GCA-6000

G.hn Coax Ethernet Adapter

User Manual

261072-037

Version A2.1, July 6, 2016

Preface

This manual provides information related to the installation and operation of this device. The individual reading this manual is presumed to have a basic understanding of telecommunications terminology and concepts.

If you find the product to be inoperable or malfunctioning, please contact technical support for immediate service by email at homesupport@comtrend.com

For product update, new product release, manual revision, or software upgrades, please visit our website at http://www.comtrend.com

Important Safety Instructions

With reference to unpacking, installation, use, and maintenance of your electronic device, the following basic guidelines are recommended:

- Do not use or install this product near water, to avoid fire or shock hazard. For example, near a bathtub, kitchen sink or laundry tub, or near a swimming pool. Also, do not expose the equipment to rain or damp areas (e.g. a wet basement).
- To safeguard the equipment against overheating, make sure that all openings in the unit that offer exposure to air are not blocked.
- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightening. Also, do not use the telephone to report a gas leak in the vicinity of the leak.

WARNING

Disconnect the Coax ADAPTER from the power source before servicing.

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http://www.gnu.org/licenses/

NOTE: This document is subject to change without notice.

Protect Our Environment

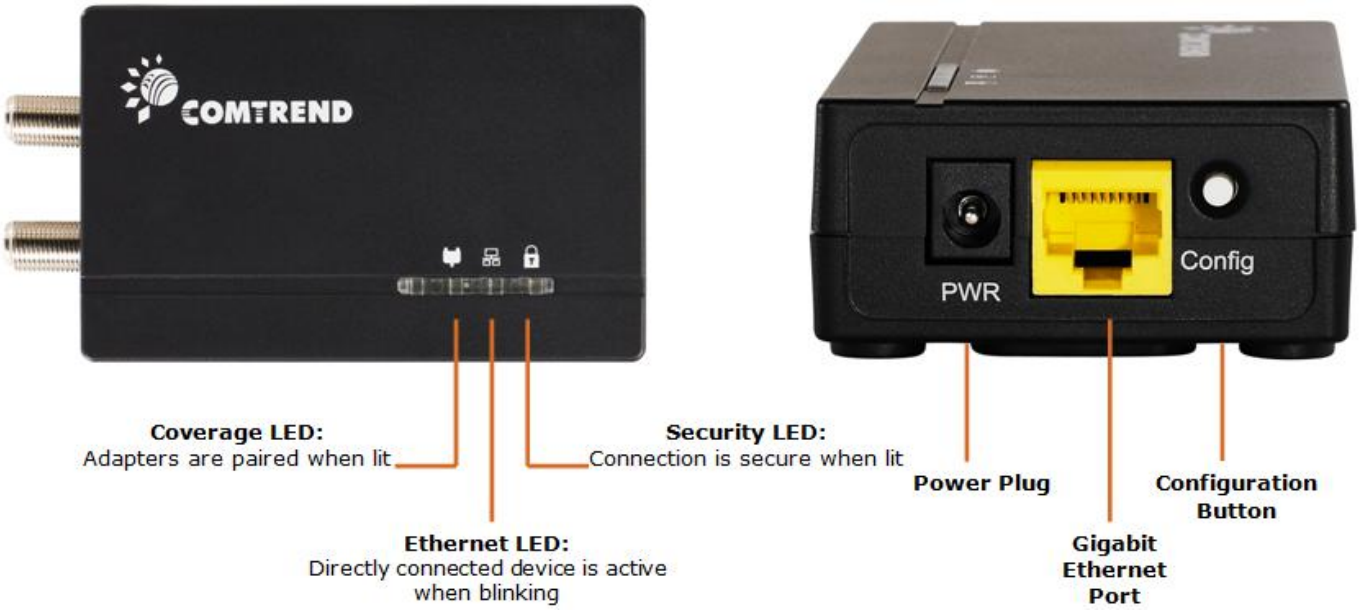
This symbol indicates that when the equipment has reached the end of its useful life, it must be taken to a recycling centre and processed separate from domestic waste.

The cardboard box, the plastic contained in the packaging, and the parts that make up this Coax ADAPTER 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, please be responsible and ask for disposal instructions from your local government.

Table of Contents

Chapter 1 Quick Installation

A Understanding Your G.hn Coax Adapter

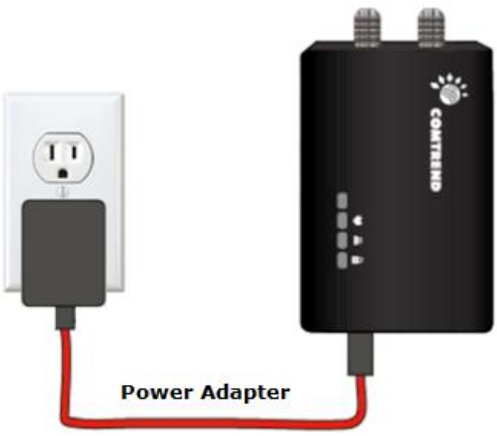


NOTE: The following steps show how to create or add onto a G.hn Coax Network (A minimum of two G.hn Coax Adapters are required to create a proper connection.)

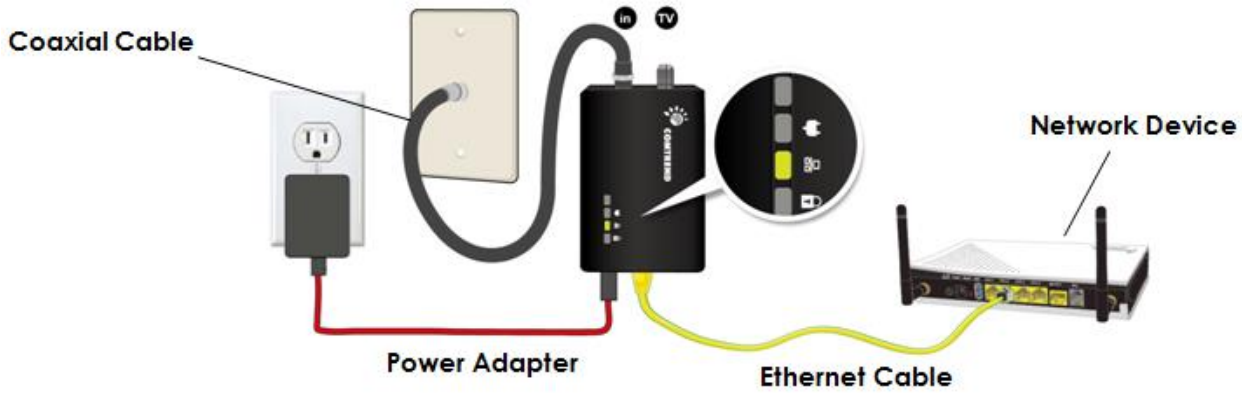
- If this is the first time you are setting up a G.hn Coax Network please continue to Section B.
- If you already have an established G.hn Coax Network, and are adding an additional adapter please skip to Section C. Follow Steps 4-8 to add additional G.hn Adapters to your network.

B Creating a New G.hn Coax Network

1. Plug the power supply into the Coax Adapter and into the power outlet nearest to the network device (Eg. Modem, Router, or Access Point). The LEDs will briefly turn on.

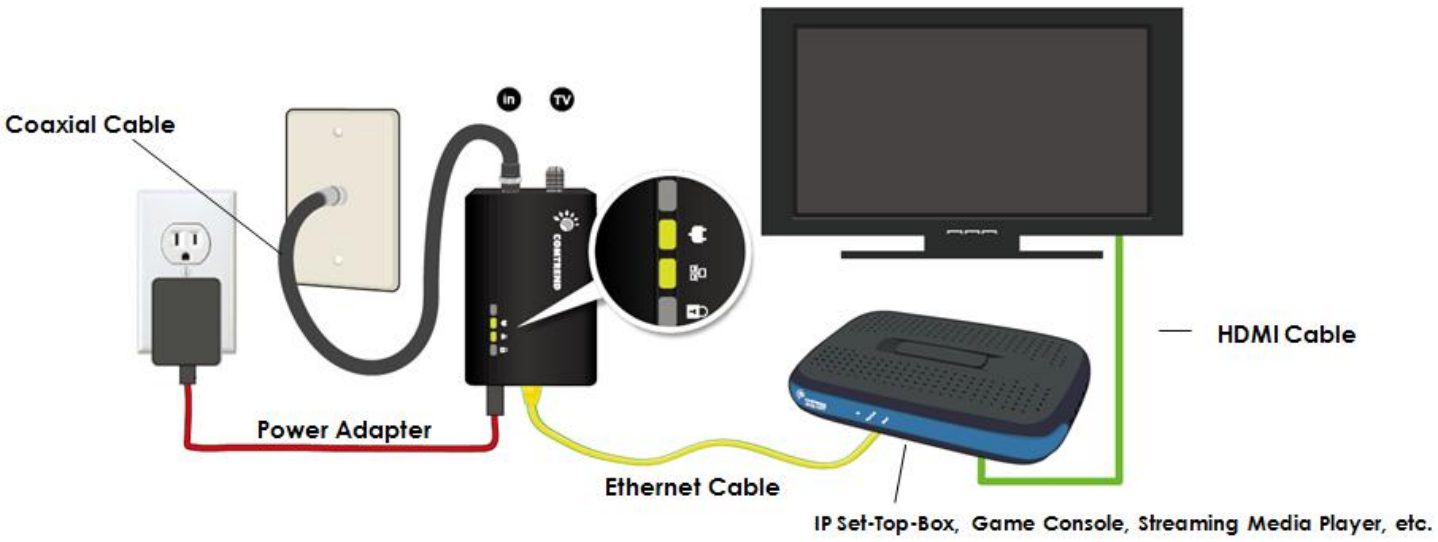


2. Connect the coaxial cable to the "**IN**" of the Coax Adapter and to a cable wall outlet.
3. Ensure that your network device is powered on. Connect the Coax Adapter to the LAN port of the network device with an Ethernet cable. Wait for 10 seconds for the Coax Adapter's **Ethernet LED** 品 to light up **GREEN** indicating a stable connection.



