XtendLan

XL-HCW224C

HomePNA3.1 Coax MDU Master Bridge

XtendLan

User's Guide

Version 1.1
Oct. 2009

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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.

NOTE: This equipment has been tested and found to comply with the limits for a Class A 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 in accordance with 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 can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures:

--Reorient or relocate the receiving antenna.

--Increase the separation between the equipment and receiver.

--Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

--Consult the dealer or an experienced radio/TV technician for help

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VCCI & CE...

CAUTION: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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INTRODUCTION

This chapter describes the features of your HomePNA3.1 over **C**oax to **E**thernet **M**aster (**M**anagement) Bridge -- **XL-HCW224C**. Refer to "HomePNA3.1 over Coax" as **HCNA** from this point**.** Also refer to "Master device XL-HCW224C as **XL-HCW224C** and refer to "Slave device XL-HC224C" as **XL-HCW224C** if they are not denoted completely.

Features

◆ One HCNA Port for Driving HomePNA3.1 Signal into Existing Coaxial Cable
◆ One TV/Antenna Port for TV Set Connection or for TV Signal from VHF/UHF Antenna/CATV
◆ Two Gigabit Ethernet Port with Auto-Detect MDIX Function(Auto Crossover) and Auto-Negotiating Half/Full Duplex 10M/100M/1000M for Expansion or Uplink to FTTx/PON/xDSL Modem
◆ One Rocker Switch to Select either Local or Line Power Mode
◆ One RCA Jack Provides Extra DC 12V/1A Power Source in Line Power Mode
◆ One Reset Button
◆ Supports up to 61 EP (Endpoint, as XL-HCW224C Slave Unit) Concurrent Connections
◆ Built-in Online Diagnostic Function for Individual EP Connection
◆ Priority Queue based QoS Support for 802.1p, IP TOS/TC, UDP/TCP Protocols
◆ Built-in Web/Telnet Server to Support Remote Configuration
◆ Supports Remote HTTP/TFTP Upgrade Function for Master/EP System Firmware and HCNA Driver
◆ Supports Master/EP Auto-Configuration via Built-in TFTP/DHCP Client
◆ Supports DHCP/IGMPv2 Snooping for Host at EP
◆ Supports SNMP Function

Glossary

◆ HCNA   HomePNA3.1 over coaxial cable
◆ MDU   Multiple Dwelling Unit
◆ Coax   Coaxial cable
◆ Master   Master HCNA device (as XL-HCW224C) in one coax network
◆ Slave   Slave HCNA device (as XL-HCW224C) in one coax network
◆ EP   Endpoint, equivalent to Slave HCNA device (as XL-HCW224C)
◆ QoS   Quality of Service
◆ M/C   Fiber-Optic Ethernet Media Converter
◆ PON   Passive Optical Network, as EPON or GPON
◆ Mixer   Coax device sums two or more signals into one
◆ Splitter   Coax device divides a signal into two or more smaller and approximately equal signals.
◆ Combiner   Coax device adds several discrete signal inputs to one and has high isolation between inputs
◆ Duplexer   Coax device separates 2 signals within the same band
◆ Diplexer   Coax device separates 2 signals in different bands
◆ Tap   Coax device uses for matching impedance or connecting subscriber drops
◆ dB   Decibel, to express either a gain or loss power ration(log) after the signal has been transmitted

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INSTALLATION

This chapter describes the installation procedure for your bridge.

Packing List

Your package should come with the equipment listed below,

- ◆ One Main Unit (HCNA to Ethernet Master Bridge) XL-HCW224C
- ◆ One DC 12V Power Adaptor
- ◆ One F-Type Coaxial Cable (RG-59U)
- ◆ One RJ-45 Ethernet Cable (CAT-5)
- ◆ One RCA-Type-Plug to DC-Type-Plug Cable (Optional)

Front
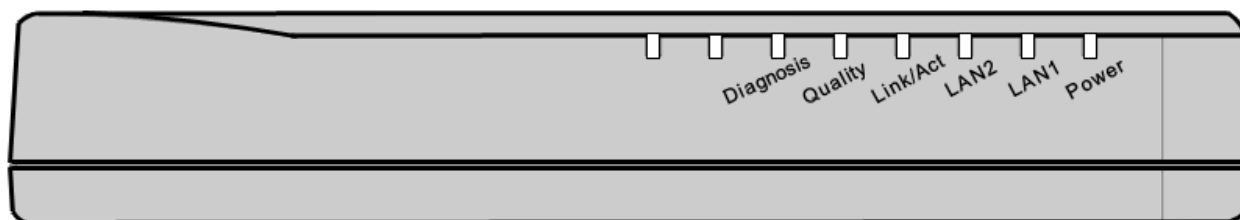
Figure 1: Front Panel

LED Indicators
1. **Power**: Lighting up when power on.
2. **LAN1**: Dual led. Green led is up when LAN1 port is active, and flashing while there is any data traffic. Extra Orange led will be on if LAN1 links in 1Gbps.
3. **LAN2**: Dual led. Green led is up when LAN2 port is active, and flashing while there is any data traffic. Extra Orange led will be on if LAN2 links in 1Gbps.
4. **Link/Act**: Lighting up when HCNA port is active, and flashing when there is any data traffic.
5. **Quality**: Dual led. Shows in Green/Orange/Red for respected High/Medium/Low average HCNA speed.
6. **Diagnosis**: Lighting up when XL-HCW224C is diagnosing HCNA connection toward/from EP.

Rear
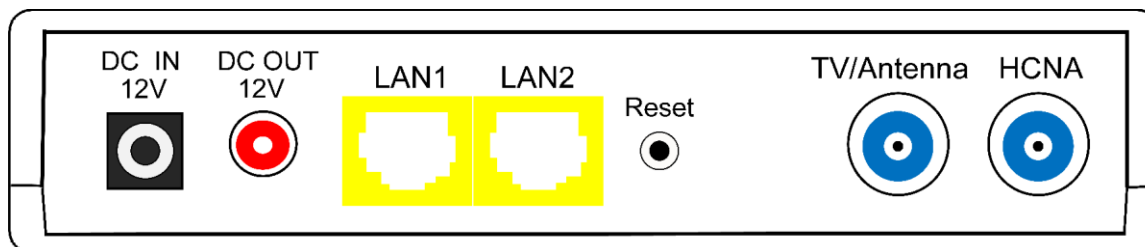
Figure 2: Rear Panel

Connectors & Button
1. **DC IN 12V**: Connect to the power adapter plug.
2. **DC OUT 12V**: Provide maximum 1Amp powering while XL-HCW224C runs in **Line Power** mode.
3. **LAN1/LAN2**: Two Gigabit Ethernet ports to connect uplink Switch/FTTx/PON/xDSL Modem.
4. **Reset**: While XL-HCW224C is on, press and release this button will reboot XL-HCW224C. Press it for lasting 5 seconds will restore all settings to factory default. For example, the IP address will restore to default '**192.168.1.1**'.

5. **TV/Antenna**: Connect to TV Set. Or connect to VHF/UHF antenna or CATV to bypass TV signal to HCNA port.
6. **HCNA**: Attach to existing coaxial cable and use it as the networking backbone in one or more MDUs. XL-HCW224C is the HCNA **Master** device and controls the other **Slave** HCNA devices (refer to Endpoint or **EP**, as XL-HCW224C) on the same coax network. Refer "Connecting the Cables" for more detail.

Side

Figure 3: Side Switch

Rocker Switch
1. **DC IN**: Runs in **Local Power** mode, powering XL-HCW224C via DC adapter plug.
2. **LINE**: Runs in **Line Power** mode, powering XL-HCW224C via the coax cable connected to port '**HCNA**'. (Port '**HCNA**'
    holds both data and power).

Connecting the Cables

To establish a new coax networking system by XL-HCW224C, reroute the CATV/Antenna signal source over coax toward XL-HCW224C '**TV/Antenna**' port and connect XL-HCW224C '**HCNA**' port to the original coax entrance to building. XL-HCW224C works as a **Combiner** for TV and HCNA signal. In each Dwelling Unit, use the HCNA **EP** to extract the TV signal and Ethernet packets. See Figure 4 for the detail cabling in one MDU,
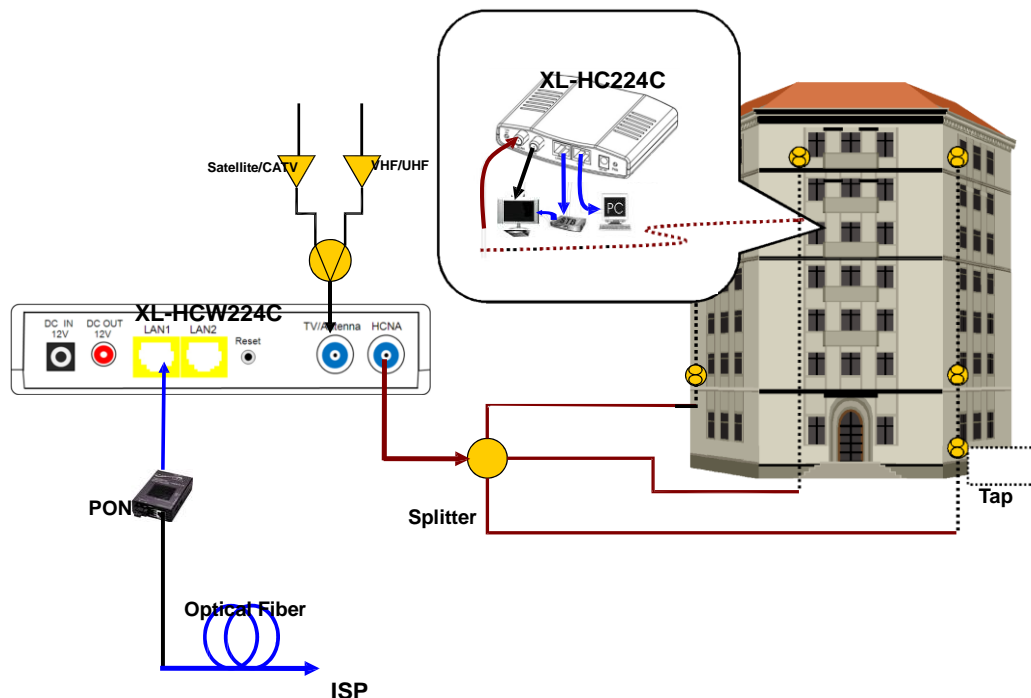
Figure 4: Detail cabling of XL-HCW224C   3

You can also use other Combiner or Mixer-Splitter with XL-HCW224C to build the same system, see the following Figure 5 for different cabling,
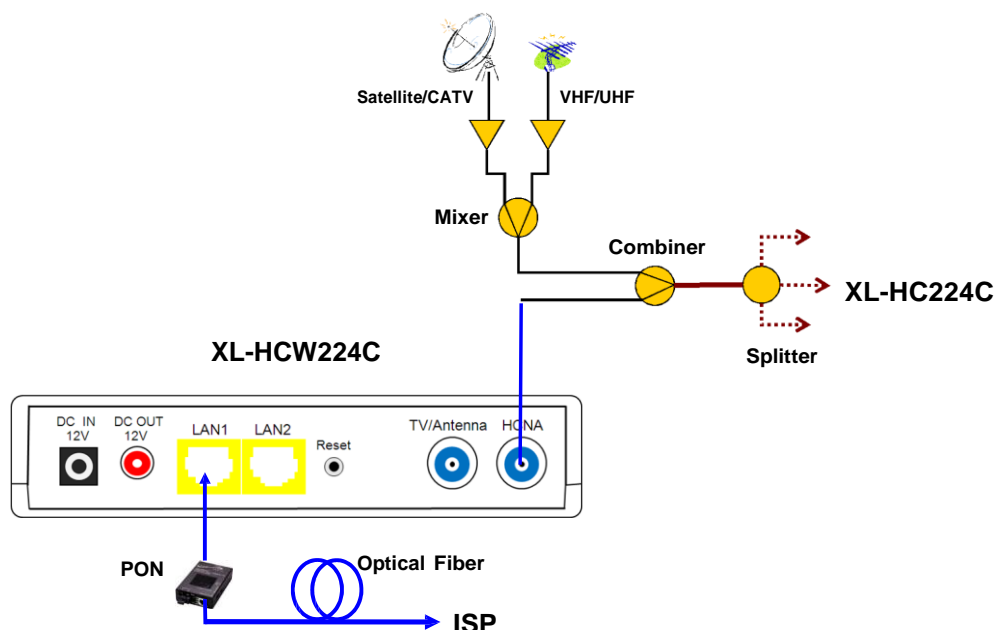
Figure 5: Different Cabling of XL-HCW224C

NOTE: After power up XL-HCW224C, the led '**Link/Act**' will light up for at least one EP is detected on the HCNA network. A dimmed led '**Link/Act**' shows no EP attached to the HCNA network.

NOTE: The minimum attenuation between Master and EP is 6dB. EP is usually connected to the coaxial cable via a **Tap** device that provides enough attenuation (contributes more than 20dB). If you intend to connect the Master and EP directly for test purpose, please add the attenuator that exceeds 6dB to the coaxial cable.

Verification

After you have finished the installation, you should be able to access XL-HCW224C through **Ethernet** link (port LAN1/LAN2). Host (PC) at EP is not allowed to access the XL-HCW224C itself, but can reach the **Ethernet** link (toward ISP)
of XL-HCW224C through **HCNA** link to verify the installation is completed. (See next Chapter for details).

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CONFIGURATION

This chapter describes the configuration procedure for your bridge.

Configuration Methods

To access and configure your bridge, choose one of the following methods:

◆ Use Web Browser
◆ Use Telnet Program
◆ Use SNMP Manager or MIB Browser

NOTE: Based on IPv4.

