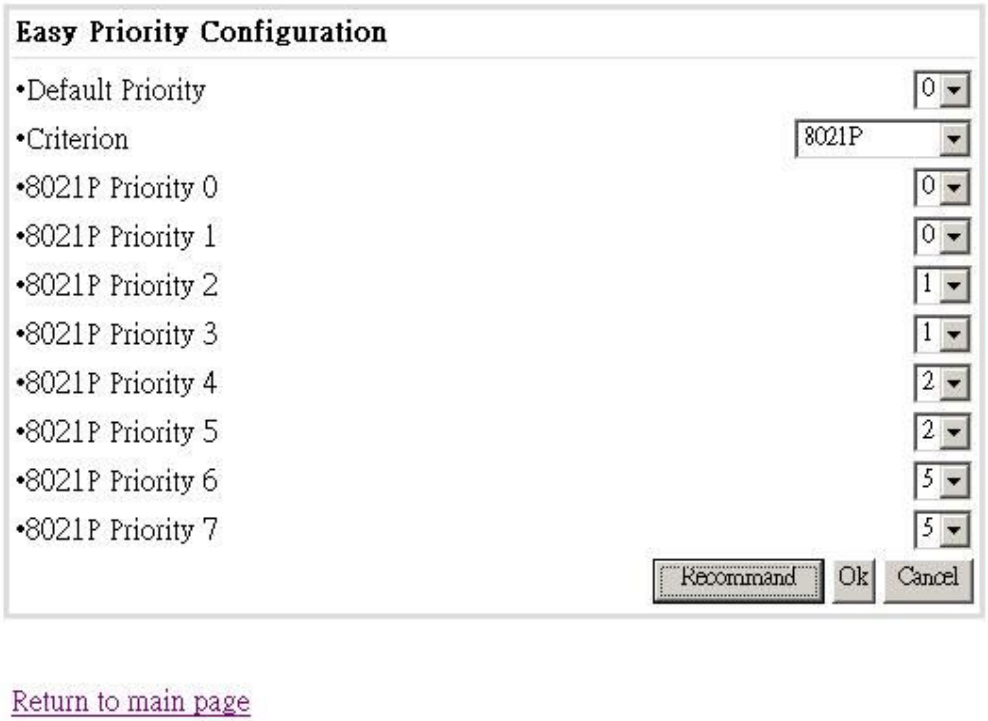
Therefore, Criterion 2 should be more general than Criterion 1, and there are certain incompatibilities that arise between these criteria. Consult this table:

If Criterion 1 Protocol is …	Then Criterion 2 can be …
Origin IP / Destination IP	None of these protocols.
TCP with port	UDP Protocol, Origin and destination IP address for UDP packets
UDP with port	TCP Protocol, Origin and destination IP address for TCP packets

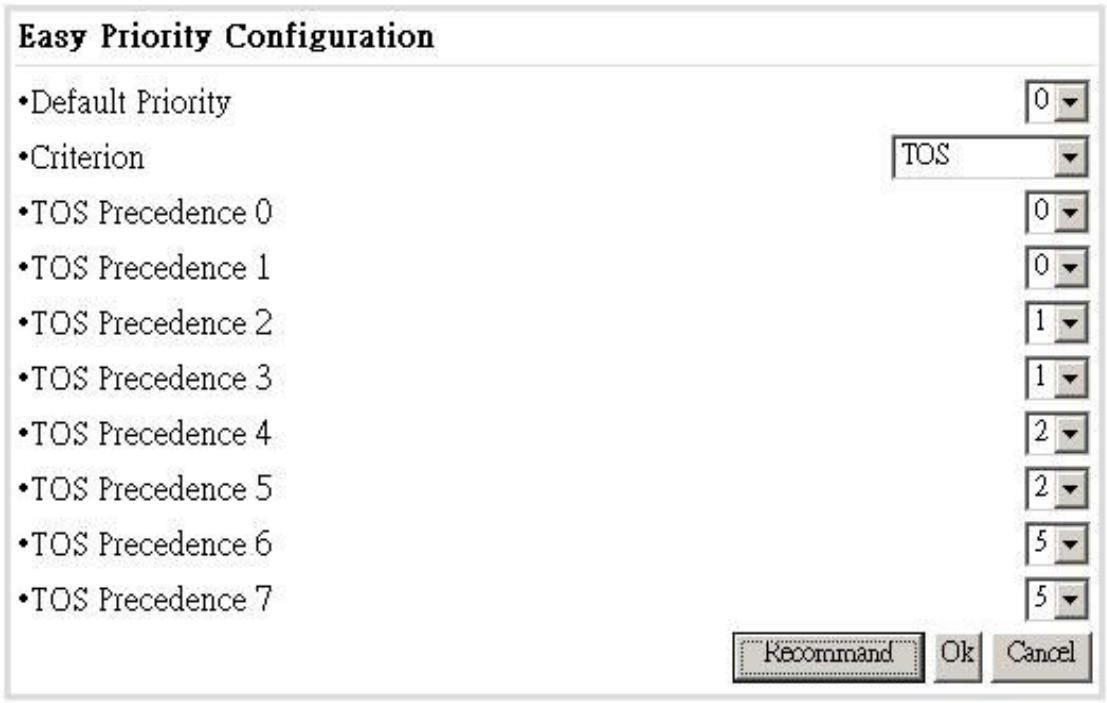
Easy Priority Configuration:

Regarding 802.1p, TOS, IGMP, for each type of priority with recommend value (From 0 to 7, 7 queues; 7 is the highest priority) please refer to the screenshot below. Press the **Recommend** button will offer the proper value automatically.

802.1p:



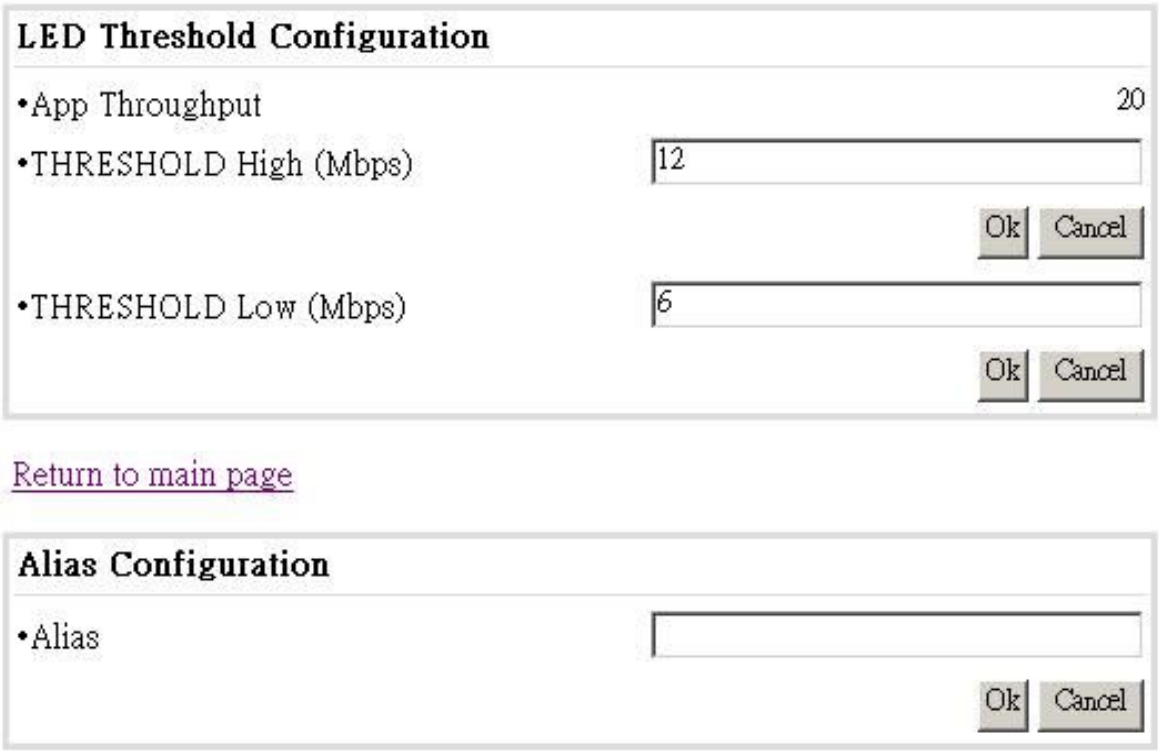
TOS:



Return to main page

IGMP:

Return to main page



LED Threshold Configuration	
This section allows you to change the configurable LED Threshold.	
App Throughput	The currently reachable throughput.
THRESHOLD High (Mbps)	The Higher Threshold of BPL/ACT LED
THRESHOLD Low (Mbps)	The Lower Threshold of BPL/ACT LED

Alias Configuration	
This section allows you to change (or remove) the device name of the PowerGrid 903	
Alias	The device name of the PowerGrid 903 It can be up to 20 ASCII characters long.

Security Configuration	
This section allows you to change (or remove) the configuration password, used to access the WUI, and perform a factory reset to recover default settings	
Status	Password is currently installed / No password installed
Set Configuration Password	To change the configuration password, notice that you must enter it twice; first in the **New password** field and again in the **Confirm new password** field. The configuration password can be up to 20 characters in length. To remove the configuration password, leave these fields empty. Click **OK** to make this change.
Factory Reset	To reset the device to factory settings, enter the factory reset password (see section 2.3 Default Settings) and click **OK**. Use this function with caution, since, as noted onscreen, this will erase the current configuration settings.

Hardware Reset
*Press the **Hardware Reset** button to reboot the device but not erase the configuration settings. It performs the same function as holding down the RESET/CONFIG button on the front panel of the unit. You must perform a hardware reset of the device to change some settings, such as IP mode (DHCP/FIXED).*

Return to main page

Flash Upgrade	
This section provides a method to upgrade the flash memory in the PowerGrid unit from a server using FTP or TFTP protocol. The flash memory is divided into three sections: the firmware, a boot-loader and the factory settings. Each of these can be upgraded separately to provide for maximum flexibility.	
Status	Reports the current status of the flash upgrade.
Flash section	Choose **firmware**, **loader** or **factory settings**
Upgrade Protocol	Choose **FTP** or **TFTP**
Server IP Address	Enter the **IP address** of the FTP or TFTP server. This will be provided by your service provider.
FTP User and Password	Enter the **user name** and **password** if required
Filename	This is the **filename** of the flash upgrade. The firmware and loader have .bin extensions, while factory settings are stored as .cfg files.

Chapter 6 - HELP

This PowerGrid unit has been designed to be a reliable and easy-to-use home networking device. However, should you experience any problems, please refer to the troubleshooting and FAQ sections below to resolve your issue.

6.1 Troubleshooting

FACTORY RESET

To reset a unit to factory default settings, simply press the RESET/CONFIG button for 5 seconds or more. The adapter will reset its configuration to factory default settings and auto-reboot. If the reboot is successful, it will be configured in EP mode. If you reset the AP unit, you will need to repeat the entire network setup process described in Chapter 3.

NETWORK SETUP

1. Converting an AP unit into an EP unit:

    c) Make sure the PowerGrid unit is plugged directly into the electrical outlet and that it is powered on.
    d) Do a factory reset (see the **RESET PROCEDURE** above).

2. Converting an EP unit into an AP unit:

    e) Make sure the PowerGrid unit is plugged directly into the electrical outlet and that it is powered on.
    f) Press **RESET/CONFIG** button until its POWER LED starts blinking.
    g) Wait until configuration period finishes (30 seconds). At that point the adapter has been designated as a Fixed AP if its POWER LED is **Orange**.

3. There MUST only be one Fixed AP in a network. Verify that this is the case by examining the POWER LED for all adapters. If there is more than one AP in the network, it means that the key exchange process has failed.

    h) Perform a factory reset on the adapter you do not wish to be designated as an AP (see step 1 above).
    i) Repeat the network configuration procedure again (see Chapter 3).
    j) If the configuration procedure fails again, it is possible the adapters are using different forms of encryption. For example, one might be using AES and the other 3DES. To eliminate this as a possibility, perform a factory reset on all adapters and repeat the configuration process.
    k) If configuration still fails, connect a PC to each adapter, and use the WUI tool to ensure that all PLC devices have the same network ID, encryption mode and key. If not, try to configure them in electrical outlets that are nearby to avoid a communications problem. Once configured, move the adapters to their final position and test connectivity again.

l) If encryption mode is not the same in the two adapters, then the EP may not have the ability to set the AP encryption mode for regulation issues or because it is from an older generation when AES was not available. Try to put the AP in an encryption mode compatible with all PLC devices, such as 3DES encryption.