C Adding your G.hn Coax Adapter to an Existing G.hn Coax Network

4. Plug the power supply into the Coax Adapter and into the power outlet nearest to the remotely located Internet-enabled device (Eg. TV, PC, STB, DVR, Etc.).
5. Connect the coaxial cable to the "**IN**" of the Coax Adapter and to a cable wall outlet.
6. Connect the Coax Adapter to the device with an Ethernet cable. The **Ethernet LED** 品 on the Coax Adapter should be flashing **GREEN**. The **Coverage LEDs** on the Coax Adapters should now be lit (they will be **GREEN, ORANGE**, or **RED** depending on the strength of the connection.)



Note: The "TV" port on the Coax Adapter is meant for traditional Cable TV services. We do not recommend using the Coax Adapter if you receive Cable TV/Internet services.

7. We recommend a secure network. If the **Security LED** is off, press the **"Config"** button on each of the two Coax Adapters for 3 seconds consecutively (until the **Security LED** starts blinking). You will have 2 minutes to complete this step once the first **"Config"** button is pressed. Upon successful connection of the Adapters, the **Security LED** will light up **GREEN** and the **Coverage LED** will light up **GREEN, ORANGE**, or **RED**.

Note: Pressing the Config button – located on the side of the device for more than 5 seconds resets the security settings (10 seconds or more performs a factory reset). If you accidentally reset the GCA-6000 unit, repeat step 7 to secure the network.

8. If the connection process is not successful, please refer to the troubleshooting steps in section F.

D Adding Additional Adapters/Devices

Follow steps 4-8 in Part C to add additional Adapters/devices to the Coax Network (up to 32 devices). For each additional adapter added, press the "**Config**" button on an already secured Adapter, then on the new adapter, so they can pair and transmit data successfully.

E Your device is now part of a G.hn Coax Network!

F Troubleshooting

The following information should help you diagnose basic setup or installation problems.

COVERAGE LED is OFF: Plug the problem GCA-6000 unit into a power outlet next to the other GCA-6000 unit; both GCA-6000 having been connected by Ethernet cable to their respective devices e.g. PC, Router, Set Top Box....etc.). After 10 seconds (approx), the **COVERAGE LED** should light up **GREEN**. If not, first Factory reset both devices by pressing the **"Config"** button on each for more than 10 seconds. Then, go to section B and follow the installation steps.

ETHERNET LED 品 is OFF: If the **ETHERNET LED 品** fails to light up, check that the LAN port of the GCA-6000 unit is connected firmly to the LAN port of the other device. To check the condition of the Ethernet cable, use another cable to test the same connection.

Chapter 2 Introduction

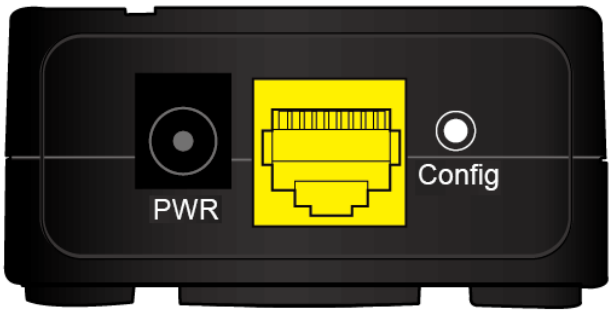
Comtrend's ITU-T G.hn networking standard compliant Ethernet adapter provides the best quality data transmission at high-speed. The GCA-6000 allows users to extend a local area network via existing coax cables, eliminating the need for extra Ethernet wiring. Installation at home (or in a small office) is quick and easy as plug-and-play technology.

2.1 Front Panel and LED indicators

LED	COLOR	MODE	Description
Coverage	Green	On	The current connection (line rate) is greater than 40 Mbps
	Orange	On	The current connection (line rate) is greater than 20 Mbps and less than 40 Mbps
	Red	On	The current connection (line rate) is between 1 and 20 Mbps per second
		Off	No LINK connection exists
		Blink	Adapter in power saving mode (blinks twice every 5 seconds)
Ethernet	Green	On	LAN connection established
		Off	LAN connection is not established
		Blink	Data transmitting/receiving

Security 	Green	On	Node is secure (it has either received or generated network keys)
		Off	Node is not secure, it has neither received nor generated network key parameters (domain name and encryption key)
		Blink	Slow: Device is pairing Fast: Device returning to pairing default settings

2.2 Bottom Panel



Item Name	Description
LAN	Local Area Network (LAN) port.
Config Button	• Press more than 2 seconds ("Security" LED starts slow blinking) and release: the "One Button Security Setup" (OBUS) procedure is started and configuration period is open. • Press more than 5 seconds ("Security" LED starts quick blinking) and release: security settings are set to default values. • Press more than 10 seconds ("Security" LED switches off) and release: a factory reset is performed.

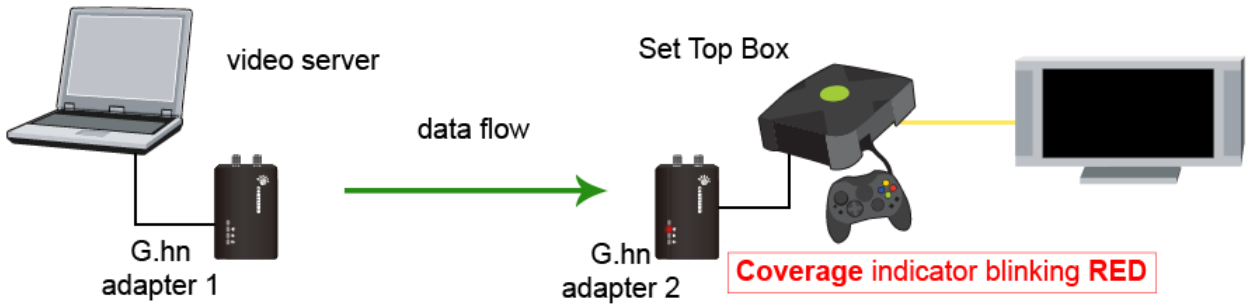
2.3 How to understand the COVERAGE LED colors

The COVERAGE LED displays quality of the network and provides important information that will provide solutions to common questions, such as why a High Definition (HD) movie is not showing or shows with pixels. The COVERAGE LED indicator will vary its color depending on the estimated speed of the Coax connection. The speed is measured in Megabits Per Second (Mbps).

Color	Information
RED	The current connection has standard quality, normal Internet activities (ex. 20Mbps) are possible but the Powerline is unable to transmit either a Standard Movie or High Definition (HD) Movie.
ORANGE	The current connection has good quality and Internet activities (ex. greater than 20Mbps and less than 40Mbps) such as transmitting a Standard Movie and HD Movie are possible.
GREEN	The current connection has excellent quality and Internet activities (ex. greater than 40Mbps) such as transmitting multiple Standard Movies and HD Movies are possible.

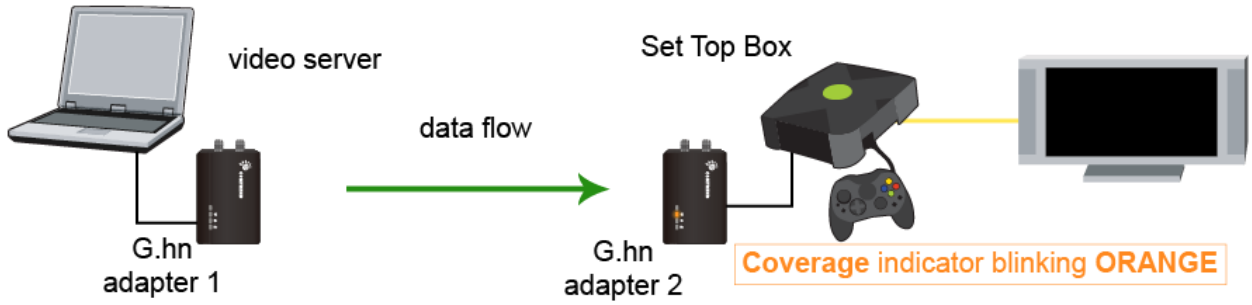
2.4 Point-to-Point Network

- **CASE 1**: Estimated throughput is less than 20 Mbps. The Coax channel is not able to transmit an SDTV channel. The COVERAGE LED will be RED as shown in the following figure:



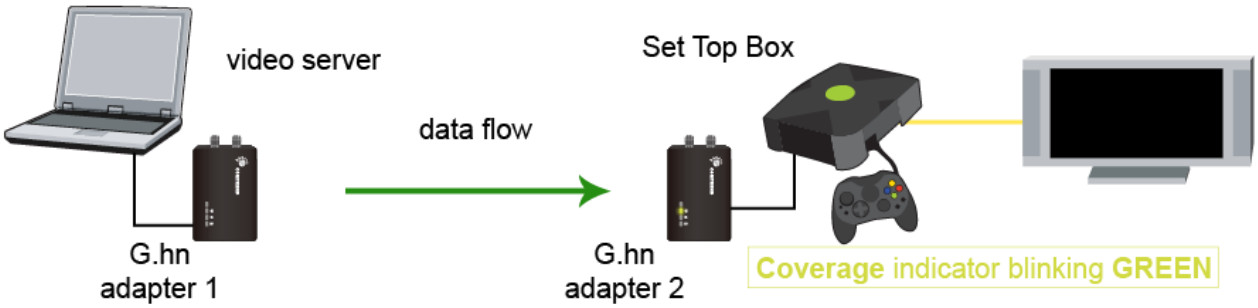
Estimated throughput < 20 Mbps

- **CASE 2**: Estimated throughput is greater than 20 Mbps but less than 40 Mbps. The coax channel is able to transmit an SDTV channel, but not two SDTV channels simultaneously or one HDTV channel. The COVERAGE LED will be ORANGE as shown in the following figure:



20 Mbps < Estimated throughput < 40 Mbps

- **CASE 3**: Estimated throughput is greater than 40 Mbps. The coax channel is able to transmit two SDTV channels simultaneously or at least SDTV one HDTV channel. The COVERAGE LED will be **GREEN** as shown in the following figure:

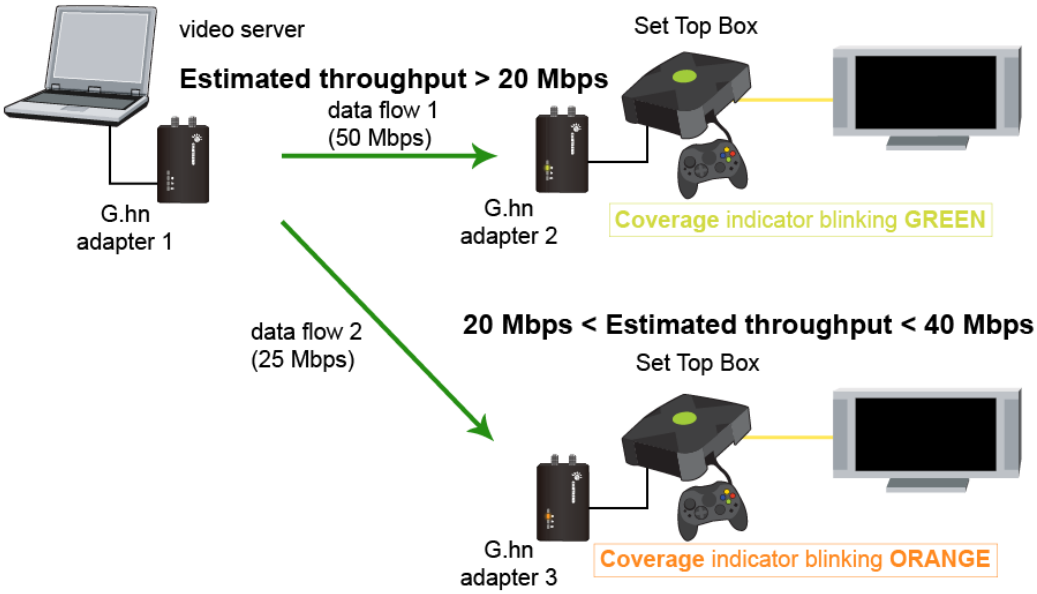


Estimated throughput > 40 Mbps

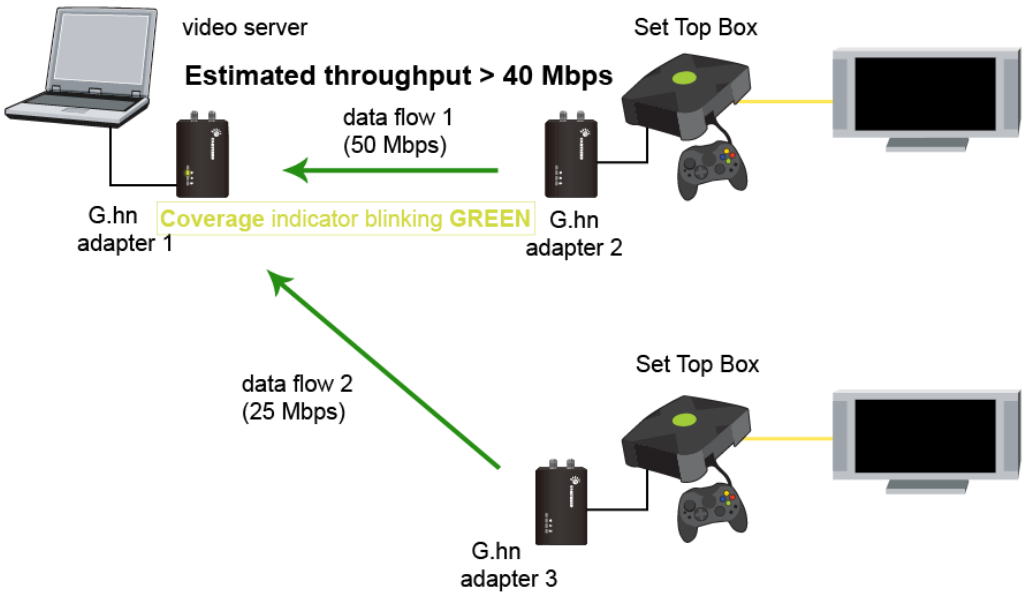
2.5 Point-to-Multipoint Network

In the case where the Coax network is composed of three or more adapters, similar situations could arise as with a point-to-point network.

- **CASE 1:** The COVERAGE LED in G.hn adapter 2 and G.hn adapter 3 will show the estimated level of the Coax link receiving from G.hn adapter 1.



- **CASE 2:** The COVERAGE LED in G.hn adapter 1 will show the estimated level of the Coax Link from which it is receiving the most amount of traffic at any given time. For example, if G.hn adapter 1 is receiving traffic at 50Mbps from G.hn adapter 2 and is receiving 25Mbps from G.hn adapter 3, the COVERAGE LED will show the level with reference to the G.hn adapter 2 link, as shown in the following figure.



Chapter 3 Log In Procedure

3.1 Configure STATIC IP MODE

In static IP mode, you assign IP settings to your PC manually.

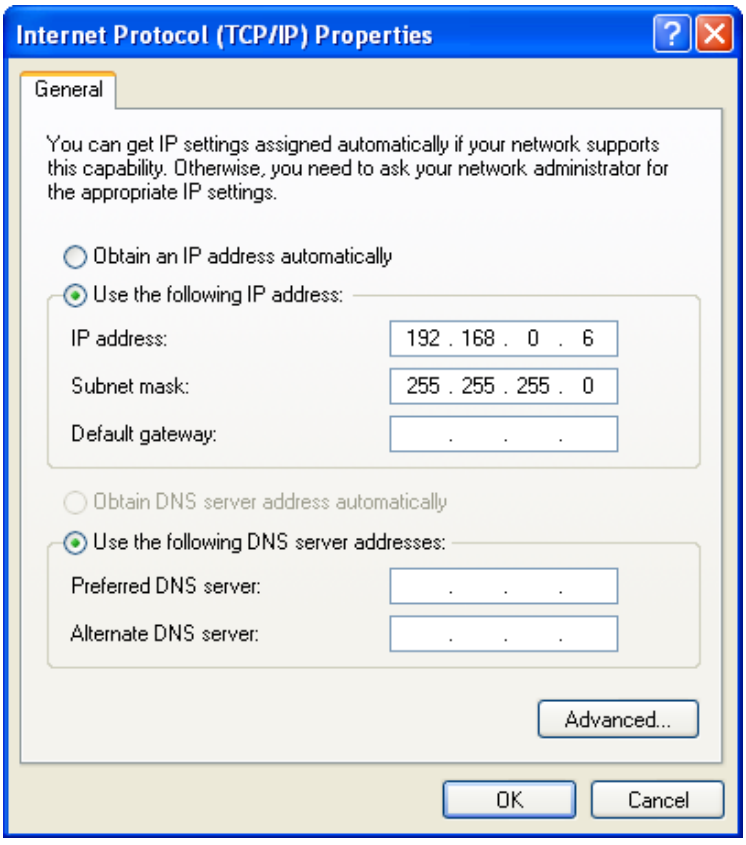
Follow these steps to configure your PC IP address to use subnet 192.168.0.x.

NOTE:	The following procedure assumes you are running Windows. However, the general steps involved are similar for most operating systems (OS). Check your OS support documentation for further details.

STEP 1: From the Network Connections window, open Local Area Connection (*You may also access this screen by double-clicking the Local Area Connection icon on your taskbar*). Click the **Properties** button.

STEP 2: Select Internet Protocol (TCP/IP) and click the Properties button.

STEP 3: Change the IP address to the domain of 192.168.0.x (6<x<255) with subnet mask of 255.255.255.0. The screen should now display as below.



STEP 4: Click **OK** to submit these settings.

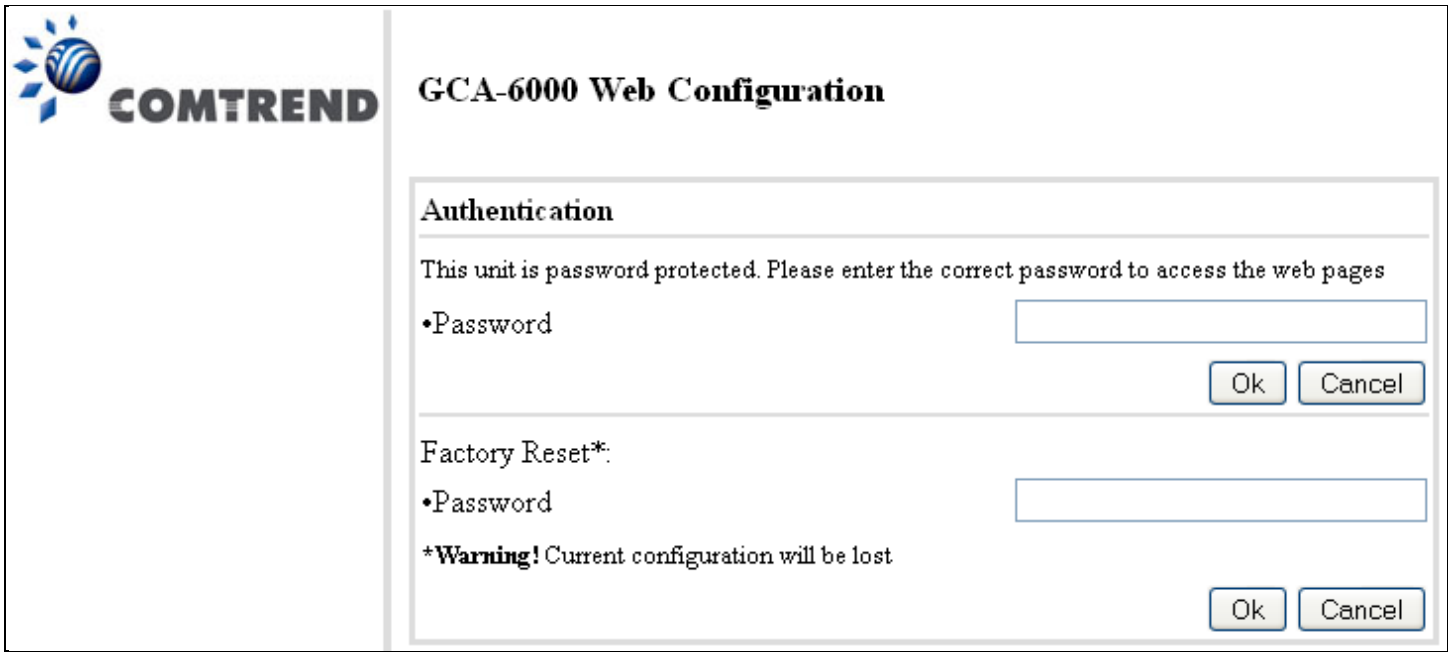
3.2 Logging In

Perform the following steps to login to the web user interface.