Use Web Browser

Web browser is the easiest tool to configure the bridge. The factory default IP address of XL-HCW224C is '**192.168.1.1**' and the default subnet mask is '**255.255.255.0**'. To access the bridge with default IP, your PC should be within the same IPv4 network as the bridge XL-HCW224C. That is, your PC's IP address should be as "192.168.1.xxx". For instance, you may connect your PC with the bridge directly by one Ethernet cable between your PC's Ethernet adapter and bridge's port LAN1. Also configures your PC's TCP/IP setting to fixed IP as "192.168.1.xxx", subnet mask as "255.255.255.0", disable DHCP option. Make your PC and the bridge within the same "192.168.1.xxx" network. Type in **192.168.1.1** in your browser's website navigating field, as the following,
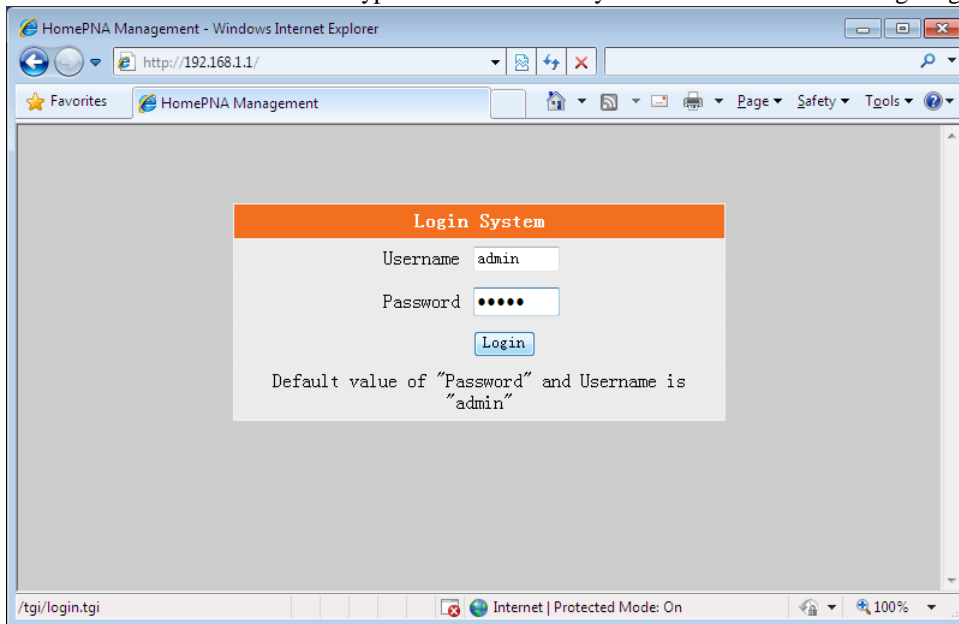
The bridge will prompt you a window for password authorization. The factory default **Username** is '**admin**', also **Password** is '**admin**'. Please change it to a more secured password after you login successfully. Here shows the main configuration menus on the browser,

Static or Dynamic IP
Instead of using default static IP, XL-HCW224C may enable DHCP client to get its '**IP/Subnet Mask/Default Gateway/DNS**'
from DHCP server. Accompanying other DHCP options to auto-configure Master/EP, refer '**XL-HCW224C Application Notes**' for more.

System Setup (TCP/IP Properties)
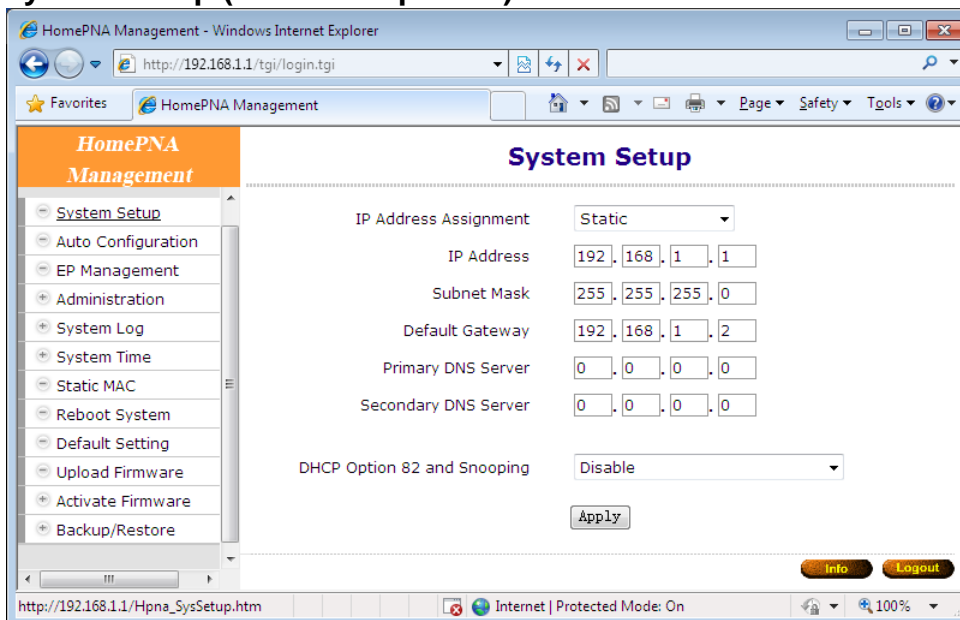
The main window contains the left sub-window for the items to be configured, and the right sub-window displays the contents for the selected item. Click your mouse on the item in the left window will pop out the corresponding item-window in the right side. Click on the '**Apply**' button (or '**OK**' button in some screens) will submit your new setting into the bridge and will take effect immediately (Some changes require 'Reboot').

DHCP Option 82 and Snooping

For Host (PC) at EP, XL-HCW224C could pad DHCP 'Option 82' and could snoop DHCP handshaking packets to verify host is using the valid IP/MAC granted by DHCP server. Refer '**XL-HCW224C Application Notes**' for more.

System Assets (Information)

Click on the bottom-right '**Info'** icon will pop out the following window,
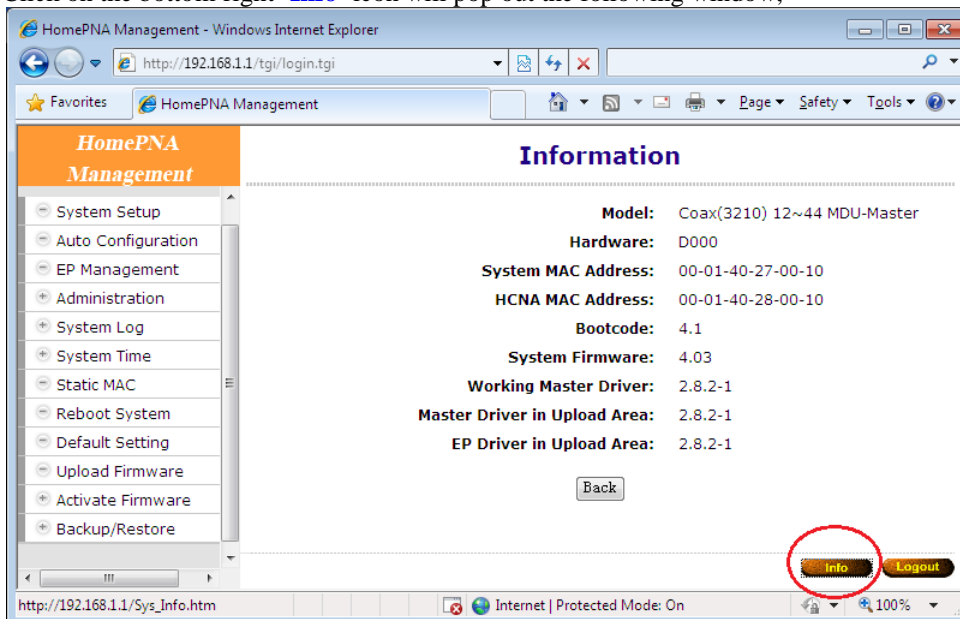
Auto Configuration

Let Master retrieve the related config files (***.shc**, ***.ep**) from TFTP server, then setup Master and connected EPs according to the config script file and overwrite the original settings in Master and EP. Refer '**XL-HCW224C**

Application Notes' for more.
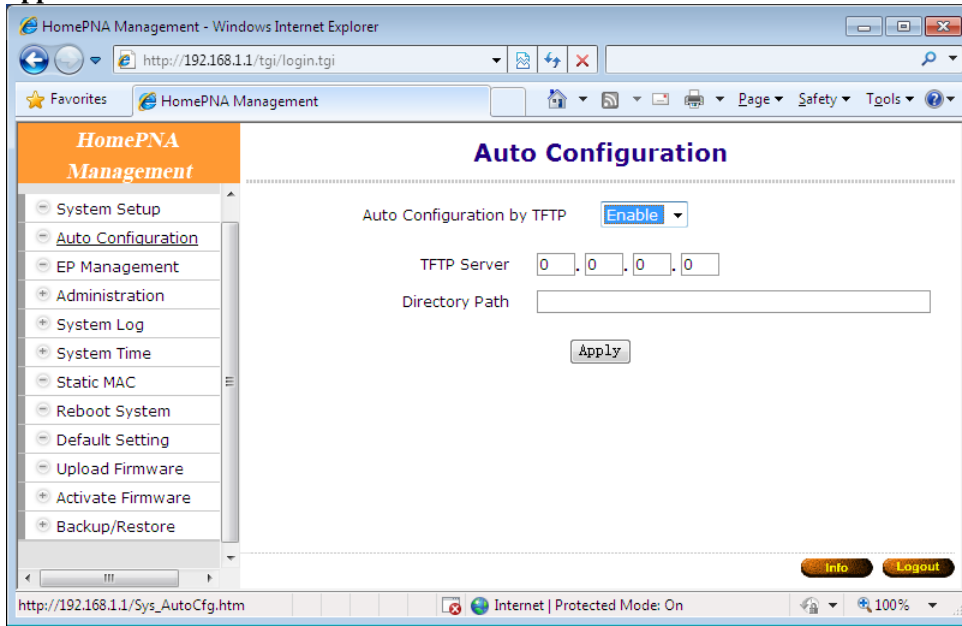
EP (User) Management

Refer the following Figure 6 as the example for generic EP management. Each EP is identified by its built-in **HCNA MAC** address. The HCNA device resides at XL-HCW224C is regarded as the **Master** (Local) device, and is used to manage other connected **Slave** EPs. The HCNA MAC exists only in HCNA (coax) domain, and is unaware for any EP end-
user in Ethernet domain. System manager needs system **IP** address and **Ethernet MAC** address to access XL-HCW224C.

Each XL-HCW224C device should be stamped with both Ethernet MAC and HCNA MAC for identification.

Figure 6: EP Management Architecture   7

Firmware/HCNA Driver Files

XL-HCW224C flash ROM is capable of storing the following files:

1. System bootcode (OS bootloader)
2. System firmware (OS)
3. Local (Master) HCNA driver (resides at XL-HCW224C)
4. EP (Slave) HCNA drivers (resides at EP like XL-HCW224C)
5. HCNA physical connection diagnosis utility

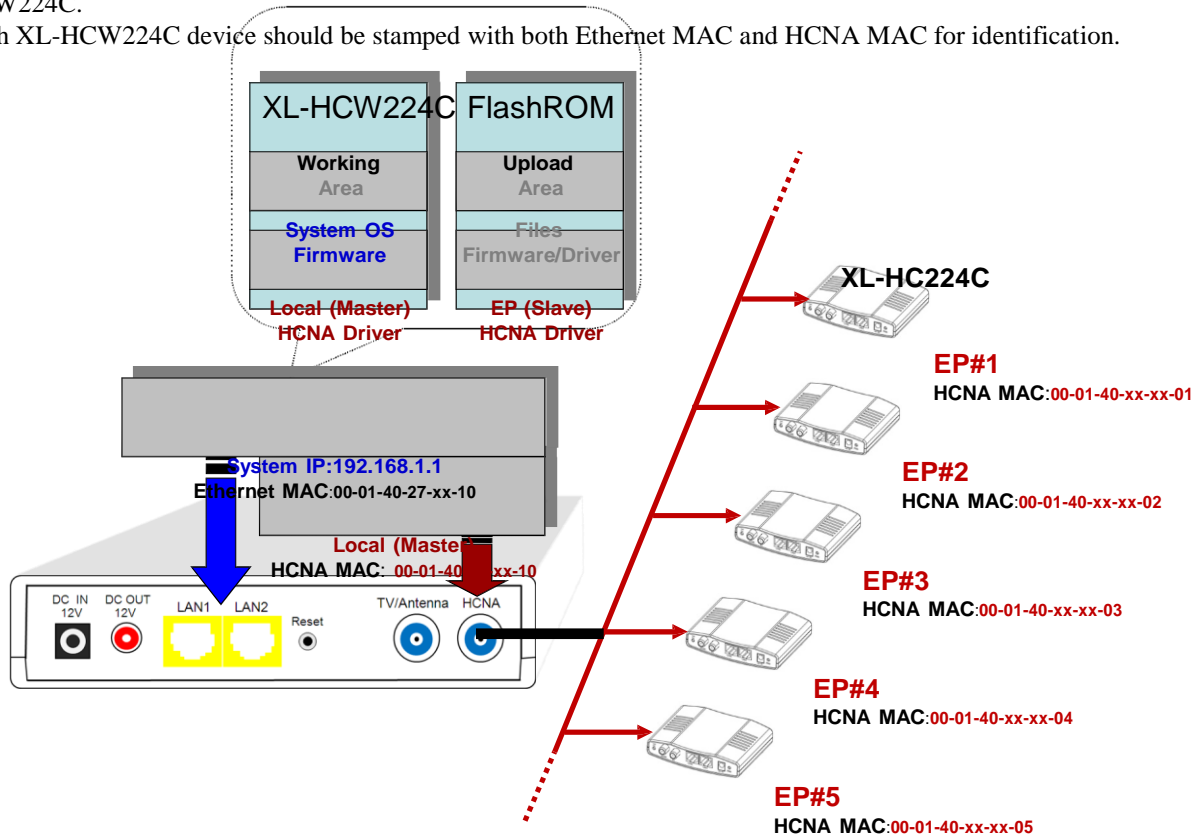To upgrade any one of them, you need to follow the 2-stage procedure. First to '**Upload**' the file onto XL-HCW224C Upload Area, then do the real upgrade by '**Activate**' it on demand -- the file will move into Working Area for running. Refer the following section entitled "**Example to Upload then Activate System Firmware and HCNA Driver**" for more detail.