4. **NETWORK PERFORMANCE**

If the network is performing slowly or not at all, try the following:

m) Check the ETH/ACT LED on every PowerGrid 903 unit.

n) If the ETH/ACT LED on any unit is **OFF**, check that the PowerGrid unit is connected securely. The ETH/ACT LED on every unit should be **GREEN**.

o) Make sure that the settings of all your networked devices are correct.

p) Next check the BPL/ACT LED of every unit. If any unit has a **RED** BPL/ACT LED, plug that unit into a different power outlet and wait for the BPL/ACT LED color to change to **ORANGE** or **GREEN**.

q) If the BPL/ACT LED of any unit remains **RED** after moving it to another outlet, perform a factory reset on the unit as described above.

r) If there is no change, perform a factory reset on every unit, starting with the AP unit. You will then need to reconfigure the network according to the instructions in Chapter 3 - Quick Setup .

FYI:

A PowerGrid unit with a **GREEN** BPL/ACT LED supports a HDTV signal (>10 Mbps), while a unit showing **ORANGE** can support a SDTV signal (4-10 Mbps).

NOTE:	If the HDTV video bandwidth is lower than 10 Mbps, it may be possible to stream the video with an ORANGE BPL/ACT LED in some cases.

FURTHER ASSISTANCE

If this section has failed to resolve or address your issue, consult your local agent.

6.2 FAQ

The following are frequently asked questions (FAQ) and answers.

1. Do PowerGrid units work with surge protected power strips?

   Basic power strips provide simple protection for a surge increase in voltage. More expensive models have this feature, but also include a filter which provides protection against EMI (Electromagnetic Interference) or RFI (Radio Frequency Interference).

   Every house has different wiring set ups, and it is impossible to say which anti-surge protectors will work with the PowerGrid 903 and which will not. Our test lab and user experience has shown that the more expensive strips with EMI/RFI filters are more likely to prevent the PowerGrid 903 working than the basic strips. The BPL/ACT LED will show red if there is a problem.

2. What if I cannot fit my PowerGrid unit into my plug socket?

   Your PowerGrid units might not fit because the sockets are too close to the floor or are in the skirting board. The easiest way around this is to use a trailing power strip and plug the Adapter into the strip. Please make sure that the strip is not an anti-surge adapter strip.

3. What if the house next door has PowerGrid units as well?

   In this case, make sure to configure the units according to the procedure in this user manual. That way, each pair of PowerGrid units will have its own unique security key and your connection will be secure.

4. Is it safe to leave the PowerGrid units on all the time?

   PowerGrid units are CE certified and completely safe to leave plugged in all the time. They may become slightly warm in use - this is perfectly normal. However, you may wish to put them into standby mode when not in use. To do so, simply press the STANDBY button and release.

5. How much power do PowerGrid units use?

   The Adapters use 5.5 Watts when in use and 1.8 Watts in standby mode.

6. What is the best way to check that my PowerGrid units are working properly?

   Your PowerGrid units are set to work together as a pair, and should work perfectly out of the box. The best way to test them is to find a double plug socket, and plug them in next to each other. Often the best place to find a double plug socket is in your kitchen. Alternatively plug them into a trailing extension strip (but not an anti-surge strip). When plugged in, after 10-40 seconds, the PowerGrid units will

configure themselves so that each has a **GREEN** BPL/ACT LED.

If the PowerGrid units don't configure themselves as above, you need to follow the **FACTORY RESET** procedure in the Troubleshooting section.

Appendix A - Acronyms

The following is a list of acronyms referenced in this manual.

Acronym	Expanded
3DES	Triple DES
AES	Advanced Encryption Standard
AP	Access Point
DES	Data Encryption Standard
EP	End Point
HDTV	High Definition TV
ISP	Internet Service Provider
PC	Personal Computer
PLC	Powerline Communications
SDTV	Standard Definition TV
STB	Set Top Box
WUI	Web User Interface