STEP 1: Start the Internet browser and enter the default IP address for the device in the Web address field. For example, if the default IP address is 192.168.0.5, type http://192.168.0.5

STEP 2: A dialog box will appear, such as the one below. Input the default Authentication Password.

Authentication Password: **admin**

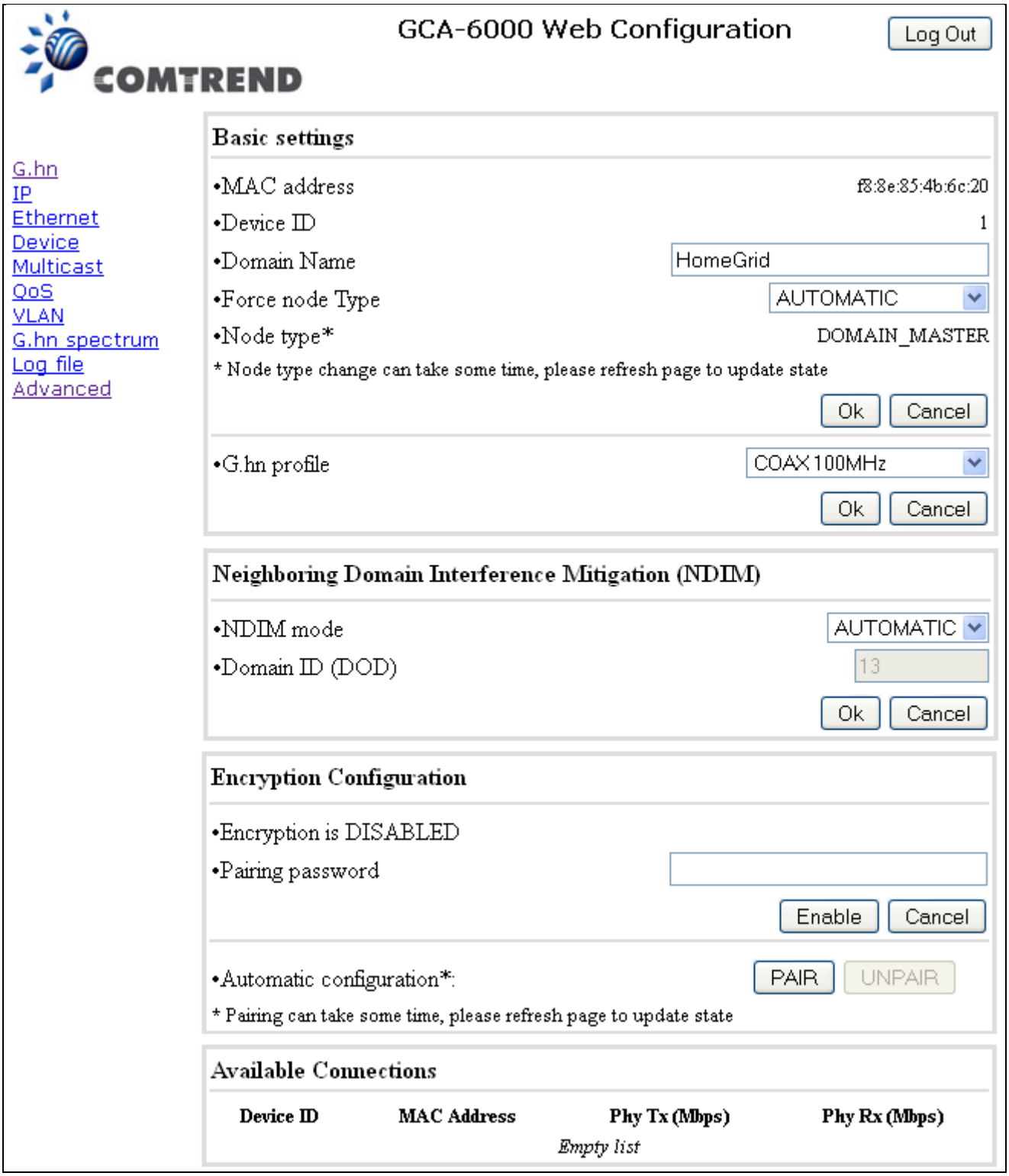


Click **OK** to continue.

Note:

The Factory Reset password is: **betera**

Chapter 4 G.hn Interface



4.1 Basic Configuration

- **Domain Name** a group name of all nodes in the network.
- **Force node Type** forces the modem to have a particular role (END POINT or DOMAIN MASTER)
- **G.hn profile** of all nodes in the network: selecting which G.hn profile must be applied to the network (PLC 50MHz, PLC 50MHz with MIMO, PLC 100MHz, COAX 100MHz and PHONE 100MHz).

4.2 NDIM Configuration

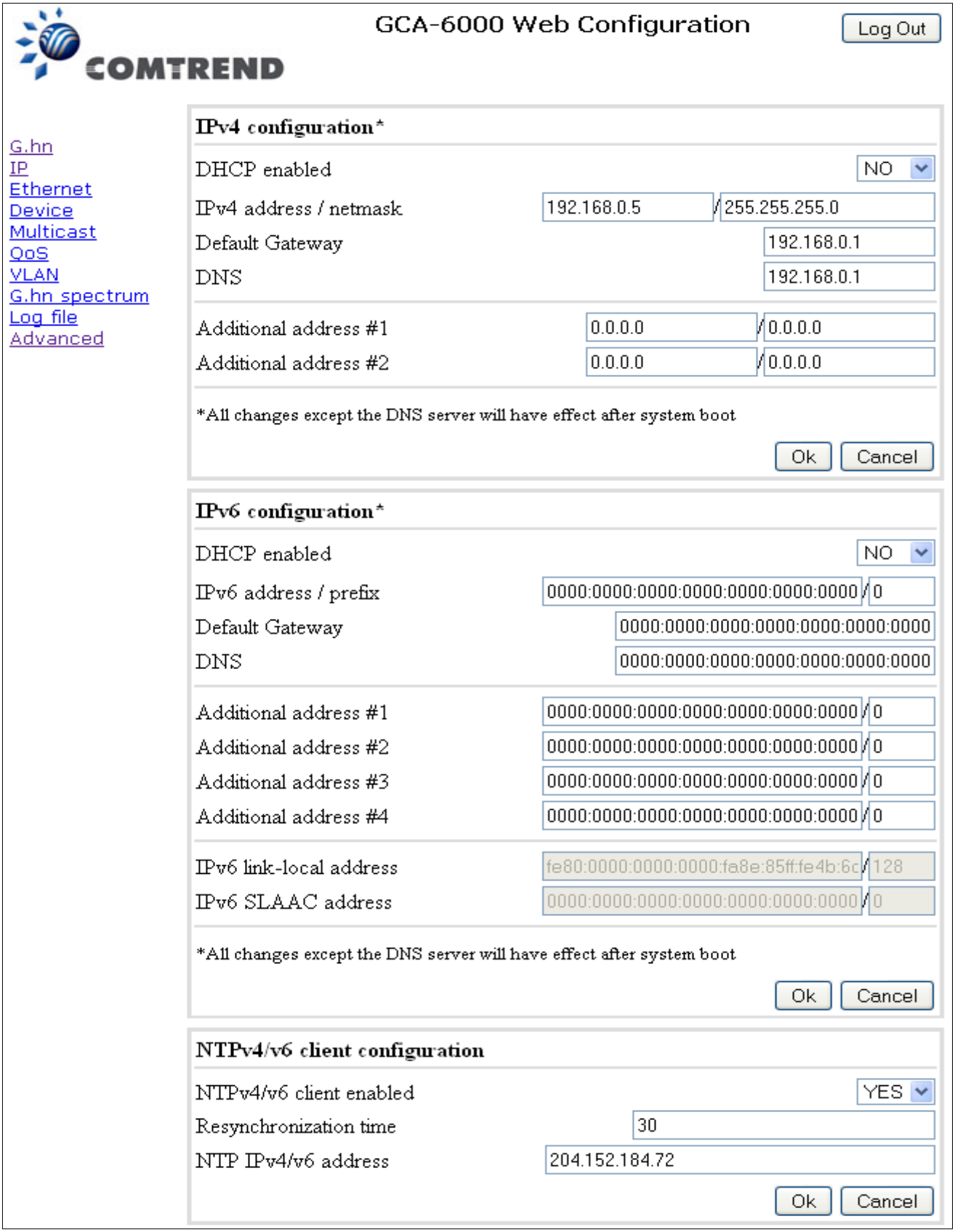
- **NDIM mode** set to Automatic for enabling automatic DOD selection functionality and set to Manual for manual configuration of DOD.
- **Domain ID (DOD)** manually set the DOD number from 1 to 15 to use a different preamble seed than the default 0.

4.3 Encryption Configuration via WEB UI

- **Pairing Password** used for authentication. Write a custom password to manually create a secure domain.

Available Connections

- In this tab table, all the available **G.hn connections** are presented. Remote node DID and MAC address, transmission and reception physical speeds.


COMTREND
GCA-6000 Web Configuration
Log Out
G.hn
IP
Ethernet
Device
Multicast
QoS
VLAN
G.hn spectrum
Log file
Advanced
IPv4 configuration*
DHCP enabled
NO
IPv4 address / netmask
192.168.0.5
255.255.255.0
Default Gateway
192.168.0.1
DNS
192.168.0.1
Additional address #1
0.0.0.0
0.0.0.0
Additional address #2
0.0.0.0
0.0.0.0
*All changes except the DNS server will have effect after system boot
Ok
Cancel
IPv6 configuration*
DHCP enabled
NO
IPv6 address / prefix
0000:0000:0000:0000:0000:0000:0000:0000
0
Default Gateway
0000:0000:0000:0000:0000:0000:0000:0000
DNS
0000:0000:0000:0000:0000:0000:0000:0000
Additional address #1
0000:0000:0000:0000:0000:0000:0000:0000
0
Additional address #2
0000:0000:0000:0000:0000:0000:0000:0000
0
Additional address #3
0000:0000:0000:0000:0000:0000:0000:0000
0
Additional address #4
0000:0000:0000:0000:0000:0000:0000:0000
0
IPv6 link-local address
fe80:0000:0000:0000:fa8e:85ff:fe4b:6c
128
IPv6 SLAAC address
0000:0000:0000:0000:0000:0000:0000:0000
0
*All changes except the DNS server will have effect after system boot
Ok
Cancel
NTPv4/v6 client configuration
NTPv4/v6 client enabled
YES
Resynchronization time
30
NTP IPv4/v6 address
204.152.184.72
Ok
Cancel

5.1 IP config

In the **IP configuration** tab of one G.hn node, the IPv4 and IPv6 settings can be read and changed.