EP Online

Sign in XL-HCW224C and open 'EP Management' window. For example,

Each row represents for one EP, here we have one Master (Local) HCNA device (on the top) and 60 extra Slave online EP devices shown on the window. Click on '**Refresh**' button will scan all connected EPs again, this may take time in probing lots of EP.

For each shown column,

No   : EP index number.

Sel   : click on '**Sel**' button will select all listed on-line EPs at once for EP HCNA driver Upgrade / ReConfig, or just designate the EP one by one for EP HCNA driver Upgrade / ReConfig. The top row is the local Master device.

Link   : light for HCNA device current link status.
  Green : EP is active -- on-line. For Master device, Green always unless Master's HCNA driver is broken.
  Yellow: EP is active -- in-config. Master is initializing the EP, turns to Green while the EP initialization has been completed.

- **Red** : EP is active – unrecognized, and cannot be configured by Master.
- **Gray** : EP is not active -- off-line, either user powers it off or cabling has trouble.

MAC **:** HCNA MAC address.

F/W **:** the current queried **working** (running) HCNA driver version

Model **:** the current queried **working** HCNA model name

Note **:** used to denote Master or EP end-user, for recording username or address or specific message.

Config **:** configure HPNA and Ethernet properties of Master/EP. Master XL-HCW224C will keep these Master/EP settings into its own nonvolatile memory and use the settings to configure each EP accordingly while power up.

Test **:** run the built-in diagnostic functions. Refer "Diagnosis" for more detail.

Upgrade **:** upgrade the selected Master/EP(s) HPNA driver with new driver at the XL-HCW224C Upload Area .

ReConfig **:** configure EP's settings (stored in XL-HCW224C) again, sync the EP internal settings to what Master has.

Add EP **:** add the off-line EP profile, pre-setup EP properties profile before it goes online.

Del EP **:** delete the off-line EP profile, to save the EP properties profile space of XL-HCW224C.

Click on each device's **'Config'** button can open the window to configure its HPNA/Ethernet properties. Click on '**Test**' button can diagnose the physical connection quality between Master and EP or can analyze the device noise spectrum.

Link in Green – EP is ready
EP has been configured properly by Master.

Link in Yellow – EP is being initializing
Turn into Green while done, as the following:
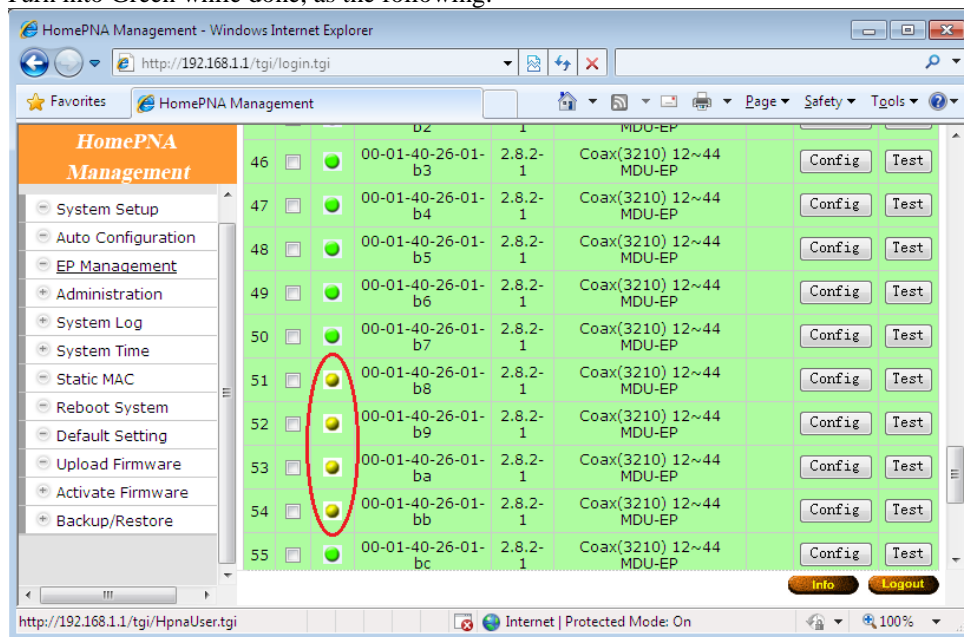
Link in Red – unrecognized/un-configured EP
It is a broken or unauthorized EP, and may degrade the whole HCNA connection quality. The EP should be removed from the system.

EP Offline

Link in Gray – EP is off

Properties Profile – store Master/EP settings

XL-HCW224C will store the **setting** values of individual EP into its nonvolatile memory, includes HomePNA properties and Ethernet properties, as a profile. And it tells the different Master and EP profile status from row background color, refer "Profile Status for Master and EP". While EP is off-line and doesn't need any service, you may delete its

obsolete profile manually to save XL-HCW224C storage space. XL-HCW224C could keep up to 62 profiles, and serve up to 1 master

plus 61 on-line EPs concurrently.

Master HomePNA Properties (HPNA)

Note

Footnote to the Master.

Security Mode – always on

The communication between EPs is isolated intentionally. EP cannot talk to each other. It is the default security mode and unchangeable.

Privacy Mode – default is off

Privacy prevents unauthorized EP from accessing the HCNA network controlled by **Master** HCNA device. While '**Privacy Mode**' is '**ON**', Master will serve the EP only if its '**Privacy Key**' matches with the Master's. The '**Privacy Key**' acts like EP's password granted by Master.

Open the Master privacy configuration window by clicking on its '**HPNA**' button,
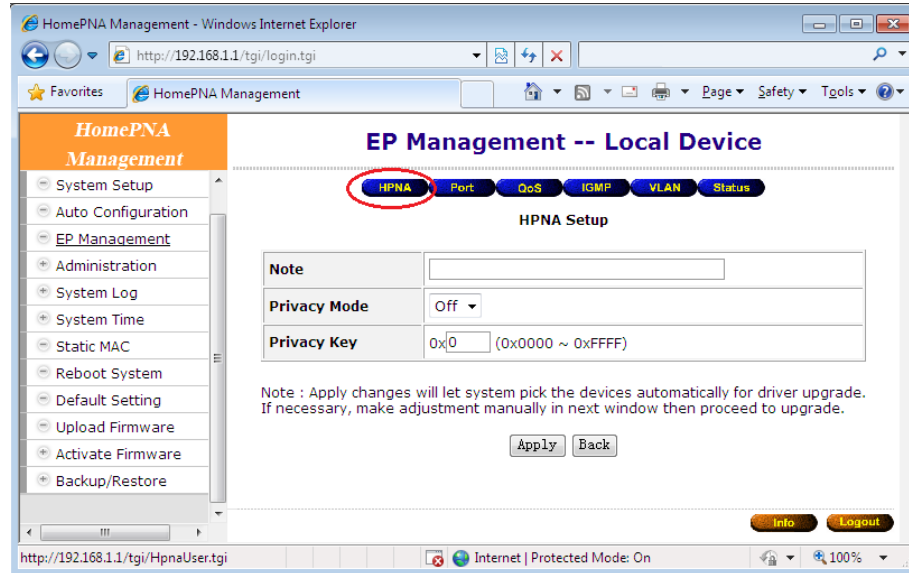
The **'Privacy Mode'** value for Master (Local device):

Off: It allows all EPs to transmit and receive packets through XL-HCW224C. Regardless of the '**Privacy Key**' values setting in Master device.

On: XL-HCW224C will communicate with EPs if they own the same **'Privacy Key'** while the **'Privacy Mode'** is turned

'ON'. There should be only one key exists in one coax networking system. EP with unmatched key will not be allowed to transmit any packets through XL-HCW224C if **'Privacy Mode'** is **'ON'**.

The factory default mode is '**Off**' and key is '**0x0**' (states in hexadecimal). Once you activate the **'Privacy Mode'** and set up the **'Privacy Key'** in XL-HCW224C (the **setting** values), you need to upgrade Master and all allowable EPs' HCNA driver with the new values (replace the running **working** values with the new **setting** ones) before any connected EP can access the network controlled by XL-HCW224C.

Privacy Mode Usage Example
For example, first activate the **'Privacy Mode'** by apply the '**ON**' setting and change the **'Privacy Key'** to '**0x1234'.** XL-HCW224C will request to upgrade the Master's HCNA driver, and all allowable EP's HCNA driver.
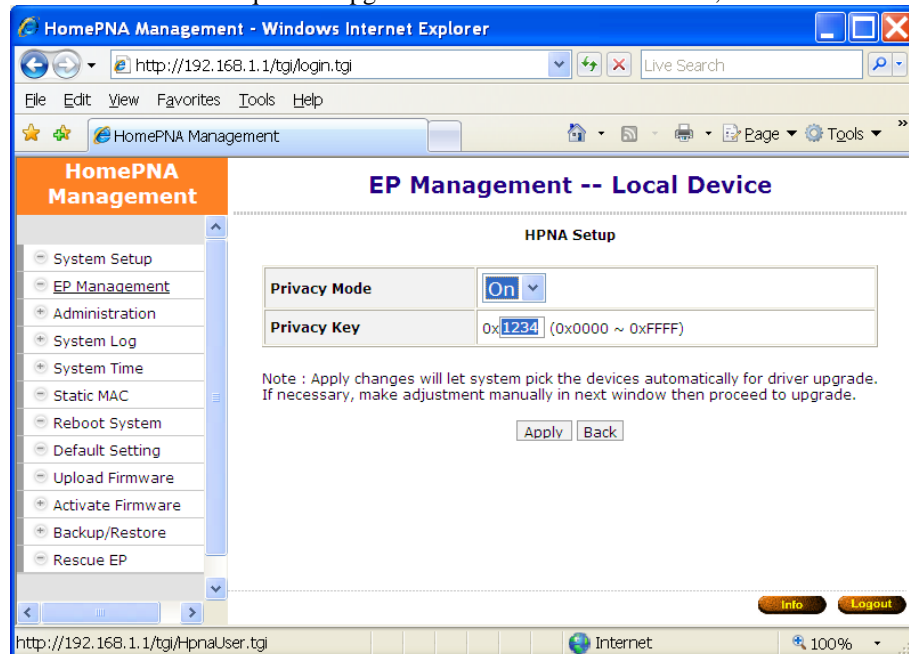
Click the '**Apply**' button will change the Master row background color to yellow (refer "Profile Status for Master and EP"), and pick all allowable EPs automatically for driver upgrade. You may change the select and proceed to upgrade, as we uncheck one EP, then do the upgrade for Master (Local) and 4 on-line EPs,

Click '**Upgrade**' button,

Here we have one banned EP shown in red background after upgrade,

HomePNA Management - Windows Internet Explorer

http://192.168.1.1/tgi/login.tgi Live Search

File Edit View Favorites Tools Help

HomePNA Management

HomePNA Management

EP Management

Driver in Upload Area, Master : 2.7.6-0 , EP (3010) : 2.7.5-2, EP (3110) : 2.7.6-0
On-line EP : 5   Off-line EP : 2

System Setup
EP Management
Administration
System Log
System Time
Static MAC
Reboot System
Default Setting
Upload Firmware
Activate Firmware
Backup/Restore
Rescue EP

Sel	Link	MAC	F/W	Model	Note	Config		Test
☐	●	00-01-40-21-00-12	2.7.6-0	Coax(3110) 12~28 Hi-Pwr MDU	Local	HPNA	Ether	Test

No	Sel	Link	MAC	F/W	Model	Note	Config		Del	Test
1	☐	●	00-01-40-05-00-01	2.7.5-2	Coax(3010) 12~28 Hi-Pwr MDU-EP		HPNA	Ether	Del	Test
2	☐	●	00-01-40-05-00-64	2.7.5-2	Coax(3010) 12~28 Hi-Pwr MDU-EP		HPNA	Ether	Del	Test
3	☐	●	00-01-40-1f-02-ca	2.7.6-0	Coax(3110) 12~28 Hi-Pwr MDU-EP Smart		HPNA	Ether	Del	Test
4	☐	●	00-01-40-1f-02-cc	2.7.6-0	Coax(3110) 12~28 Hi-Pwr MDU-EP Smart		HPNA	Ether	Del	Test
5	☐	●	00-01-40-1f-02-cd	2.7.6-0	Coax(3110) 12~28 Hi-Pwr MDU-EP Smart		HPNA	Ether	Del	Test
6	☐	○	00-01-40-1f-02-d6	NA	NA		HPNA	Ether	Del	Test
7	☐	○	00-01-40-1f-03-15	NA	NA		HPNA	Ether	Del	Test

Refresh Upgrade

Info Logout

http://192.168.1.1/tgi/HpnaUser.tgi   Internet   100%

Then power on the 2 extra off-line EPs, they will also be banned since their '**Privacy Mode/Key**' (as default '**OFF**'/'**0x0**') doesn't match with the Master's (now key is '**ON**'/'**0x1234**').

HomePNA Management - Windows Internet Explorer

http://192.168.1.1/tgi/login.tgi Live Search

File Edit View Favorites Tools Help

HomePNA Management

HomePNA Management

EP Management

Driver in Upload Area, Master : 2.7.6-0 , EP (3010) : 2.7.5-2, EP (3110) : 2.7.6-0
On-line EP : 7   Off-line EP : 0

Sel	Link	MAC	F/W	Model	Note	Config		Test
☐	●	00-01-40-21-00-12	2.7.6-0	Coax(3110) 12~28 Hi-Pwr MDU	Local	HPNA	Ether	Test

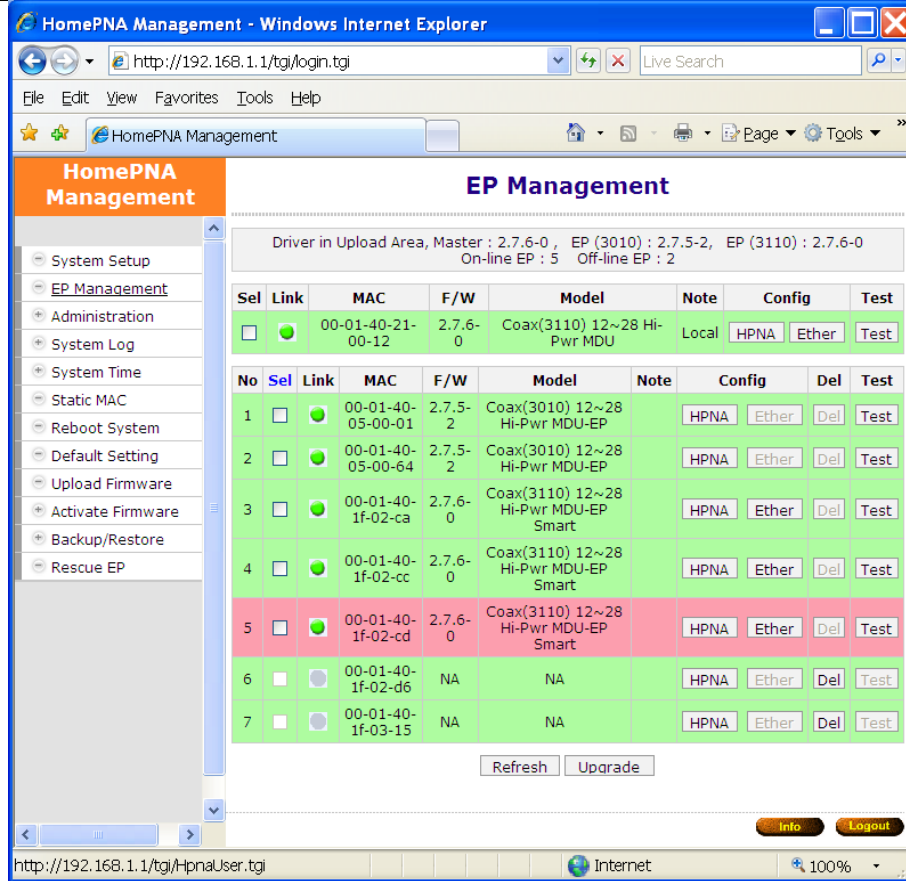| No	Sel	Link	MAC	F/W	Model	Note	Config		Del	Test
1	☐	●	00-01-40-05-00-01	2.7.5-2	Coax(3010) 12~28 Hi-Pwr MDU-EP		HPNA	Ether	Del	Test
2	☐	●	00-01-40-05-00-64	2.7.5-2	Coax(3010) 12~28 Hi-Pwr MDU-EP		HPNA	Ether	Del	Test
3	☐	●	00-01-40-1f-02-ca	2.7.6-0	Coax(3110) 12~28 Hi-Pwr MDU-EP Smart		HPNA	Ether	Del	Test
4	☐	●	00-01-40-1f-02-cc	2.7.6-0	Coax(3110) 12~28 Hi-Pwr MDU-EP Smart		HPNA	Ether	Del	Test
5	☐	●	00-01-40-1f-02-cd	2.7.6-0	Coax(3110) 12~28 Hi-Pwr MDU-EP Smart		HPNA	Ether	Del	Test
6	☐	●	00-01-40-1f-02-d6	2.7.5-4	Coax(3110) 12~28 Hi-Pwr MDU-EP Smart		HPNA	Ether	Del	Test
7	☐	●	00-01-40-1f-03-15	2.7.5-4	Coax(3110) 12~28 Hi-Pwr MDU-EP Smart		HPNA	Ether	Del	Test

Refresh Upgrade

Info Logout

http://192.168.1.1/tgi/HpnaUser.tgi   Internet   100%

EPs are classified by the shown background color, green for allowed EP, red for banned EP.

Privacy Mode/Key Summary

EP can't communicate with each other regardless of the settings of **'Privacy Mode'** and 'Privacy Key'. EP could access the coax network controlled by XL-HCW224C only if EP has the right **'Privacy Mode'** and 'Privacy Key'. Please refer the following diagram for more detail,

Master **Privacy Mode** EP **Privacy Mode**	**On**	**Off**
On	9 (**Key** match) 8 (**Key** not match)	8
Off	8	9 (factory default)

9: EP can access the network

8: EP can't access the network

Upgrade the EP's HCNA driver is the only way to change the EP's **'Privacy Mode'** and 'Privacy Key'—by applying the setting values of the Master HCNA device onto selected EPs.

Profile Status for Master/EP

Each listed device status can also be classified by the shown background color:

Green: For Master, the 'Privacy Mode/Key' **working** values in device is consistent with the profile stored **setting** values in XL-HCW224C. For EP, it can access the network.

Yellow: For Master, it has inconsistent 'Privacy Mode/Key' settings. You may upgrade the Master's driver to synchronize its **working** values (to replace the running **working** values with the **setting** ones). For EP, it has inconsistent HCNA driver version (Request to upgrade/sync the **working** EP HCNA driver with the new **uploaded** EP HCNA driver).

Red : For banned EP, either 'Privacy Mode/Key' in EP is not matched or the 'Host Limit' value in EP is 0. XL-HCW224C will refuse to serve this EP.

EP HomePNA Properties (HPNA)

EP conforms to the following HomePNA settings stored in XL-HCW224C Master,
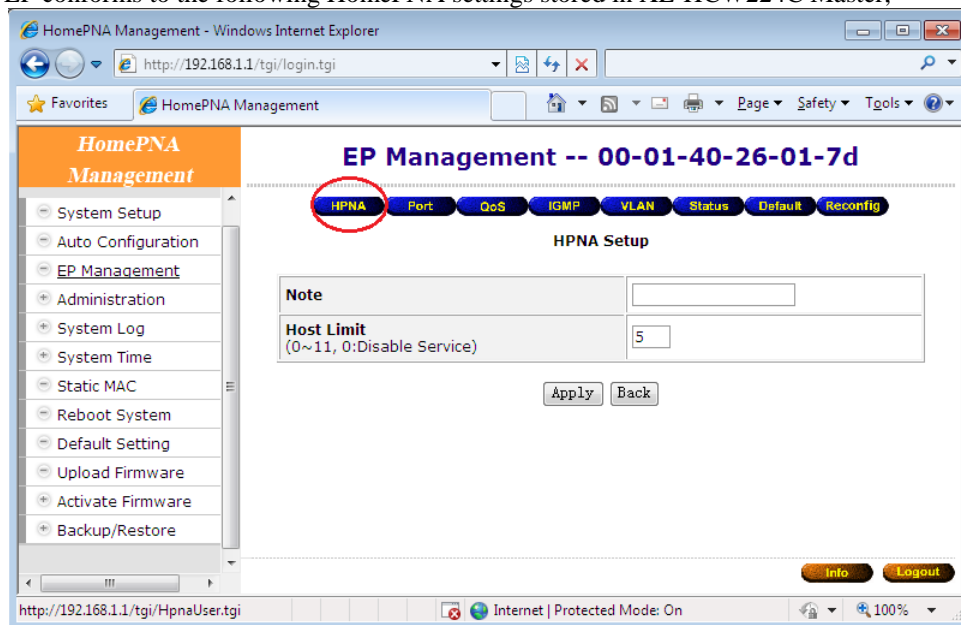
Note

Footnote to the EP (user).

Host Limit
Specify the maximum allowable host (as PC) number attached on this EP:
0: Service is disabled, none host is allowed
1~11: The factory default value is 5.

Master/EP Ethernet Properties
The Ethernet properties of Master device and EP device are configurable.

Port Setup
To configure built-in Ethernet port properties, include speed, flow control, and maximum Down/Up rate (bandwidth control) of port LAN1/LAN2/HCNA.

Service and Speed/Duplex
Change '**Service**' to On (enable) or Off (disable) per port. This setting open or close the related port in EP. And default setting in field '**Speed/Duplex**' is '**Auto**' states for auto-negotiation.

Bandwidth Control per Port
Limit the maximum allowable **downstream**/**upstream** bandwidth of Master/EP. This is hardware based bandwidth control to throttle traffic.

Consider port HCNA as the network backbone and refer the following diagram to set up per port bandwidth control parameters in Master/EP. **DownRate** states for downstream rate from Master to EP, and **UpRate** is the upstream rate from EP to Master. The maximum allowed rate should be the setting value multiplied by 64Kbps. If maximum rate exceeds 100Mbps (as the value **1563**) at EP or exceeds 200Mbps (as the value **3125**) at Master, there will be no bandwidth control at all.

Bandwidth Control per EP
EP HCNA port is the main entrance toward the coax trunk. By throttling only the EP HCNA port, the Up/Down bandwidth per EP is controlled.

EP Upstream
Bandwidth Control
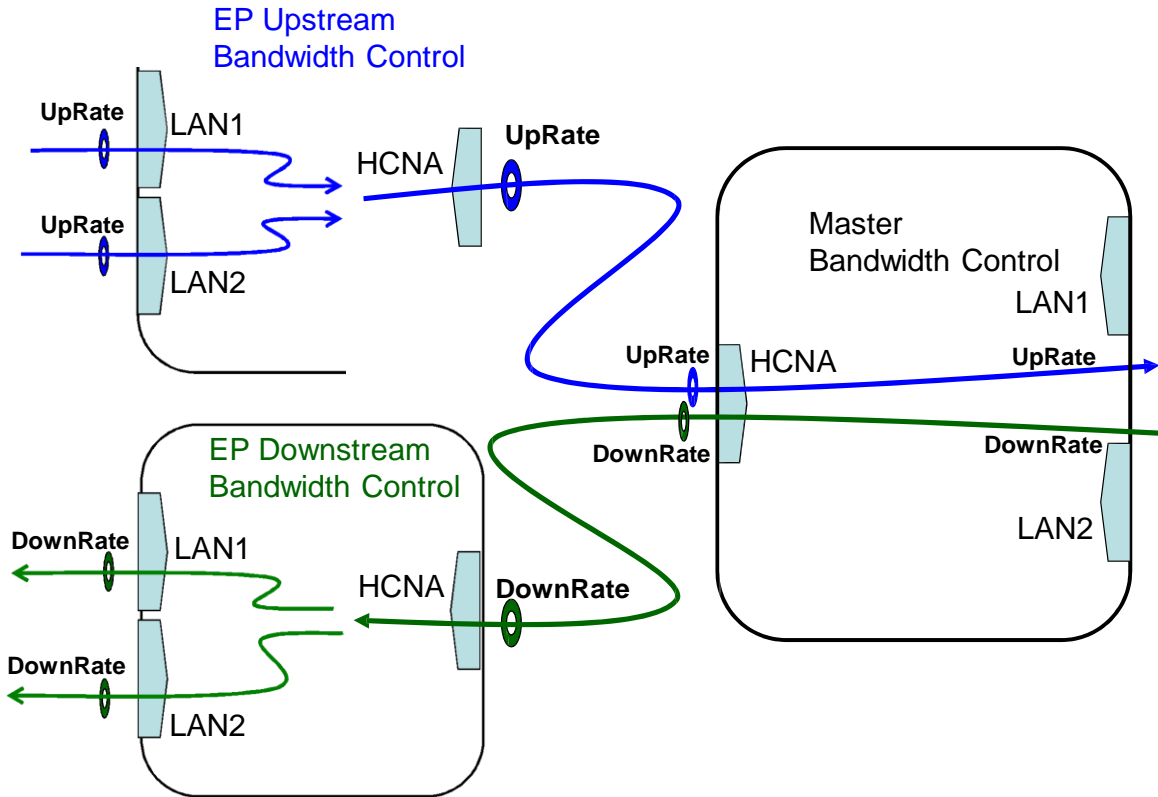
QoS

Total 4 prioritized queues are provided for Ethernet packets, denoted as **Queue0** (lowest priority), **Queue1**, **Queue2** and **Queue3** (highest priority). By default, packet priority is based on 802.1p, IPv4 TOS, IPv6 TC. Refer Chapter "ADVANCED FEATURES" for more XL-HCW224C QoS mechanism detail.