IPv4 subsection:

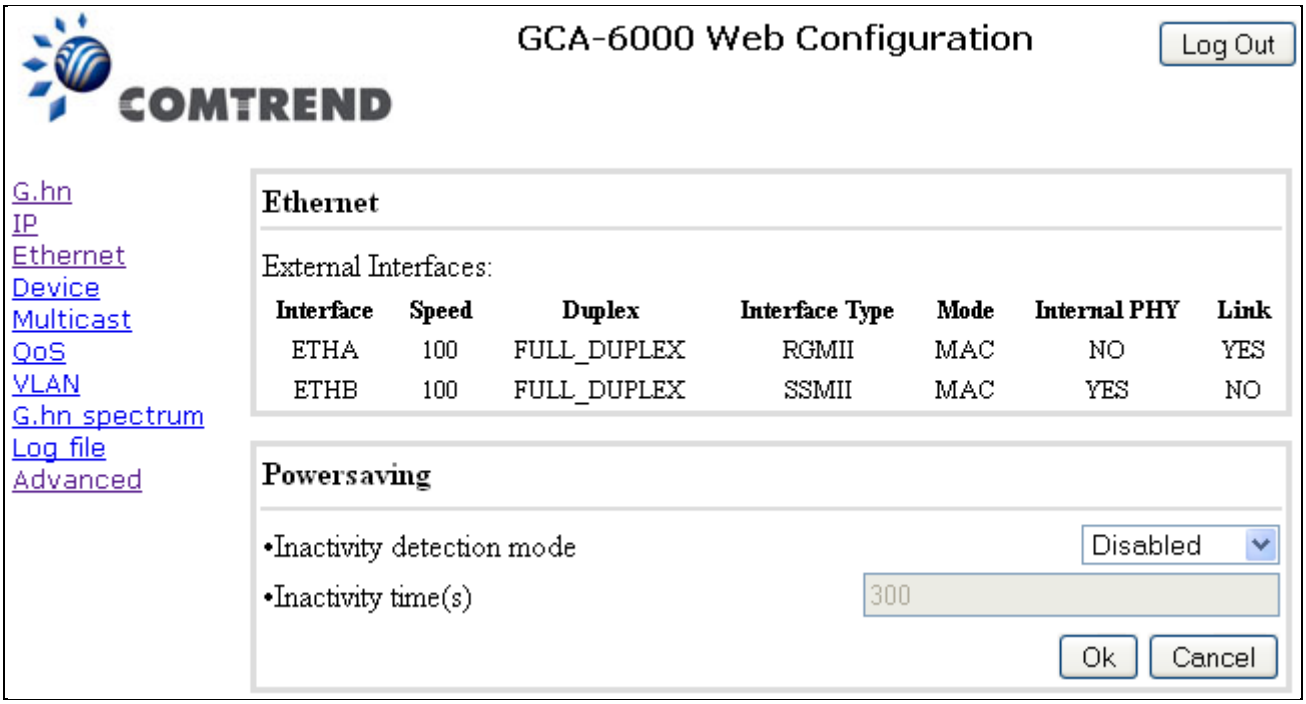
- **DCHPv4 enabled**: to enable the IPv4 DHCP configuration or choose not to. In the case of choosing ”**NO**" IP configuration in the following parameters, the IPv4 Address, Subnet Mask, Default Gateway and DNS should be configured; fill these fields in. In the case of choosing “**YES**” they will be filled automatically when configuration is received from the DHCPv4 server.
- **IPv4 address/netmask**: IPv4 address / netmask of this device.
- **Default Gateway**: IPv4 gateway to connect the node to other LAN segments.
- **DNS**: Domain Name Server IP (IPV4).
- **Additional address**: additional fixed IPv4 addresses that will always be configured at boot time.

IPv6 subsection:

- **DCHPv6 enabled**: to enable the IPv6 DHCP configuration or choose not to.
- **IPv6 address / prefix**: IPv6 prefix that applies to the IPv6 address.
- **Default Gateway**: IPv6 gateway to connect the node to other LAN segments.
- **DNS**: Domain Name Server IP (IPV6).
- **Additional address**: additional fixed IPv6 addresses.
- **IPv6 Link Local Address**: IPv6 link local address, automatically generated from the MAC address.
- **IPv6 SLAAC address**: IPv6 address, automatically obtained by means of the SLAAC mechanism.

NTPv4/v6 client configuration subsection:

- **NTPv4/v6 client enabled**: Enable/disable NTP client.
- **Resynchronization time**: Configure re-synchronization interval time.
- **NTP IPv4/v6 address:** Hostname or IP (IPv4 or IPv6) of NTP server.

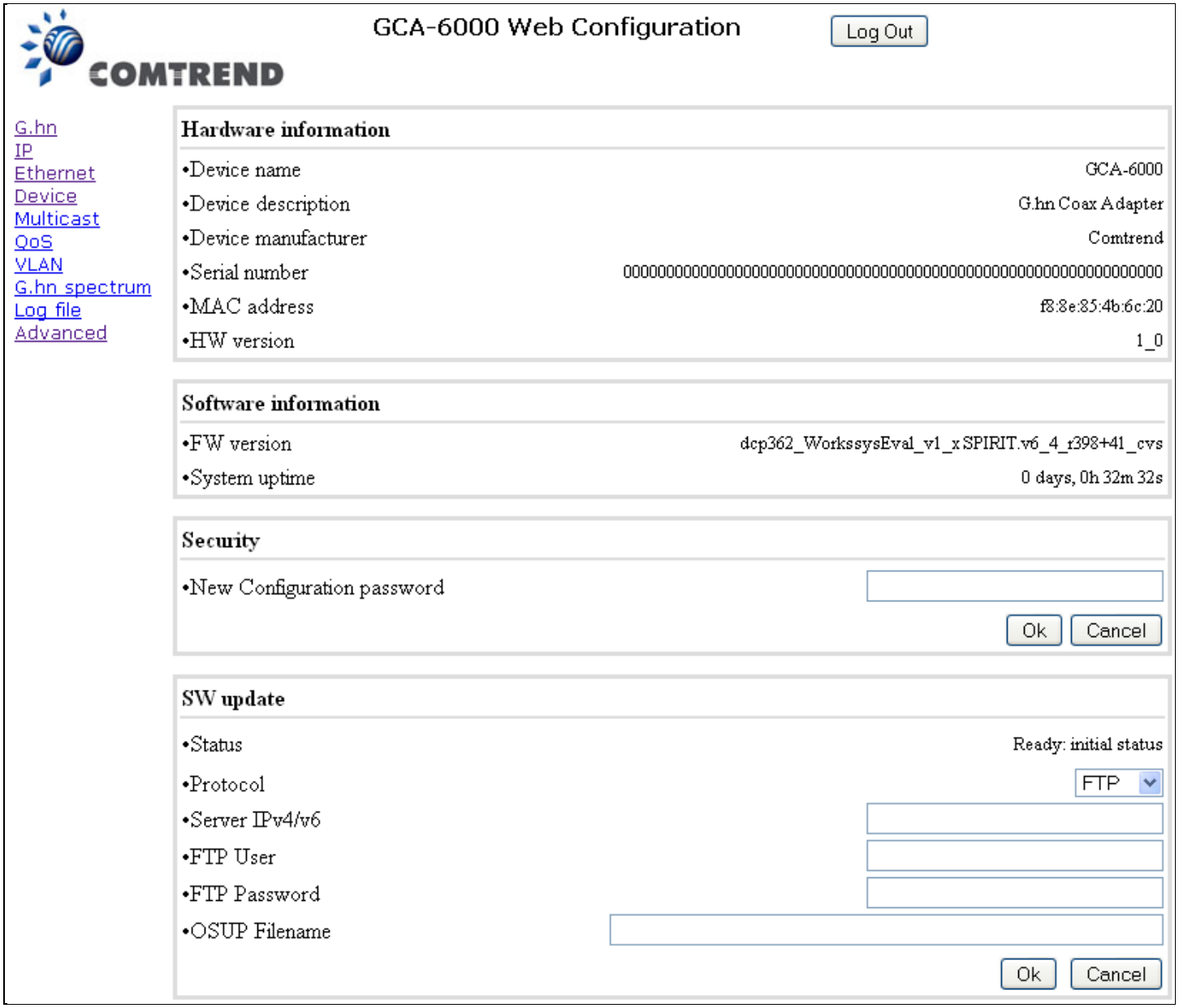


The Ethernet table shows the status & Info of the Ethernet interface; including Interface, Speed, Duplex, Interface Type, Mode, Internal PHY & Link.

Powersaving

Ethernet powersaving can be disabled, enabled by Ethernet link or enabled by Ethernet activity; idle timer can be configured as well.

Chapter 7 Device Interface



7.1 HW information

In this tab, basic information such as Serial Number, MAC Address, HW Product and Revision is shown.

7.2 SW information

Shows the FW version and system uptime.

7.3 Security

Configuration password

The nodes in the network: to change the configuration password string from the default ("paterna") to another; decided by the user.