We can further assign packet priority based on TCP/UDP port protocol. For example, as the following setting diagram we classify TCP/UDP packet with port '1234' (decimal) as the highest priority packet goes to Queue3, port '23' goes to Queue2 and port '80' goes to Queue1; other normal packet goes to Queue0.
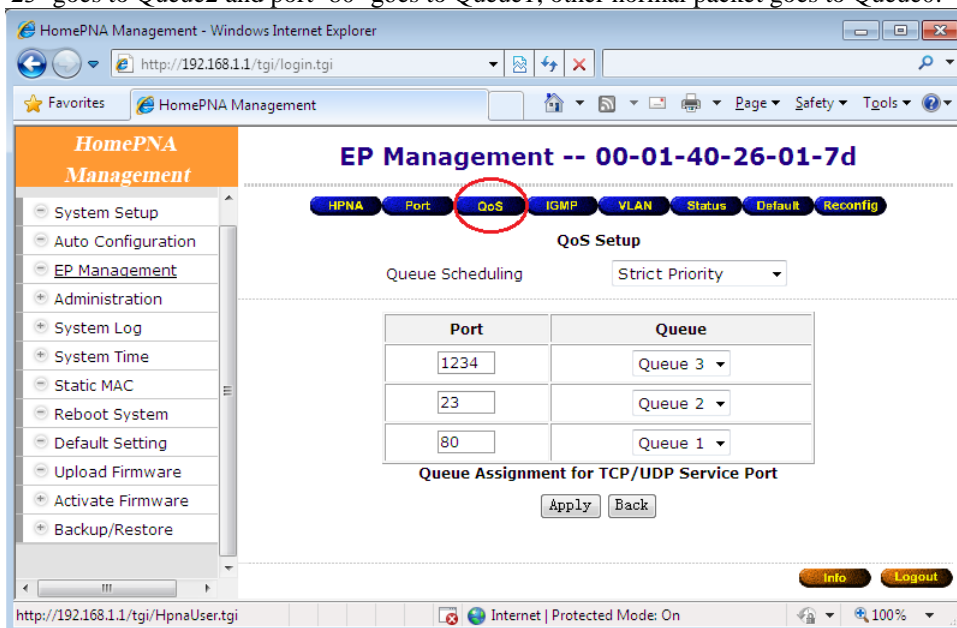
IGMP v2 Snooping

Support IGMP v2/v1 snooping with 'Fast Leave' feature. Close (disable) it if IGMP v3 is adopted in the network.
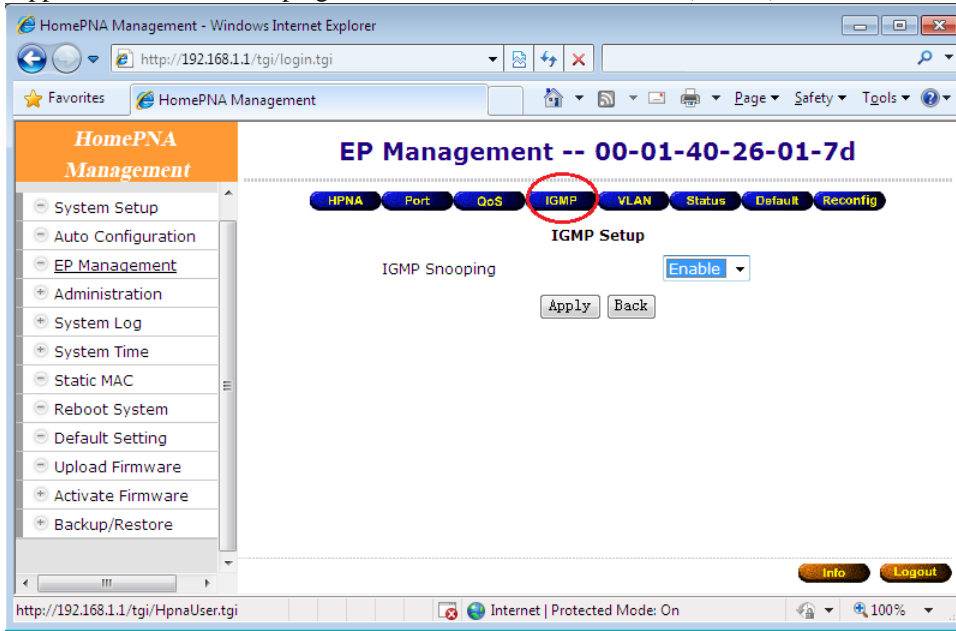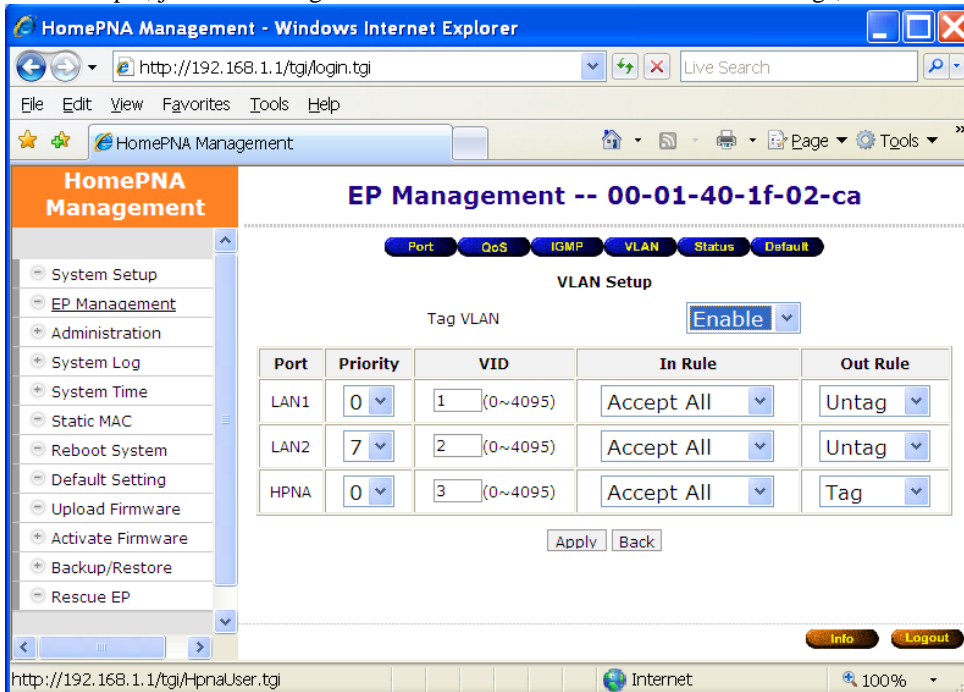

Tag VLAN

Enable the 802.1Q Tag VLAN function and set up the values in field '**VID'** and '**Priority'**. VID range is 1~4095 and Priority is 0~7.

Regard port HCNA as the network trunk. Once Tag VLAN is enabled, by default port LAN1 and port HCNA are set to the same VLAN; also port LAN2 and port HCNA are within the same VLAN. Port LAN1 and port LAN2 are not within the same VLAN if assigned with different VID.

Take the following VLAN setting diagrams for example.
First example, just enable Tag VLAN in both Master and EP '**VLAN**' settings,

The following diagram denotes the path for tagged packets according to the above settings,
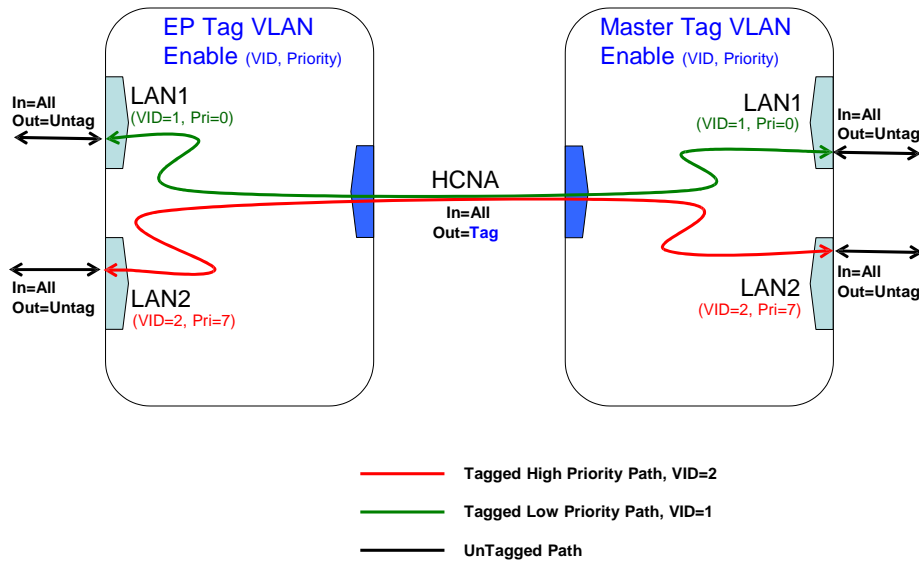
Second example, enable Tag VLAN in EP only, and keep Master Tag VLAN disabled as default, accompanied the following packet path diagram.

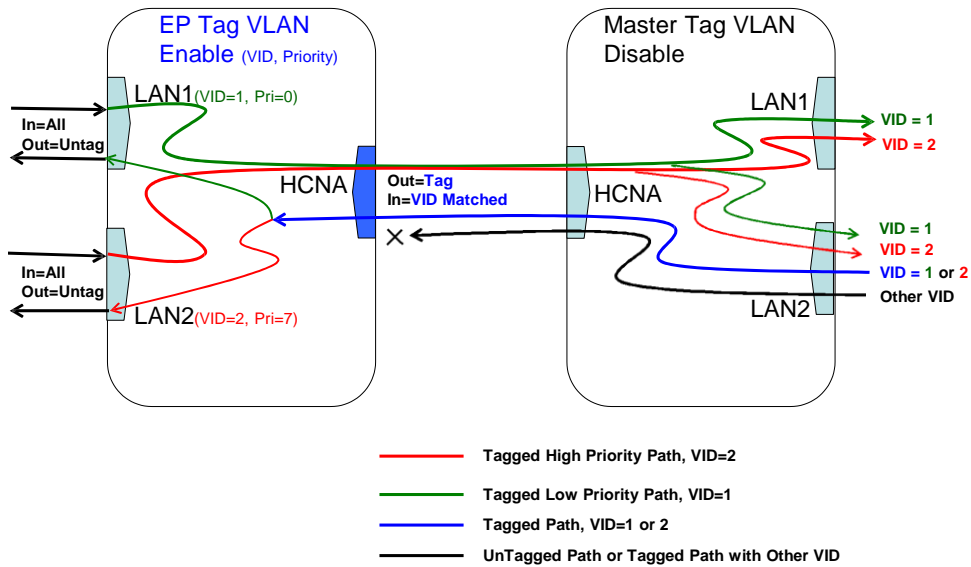|			
────────		Tagged High Priority Path, VID=2	
────────		Tagged Low Priority Path, VID=1	
────────		Tagged Path, VID=1 or 2	
────────		UnTagged Path or Tagged Path with Other VID	

Status and Statistics

Show port LAN1/LAN2/HCNA port link status and port statistics.

Reset to Default

For EP, to reset all settings to factory default, including '**HPNA'**, '**Port**', '**QoS**', '**IGMP**', and '**VLAN**'.

ReConfig EP

Re-initialize all EP settings. Sync/Confirm the targeted EP configuration again.

Delete the Obsolete EP Profile

For the off-line EP, the light in **Link** field has gray, click on the '**Del EP**' button will delete chosen EP profile(s).

Diagnosis

Click on 'Test' button to run the built-in diagnostic tools.

Online Diagnosis – between Master and EP

Measure the connection factors 'SNR', 'PE' and 'Rx Power' between targeted EP and Master without interrupting service,

SNR: Normally between 28dB~34dB.

PE: 64Mbps~192Mbps/224Mbps (best connection carrier speed, in bits per second) for normal connection. XL-HCW224C will adopt lower carrier speed automatically for connection path with high attenuation (lower
      SNR).

Rx Power: measured signal power

Device Noise – in Master

Measures local Master device's HCNA interface noise level (noise floor). For example, here shows the Master noise frequency spectrum diagram after test– Note that service will be stopped temporarily during Master's test.
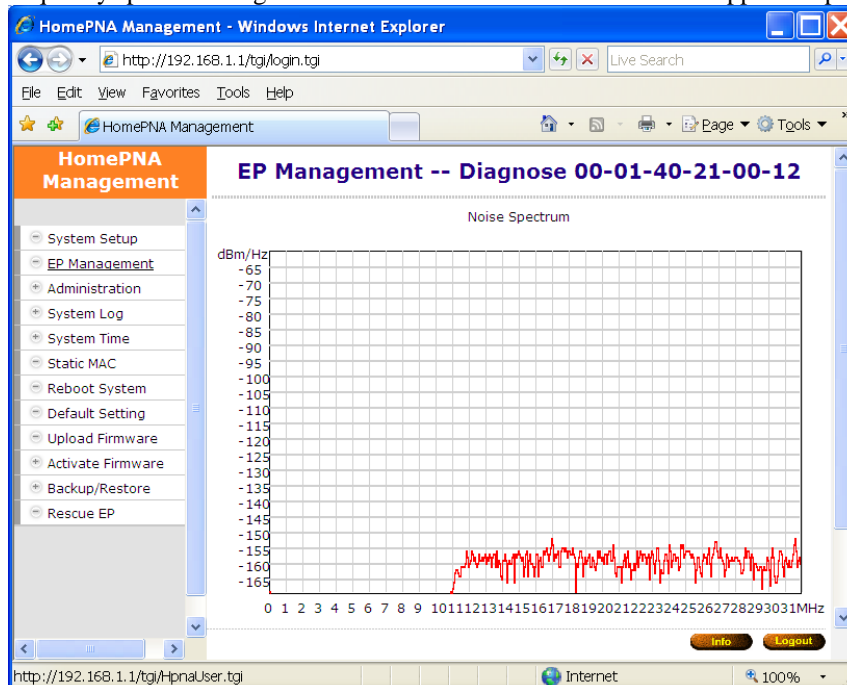
Device Noise – in EP

Measures EP device's HCNA interface noise level (**noise floor**). For example, here's the noise frequency spectrum of one connected EP. **Note** only the EP (testee) service will be stopped during test, test will not influence other online EP.
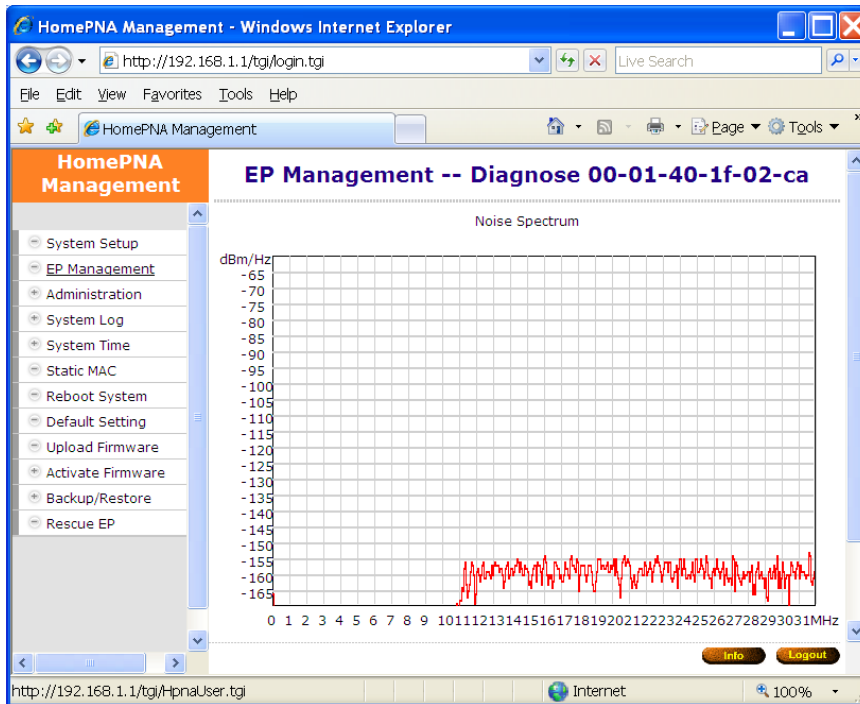
Offline Diagnosis – between Master and EP

This diagnosis will stop service for 10~20 seconds. Here's the result by clicking on '**Tx Diag**' button to perform a test between XL-HCW224C and connected EP,
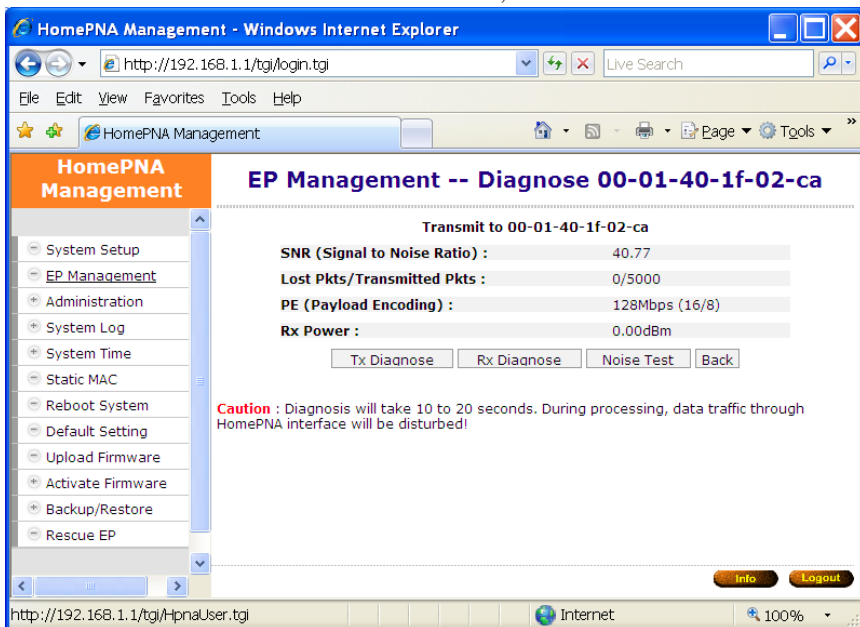
This diagnosis runs the downstream test from XL-HCW224C toward EP.

Also the result of '**Rx Diag**' of the same gears,
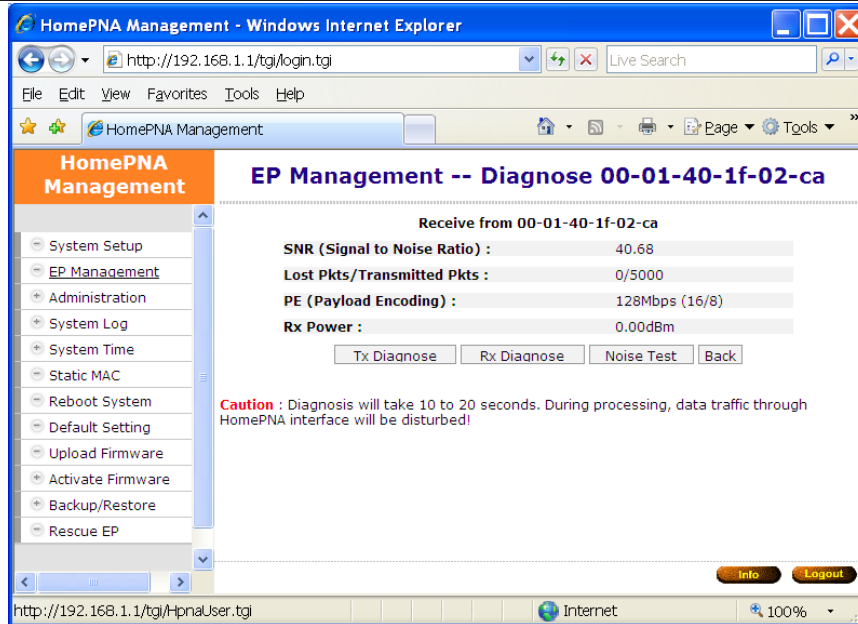
This diagnosis runs the upstream test from EP to XL-HCW224C.

The shown factors '**SNR**', '**Lost Pkts**', '**PE**' and '**Rx Power**' are obtained during communication diagnosis between the tested EP device and Master device.

Lost Pkts: Denominator is the total number of transmitted packets in one test run. Numerator is the number of lost packets in one test run.

Administration

The settings include the Administrator account, the allowable Host with specified source IP, and the protocols like Http/Telnet/Icmp/Snmp in XL-HCW224C management. Set up the criteria for management packets toward XL-HCW224C. Irrelevant for data packets pass through XL-HCW224C toward EP.

Administrator

For each account, 3 level of privilege is provided: Superuser, Read, and ReadWrite. The unchangeable username 'admin' holds the 'Superuser' rights always.
To add user account, you need the 'Superuser' privilege,
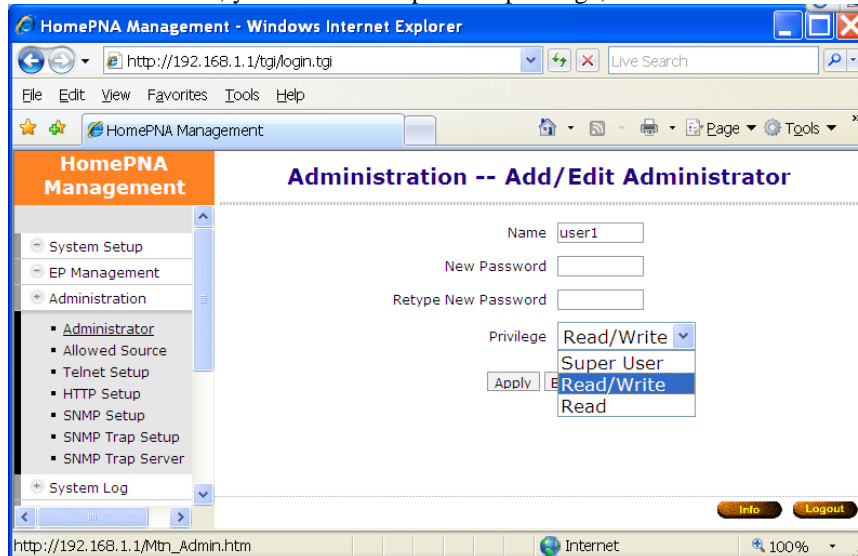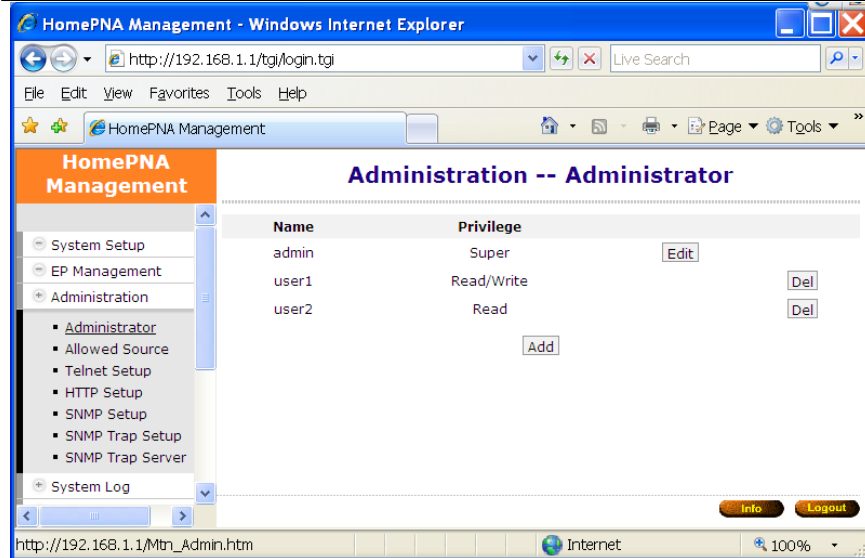
Allowed Source

Factory default filter set for the 'IP address' is '**0.0.0.0**' and the 'Subnet Mask' is '**0.0.0.0**' in '**Allowed Source**' setting. If the incoming packet fulfills the following criterion, XL-HCW224C will accept the management packet, else reject it.

(Incoming Source IP Address **&** Subnet Mask) = (IP Address **&** Subnet Mask)

For the factory default setting, it will accept all incoming packets.

For example, the following filter set permits all Hosts with IP address '192.168.1.xxx' to access and configure XL-HCW224C,
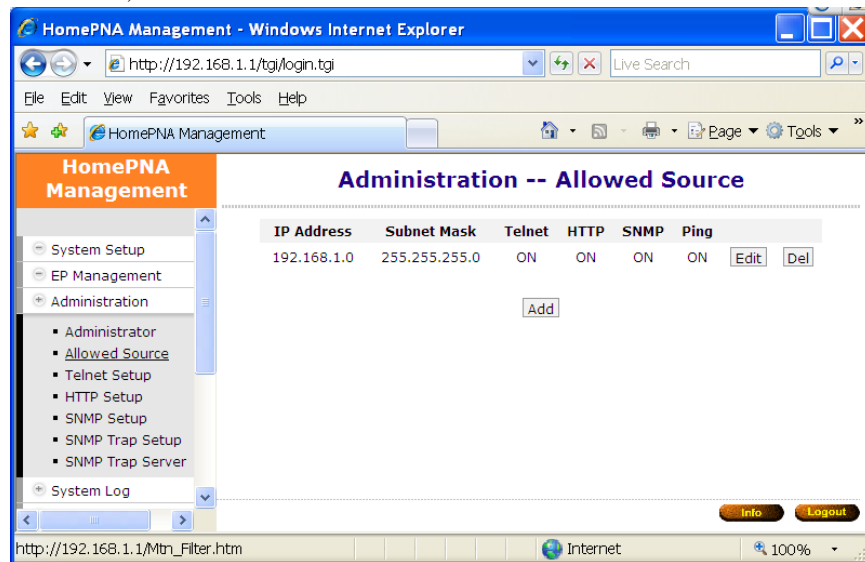
For each programmed filter set, you can further specify if the protocol Telnet/Http/Snmp/Ping is enabled or not. Be careful not to block your current IP from accessing XL-HCW224C remotely; else you have to press the Reset Button locally and restart XL-HCW224C from factory default settings.

Telnet/Http/Snmp Setup
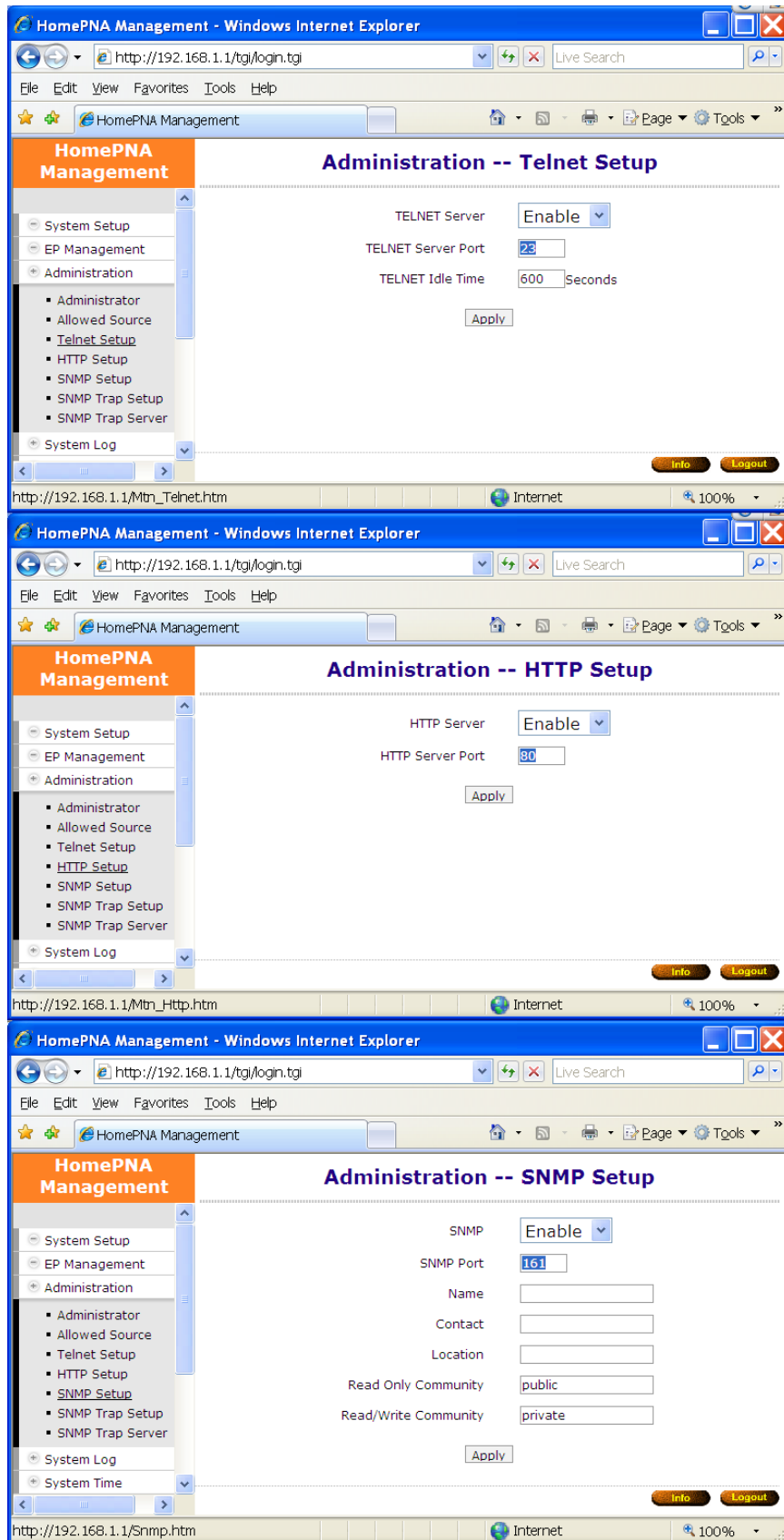
Specify that if the built-in Telnet server, Web server, and Snmp agent is enabled or not and assign the port number for the related service.