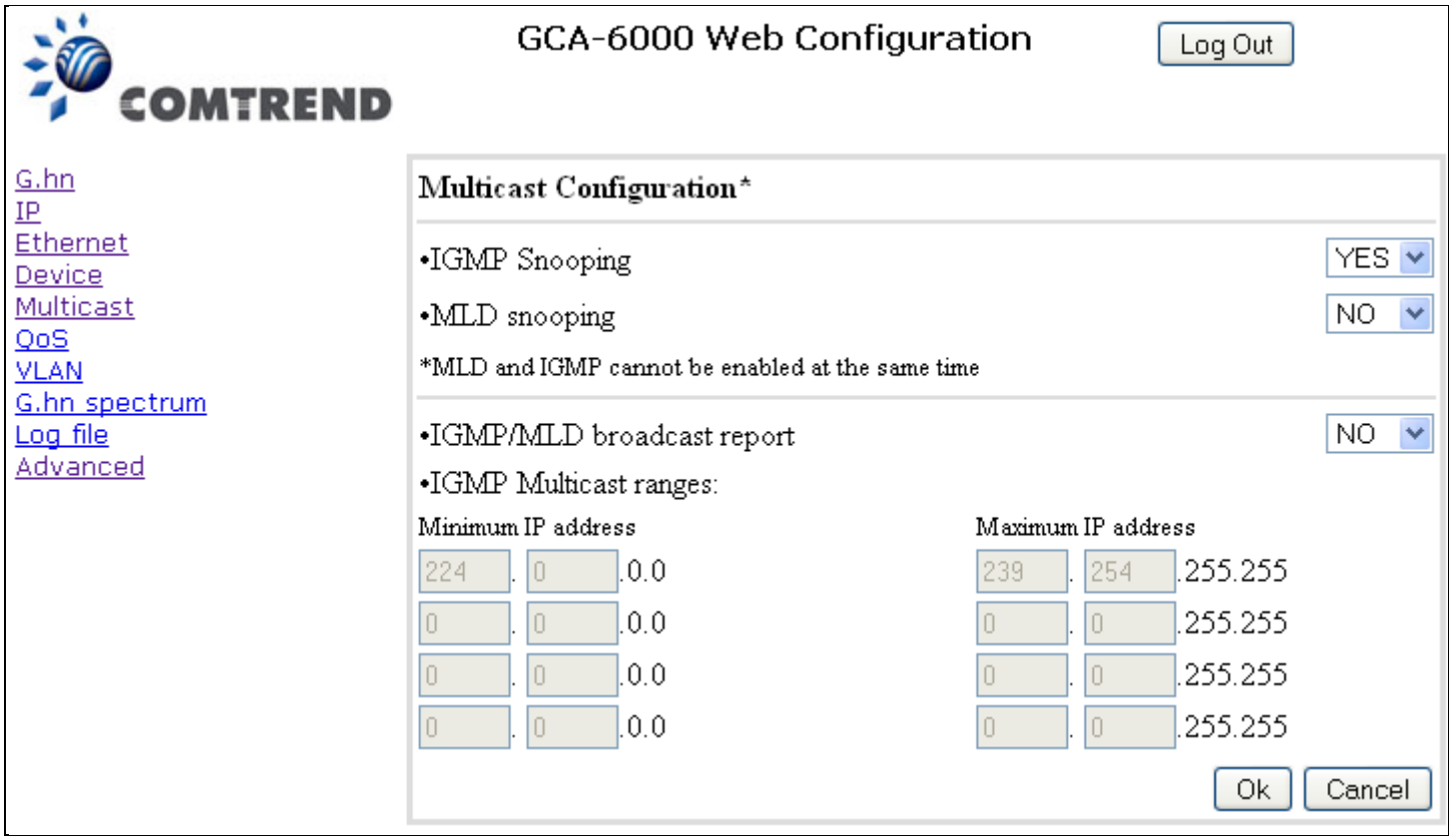
7.4 SW Update

Firmware update:

This section provides a method to upgrade the flash memory in the GCA-6000 unit from a server using FTP or TFTP protocol.

- **Status**: Reports the current status of the upgrade.
- **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.
- **OSUP Filename**: This is the filename of the upgrade.

The protocol is by FTP client or TFTP client. L2 is proprietary and is reserved for future use.



8.1 MCAST Configuration

In the **MCAST Configuration** tab **IGMP snooping and MLD** features can be enabled or disabled. Also, IGMP multicast IP addresses ranges which the G.hn PLC network will sniff; can be configured.

- **Multicast Snooping Type**: choose from IGMP snooping, MLD snooping or None (by selecting NO form the drop-down menu.
- **IGMP/MLD broadcast report (allowed)**: set to NO for enabling reports dropping until the video source is detected, this is a recommended setting when IGMP/MLD is enabled. Set to YES for broadcasting reports until the video source is detected; this implies the multicast video stream is sent as broadcast and it is the recommended state when IGMP/MLD is disabled.

IGMP Multicast ranges configuration: 4 multicast IP address ranges can be configured defining the minimum and maximum IP addresses of each range. Only multicast traffic within these ranges will be processed.

COMTREND

GCA-6000 Web Configuration

Log Out

- G.hn
- IP
- Ethernet
- Device
- Multicast
- QoS
- VLAN
- G.hn spectrum
- Log file
- Advanced

QoS Configuration

QoS criterion	Custom
Type of frame	Ethernet frame
Packet detection 1	IPv4
Offset	6
Bitmask	0xFFFF
Pattern	0x0800
Packet detection 2	None
Offset	0
Bitmask	0x0000
Pattern	0x0000

Packet classification

•Default prio 0

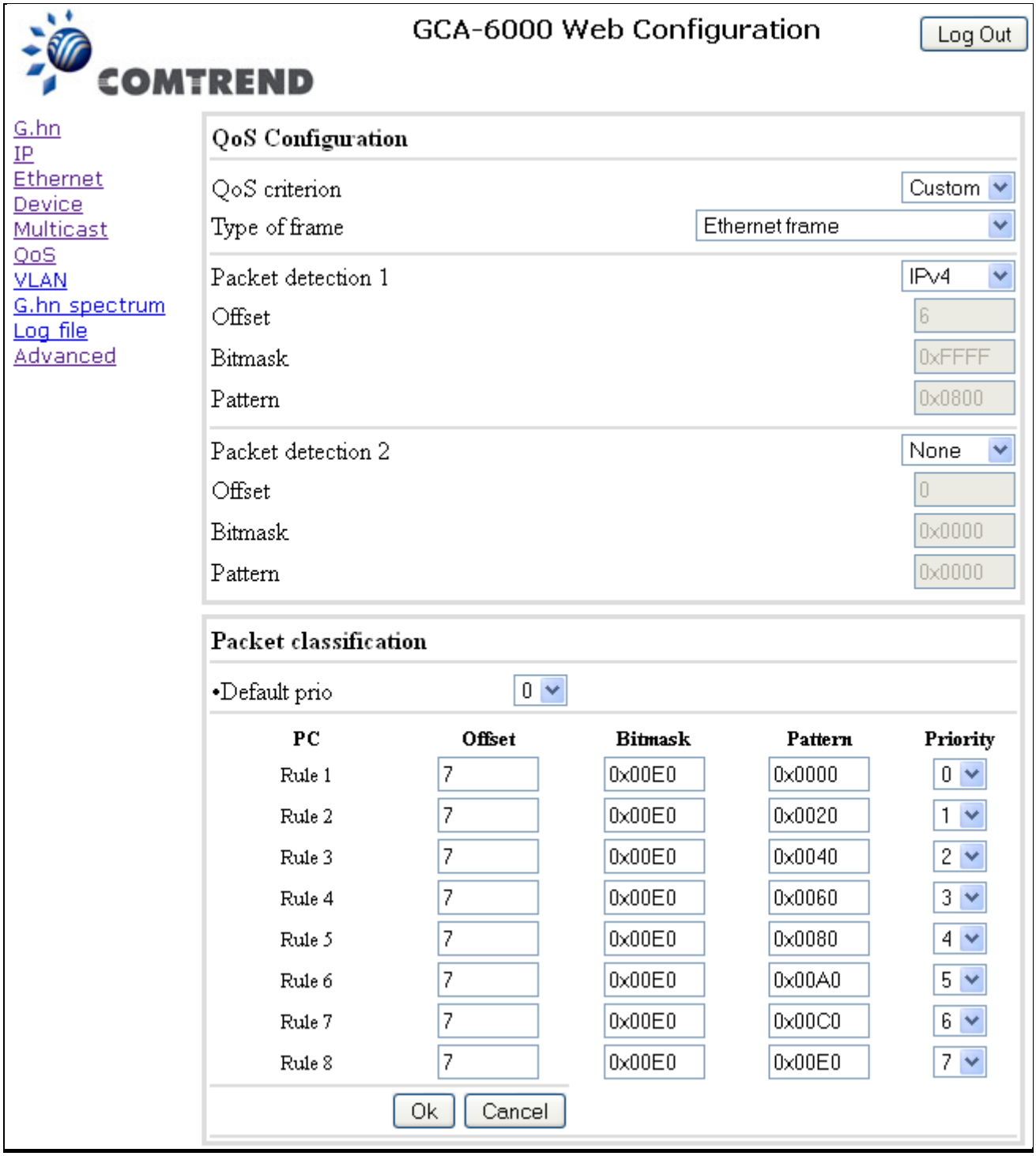
PC	Offset	Bitmask	Pattern	Priority
Rule 1	7	0x00E0	0x0000	0
Rule 2	7	0x00E0	0x0020	1
Rule 3	7	0x00E0	0x0040	2
Rule 4	7	0x00E0	0x0060	3
Rule 5	7	0x00E0	0x0080	4
Rule 6	7	0x00E0	0x00A0	5
Rule 7	7	0x00E0	0x00C0	6
Rule 8	7	0x00E0	0x00E0	7

Ok Cancel

9.1 QoS Configuration

In the **QoS** configuration tab, the packet classifier can be managed to define a QoS rule for incoming Ethernet traffic, and assign a priority to be used in the G.hn network. Press the "**OK**" button for loading the newly configured settings:

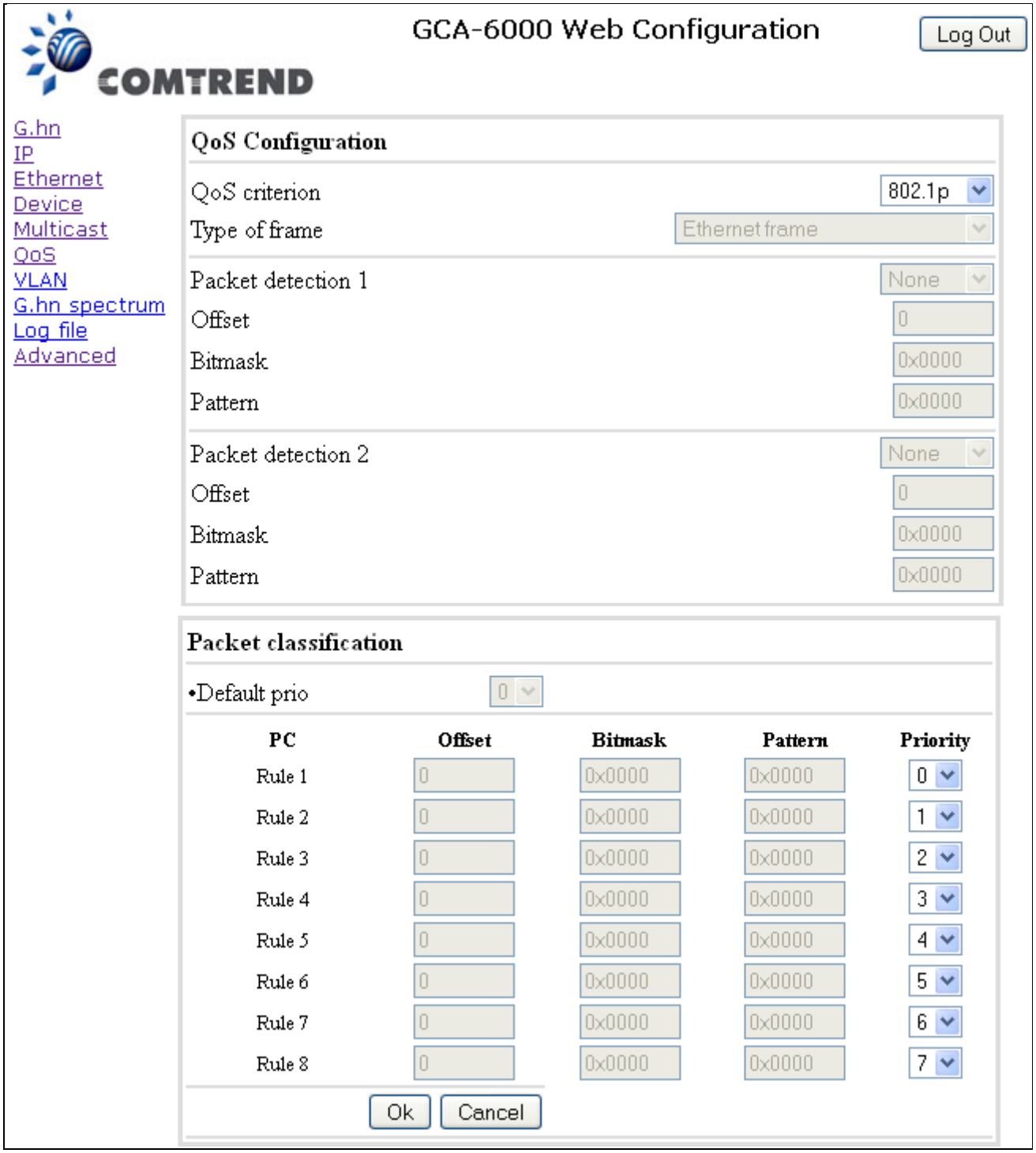
Example 1



- **QoS CRITERION**: a general criterion can be chosen among "None" (no QoS), "Custom" and "802.1p".
- **Type of Frame**: with this parameter the type of Ethernet traffic being transmitted by the G.hn network should be selected. Based on this parameter, the internal offsets in the system are adjusted. There are 3 types of frame that can be selected. Ethernet frame, 802.1Q tagged frame and 802.1ad double tagged frame can be selected.
- **Packet detection 1**: first packet detection rule can be configured (offset, bitmask and pattern). Packets which accomplish it will be sent to the classification module.
- **Packet detection 2**: if second packet detection is also enabled, both, first and second detection criteria must be accomplished to pass packets to the classification module.

- **Packet classification**: up to 8 classification rules can be defined in this section for packets which have previously been correctly detected. For 802.1p only priorities can be managed, offset, bitmask and pattern are predefined to sniff the PCP field.
- **Default priority**: select default priority; which will be applied to non classified incoming packets. Priority 7 is the highest. Priority 0 is the lowest.

Example 2



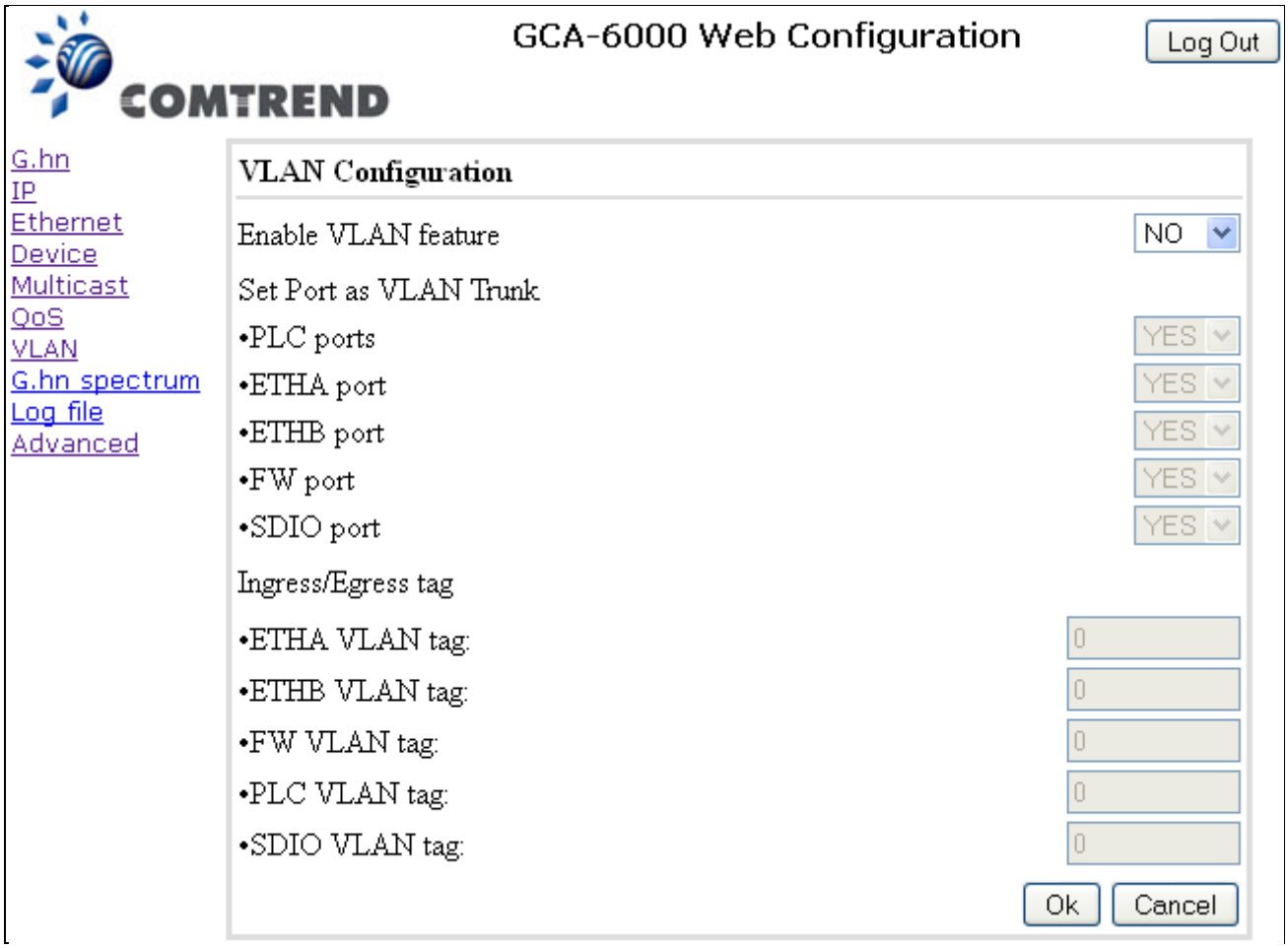
If QoS criterion: 802.1p, all other options are grayed out, and follow the QoS rules below.

According to G.9960 specs, the priority mapping recommended by [IEEE 802.1D] subclause 7.7.3 is presented in the table below for eight priority queues.

PCP	Priority	Acronym	Traffic Types
1	0 (Third)	BK	Background
0	1 (lowest)	BE	Best Effort
2	2 (lowest)	EE	Excellent Effort
3	3 (Third)	CA	Critical Applications
4	4 (second)	VI	Video, < 100 ms latency and jitter
5	5 (second)	VO	Voice, < 10 ms latency and jitter
6	6 (highest)	IC	Internetwork Control
7	7 (highest)	NC	Network Control

In summary, the sequence of priority queue, (7,6) > (5,4) > (3,0) > (2,1)