System Log

By designating the **Syslog** server IP on XL-HCW224C, XL-HCW224C will emit Unix-like **Syslog** events toward each server. Please refer RFC-3164 for **Syslog** '**Severity'**, used to denote the log level – digit '0' to '7' for different severity level:

0: EMERGENCY – log only severe events
1: ALERT
2: CRITICAL
3: ERROR
4: WARNING
5: NOTICE
6: INFO
7: DEBUG – log everything

For example, XL-HCW224C will emit only 'EMERGENCY' event to Server with IP address '**192.168.1.111**' according to the following,
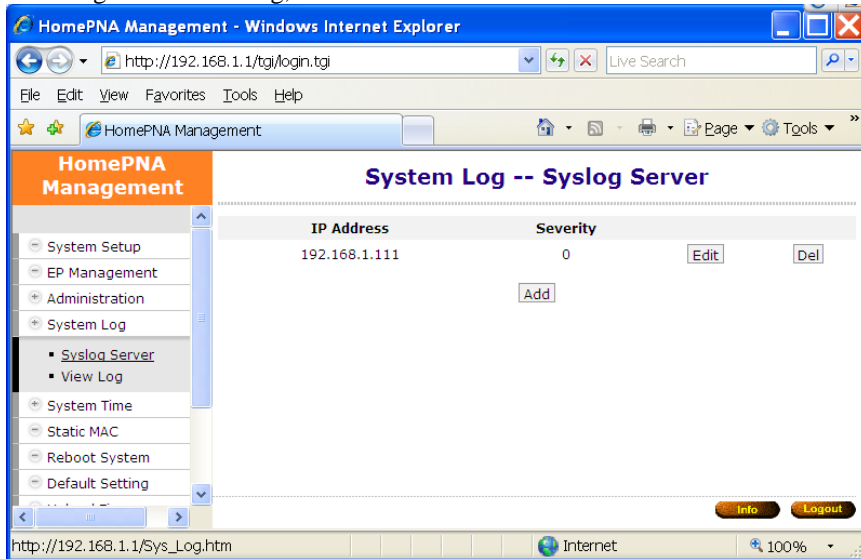
System Time

In order to provide correct timestamp for **Syslog** event, XL-HCW224C supports SNTP protocol and you may assign the suitable SNTP servers to XL-HCW224C.

For example,
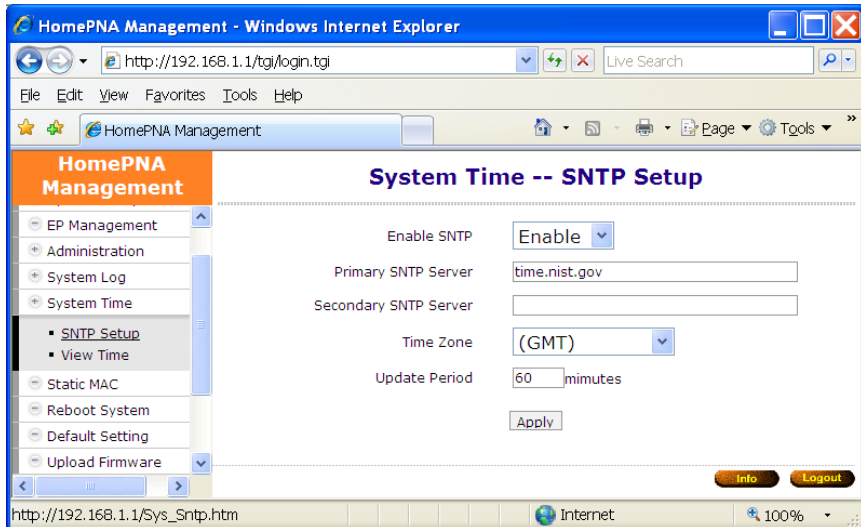
To access your listed SNTP server by its domain name instead of IP address, the '**DNS Server**' and '**Default Gateway**' in '**System Setup**' window need to be set up correctly. In order for XL-HCW224C to access the SNTP server by its domain name.

Static MAC

It may be necessary to bind and secure the server/gateway MAC addresses to port LAN1/LAN2 of XL-HCW224C for security. Static MAC is using to prevent MAC-spoofing-attack in Ethernet network. For example,
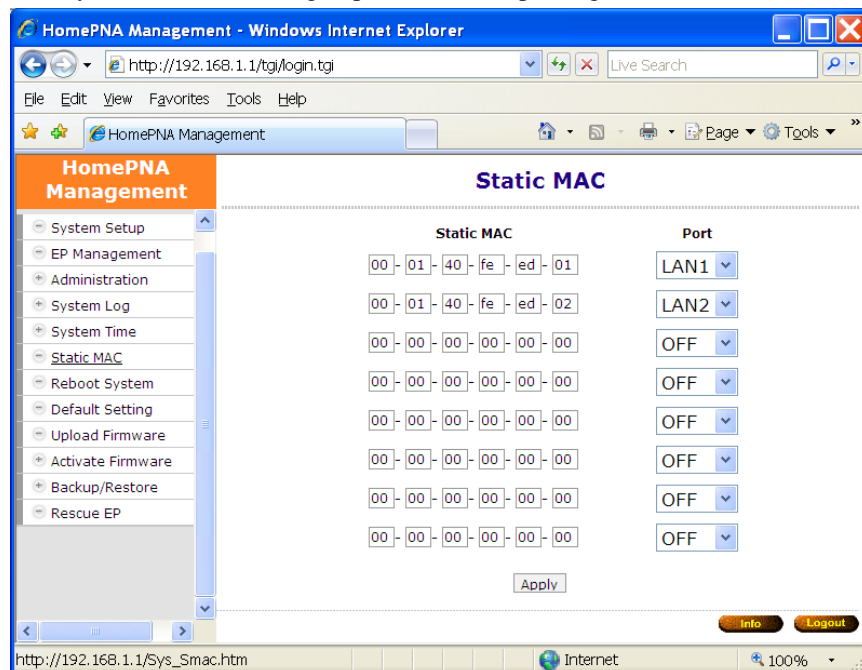
We bind MAC address 00-01-40-fe-ed-01 to port LAN1 and MAC address 00-01-40-fe-ed-02 to port LAN2,

Reboot System

Reboot Master XL-HCW224C only. EP untainted.

Default Setting

Restore all settings of XL-HCW224C to factory default, including username/password, IP address, privacy mode/key, etc. Press 'Reset' button locally for lasting 5 seconds works alike. XL-HCW224C will reboot afterward.

Upload Firmware

Upload '**Bootcode**' / '**System firmware**' / '**Master driver**' / '**EP driver**' / '**Diagnosis utility**' onto XL-HCW224C '**Upload Area**'. Not functional yet, wait to '**Activate Firmware**' or to '**Upgrade**' driver. Refer the following "**Example to Upload then Activate System Firmware and HCNA Driver**" for more detail.

Activate Firmware

To do the real upgrade for '**Bootcode**' or '**System Firmware**', make the previous uploaded image functional. Refer the following "**Example to Upload then Activate System Firmware and HCNA Driver**" for more detail.

Backup/Restore Configuration

Use to backup current configuration into a file with filename extension '**.shc**'. Or to restore the XL-HCW224C configuration form the previous saved file.

Example to Upload then Activate System Firmware and HCNA Driver

It is a 2-stage file upgrade procedure, first to upload the selected file onto XL-HCW224C flash ROM '**Upload Area**', then to
'**Activate**' it. A coax network system with one XL-HCW224C and seven connected EPs will be used as an example to demonstrate the upgrade details.

Current System Firmware and HCNA Driver Version

The system firmware version is '**3.05**' before upgrade, check the 'Information' window,
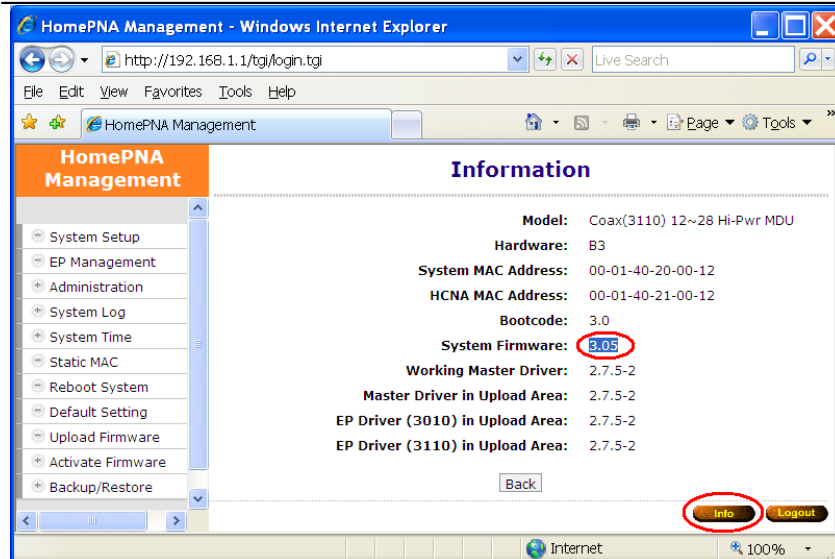
Open the '**EP Management**' window, here's the connected EPs,
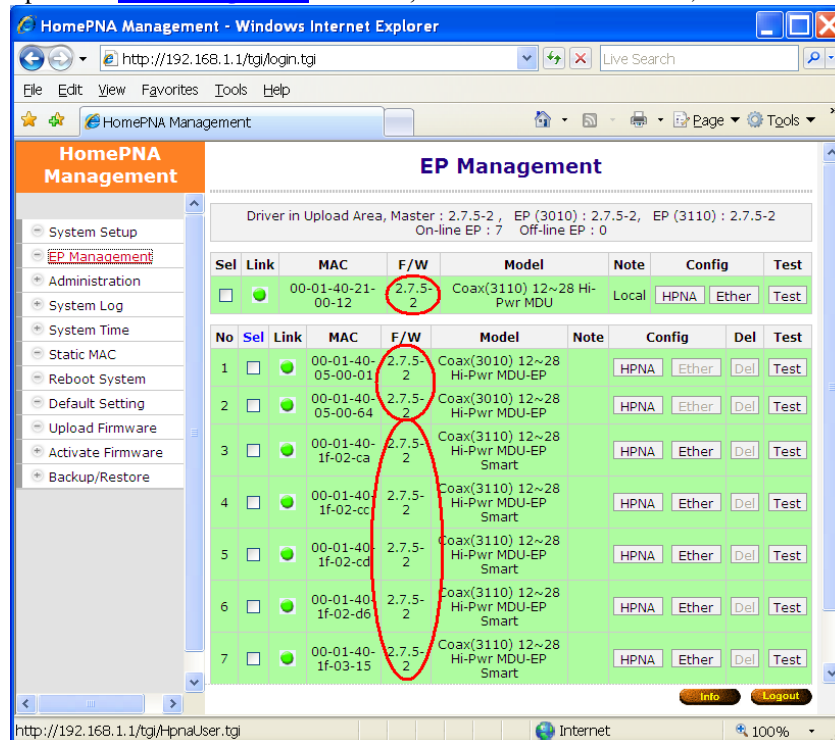
In the example, the onboard Master (denoted '**Local**') device driver version is '**2.7.5-2**'. The seven EPs' device driver version is also '**2.7.5-2**'.

New System Firmware and HCNA Driver Files

In this example, preparing the following binary files to upgrade the XL-HCW224C (XL-HCW224C) and the seven connected EPs
(XL-HC224C),

◆ **XL-HCW224C_Sysfw_V3.06.bin** Æ XL-HCW224C system firmware version '**3.06**'
◆ **XL-HCW224C_Driver_V2.7.5-3.bin** Æ HCNA device driver version '**2.7.5-3**', include Master(Local) driver version
    '**2.7.5-3**' , EP(as XL-HC224C) driver version '**2.7.5-3**'