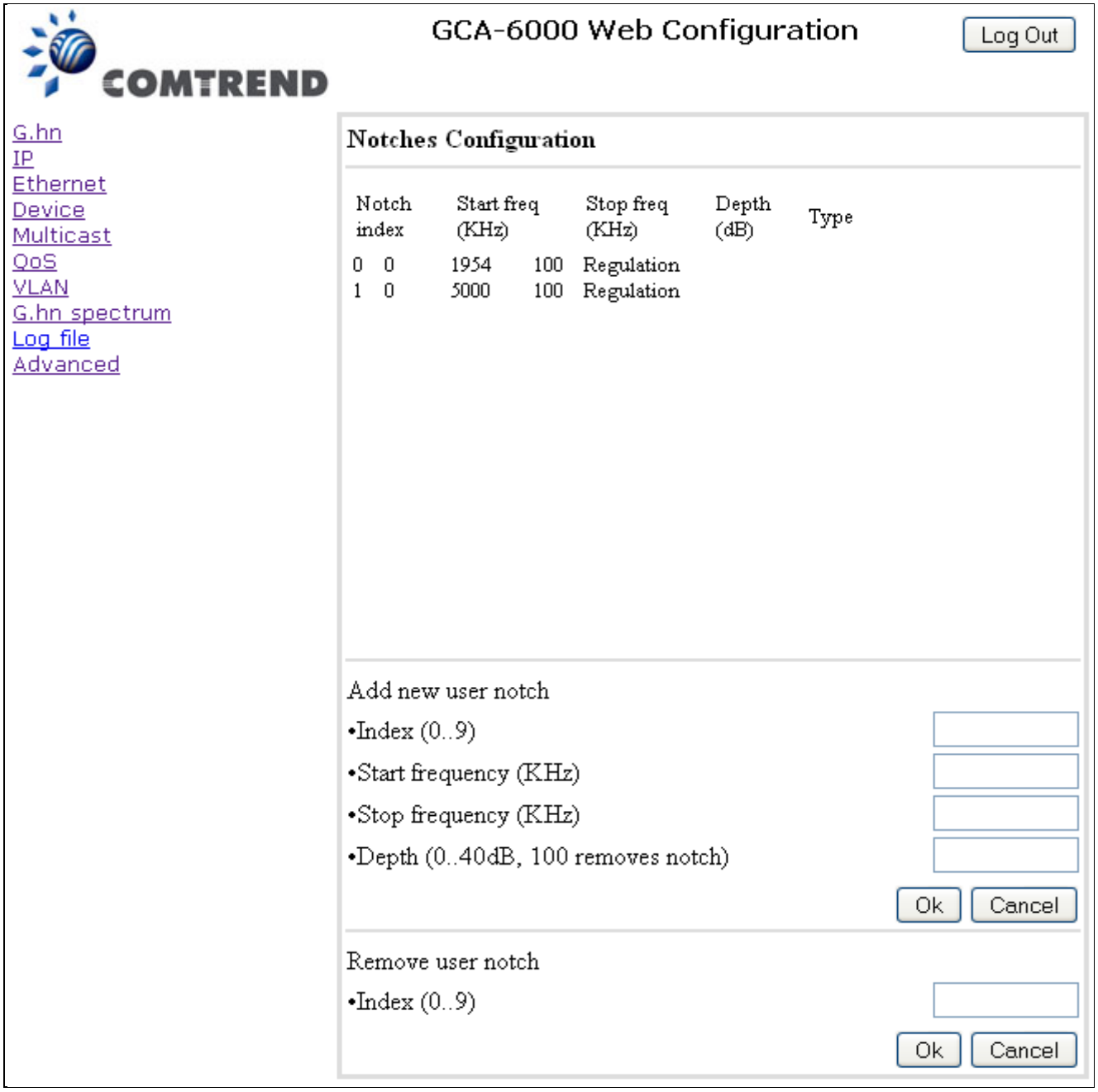
Chapter 10 VLAN Interface



10.1 VLAN Configuration

In the **VLAN Configuration** tab of one G.hn node, a VLAN tag can be added or removed per interface. Also, removing a tag at egress per interface can be also enabled or disabled:

- **Enable VLAN feature**: Select NO to disable completely the VLAN functionality, removing all tags and trunk ports.
- **Set Port as VLAN Trunk:** Removing all tags at egress of a port can be configured by setting the parameter to NO or default YES keeps tags but removes the one configured in the previous section (if any).
- **Ingress/Egress tag:** A tag value (from 1 to 4095) per interface can be added in this section. Set value to 0 for no tagging.



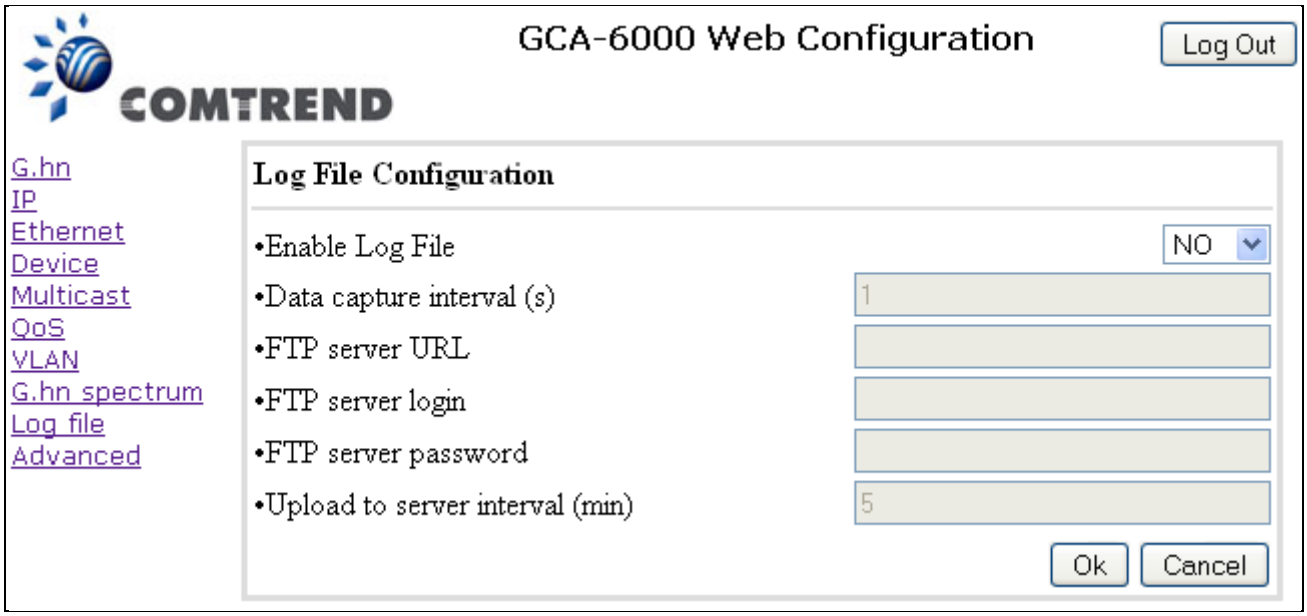
11.1 Notches

In this tab a table with all configured **Notches** of selected node will be shown. It is composed of options for every notch: Notch Index, Start Frequency (KHz), Stop Frequency (KHz), Depth (in dB). The first 2 notches (Regulation) are Read Only, **RO**, in the system and they can be neither removed nor modified. The next 10 notches (User) are R/W and they can be added/removed by user using this tool.

To add new notches the user should fill the "**Add a new User Notch**" fields, setting Start and Stop frequencies in KHz and depth in dB of notch and then press the "**OK**" button. They will be added in first User free position from number 0 to 9 after the screen refreshes.

To remove a User Notch, the "**Remove a User Notch**" section should be used, setting notch number to be removed from 0 to 9 and pressing the "**OK**" button.

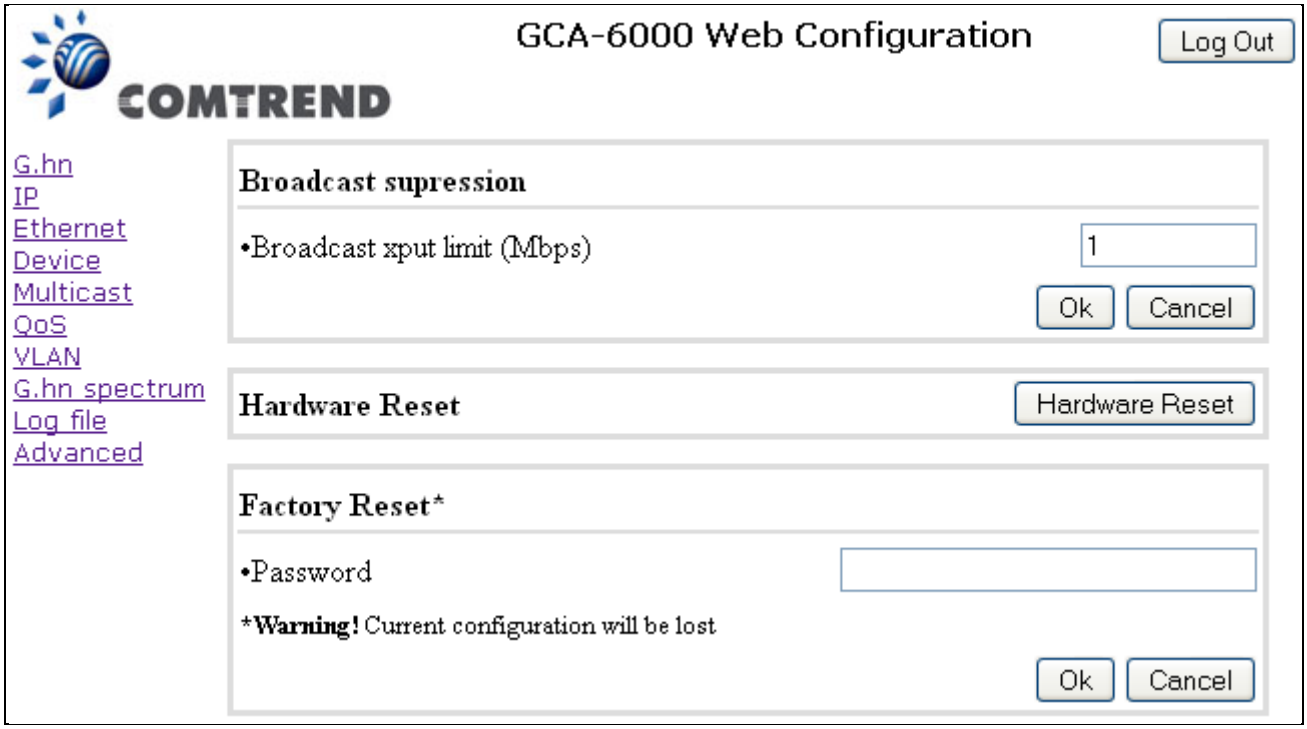
Chapter 12 Log file Interface



12.1 Log File

In the **Log File** configuration tab the following settings can be read, and changed by clicking on the "**OK**" button.

- **Enable Log File** set to YES for enabling Log File functionality in the node and set to NO for disabling it.
- **Data Capture Interval** sets the interval of time in seconds to capture data.
- **FTP Server URL** configures the URL for the remote FTP server where the files will be uploaded.
- **FTP Server Login** configures the user name for the FTP server.
- **FTP Server Password** configures the password for the FTP server.
- **Upload to Server Interval** sets the interval of time in minutes to send the captured file to the remote server.



13.1 Broadcast Suppression

Broadcast traffic higher than the inputted value will be dropped. Input the required value (Mbps) and click the **OK** button. To deactivate this functionality, set the value to 0.

13.2 Hardware Reset

Click on the **Hardware Reset** button to perform a reboot (hardware reset).

13.3 Factory Reset

Input the factory reset password, **betera** and click on the **OK** button to perform a factory reset. Note that the current configuration will be lost.