System Firmware

Upload the New System Firmware

Start from the '**Upload Firmware**' window and click on 'Upload' button,
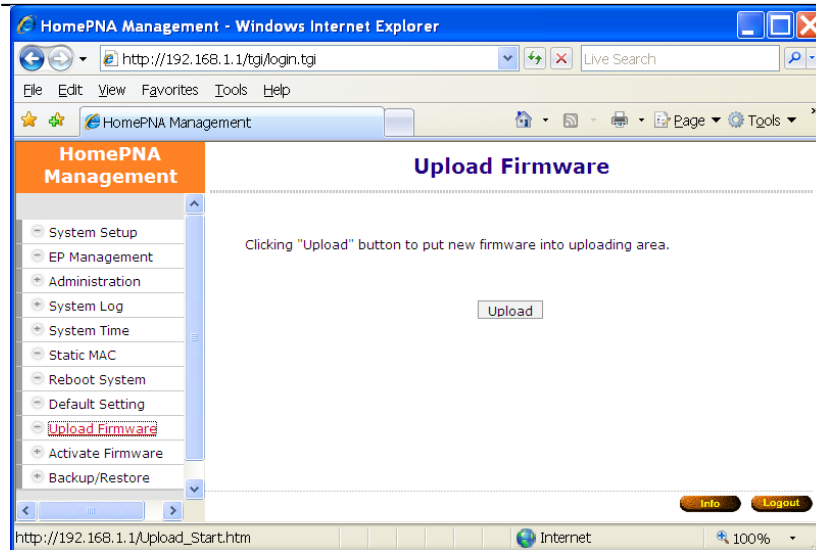
A count-down counter for entering the uploading mode,
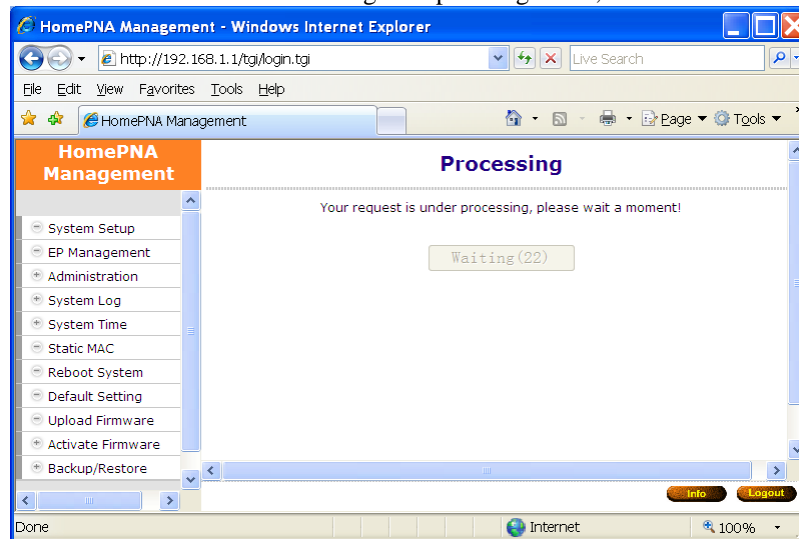
Click '**Continue**' button to proceed,
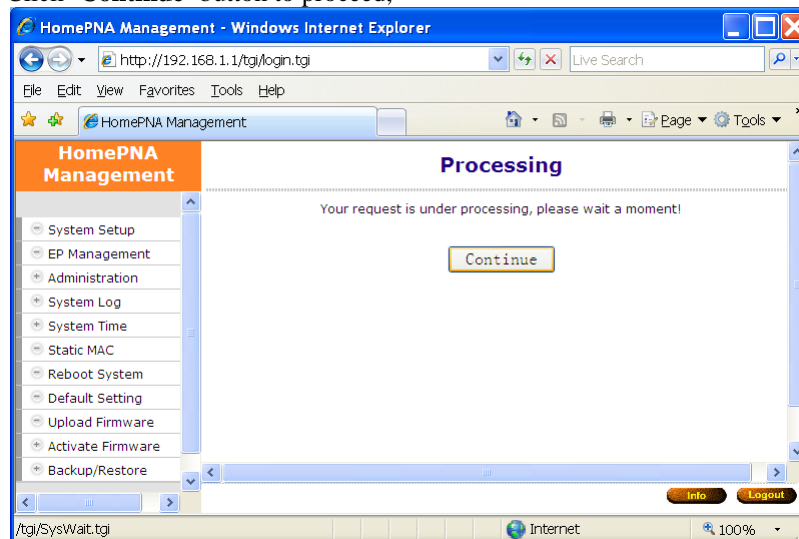
Click '**Browse**' button to locate where the new system firmware resides at your PC, then click '**Start**' button to upload the file (**XL-HCW224C_Sysfw_V3.06.bin**) onto your XL-HCW224C**,**
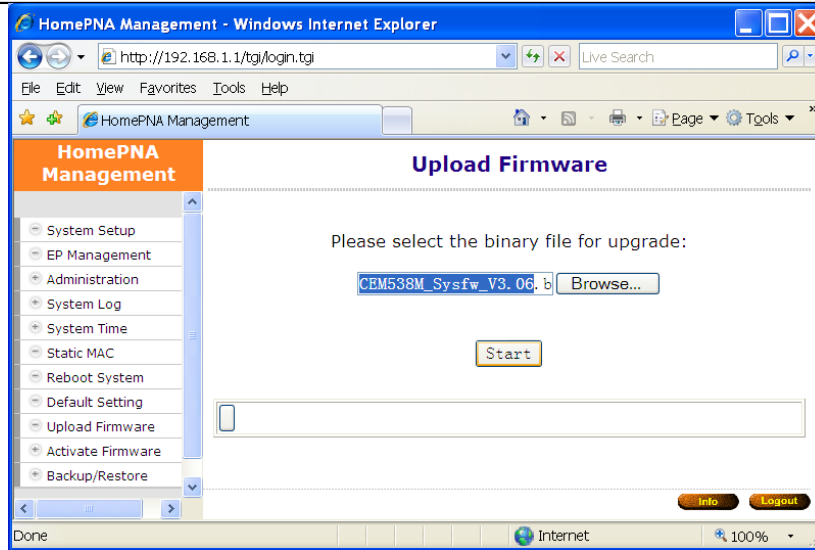
Uploading in progress,
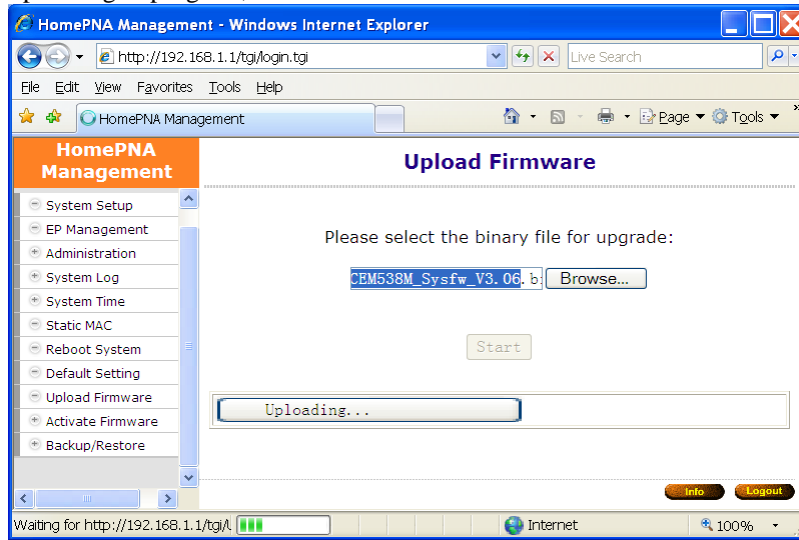
Another count-down counter to verify the integrity of uploaded file,
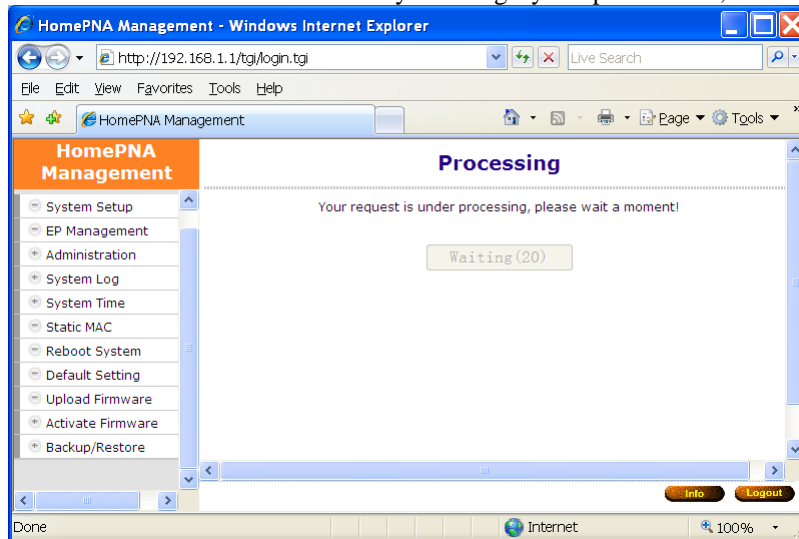
Verifying is ok, click '**Continue**' button.
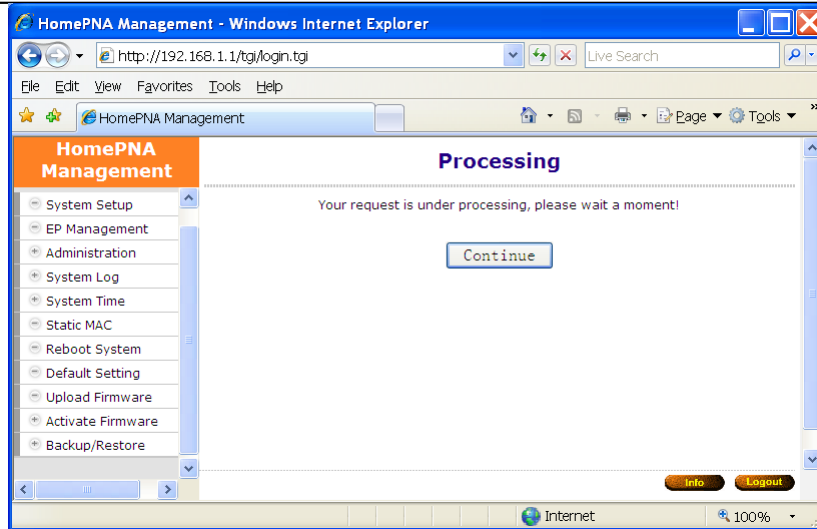
You may activate the new system firmware right away, or wait for the proper scheduled time in order not to disturb current operation.
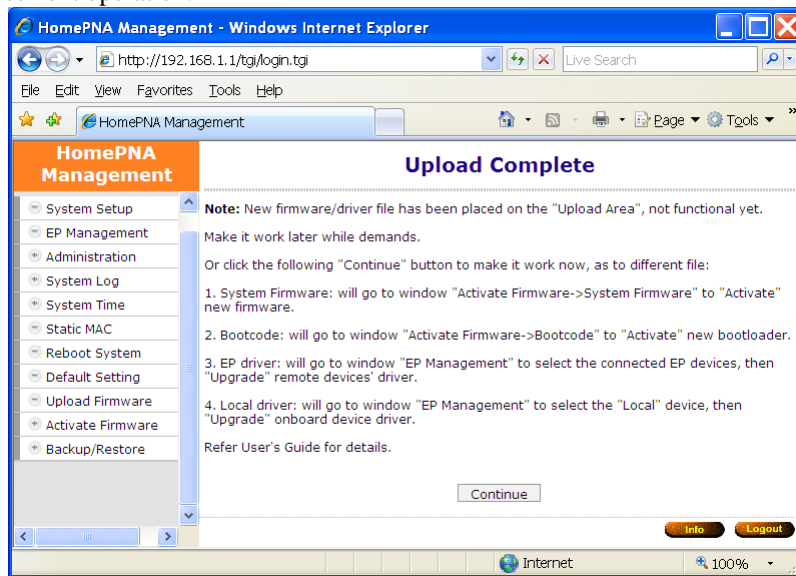
Check the New System Firmware in 'Upload Area'

After the successful uploading, you may check the uploaded '**System Firmware**' does exist in '**Upload Area**'. By opening the '**System Firmware**' window in the '**Activate Firmware**' function item, here shows the new system firmware version '**3.06**'.
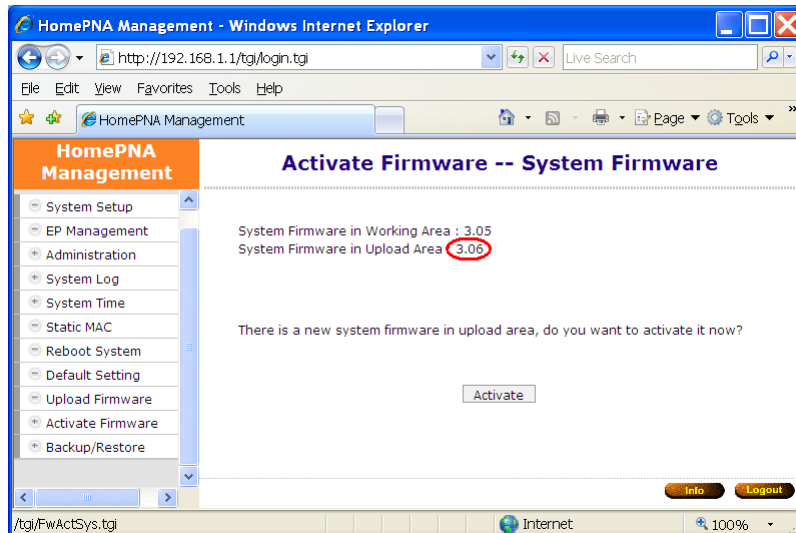
If you don't upload 'System Firmware' first, the 'Upload Area' is blank,
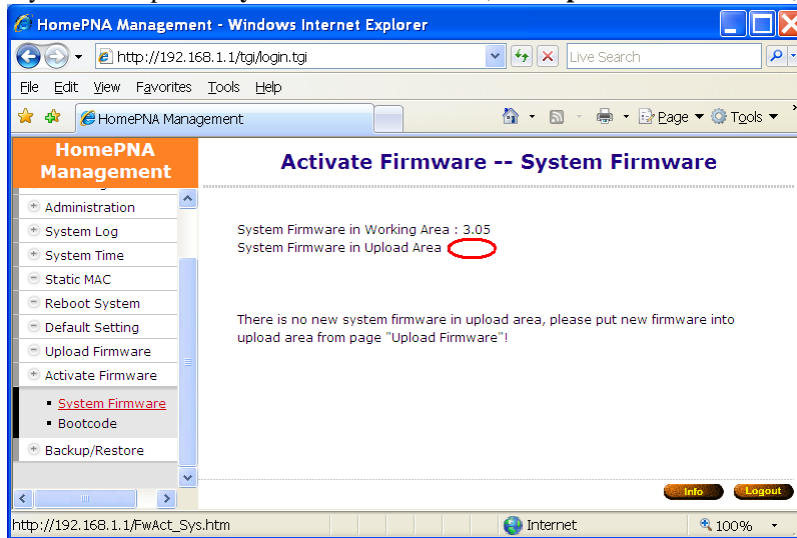
Activate the New System Firmware
Click 'Activate' button in the 'System Firmware' window will do the real upgrade and replace the old 'System Firmware' (OS),
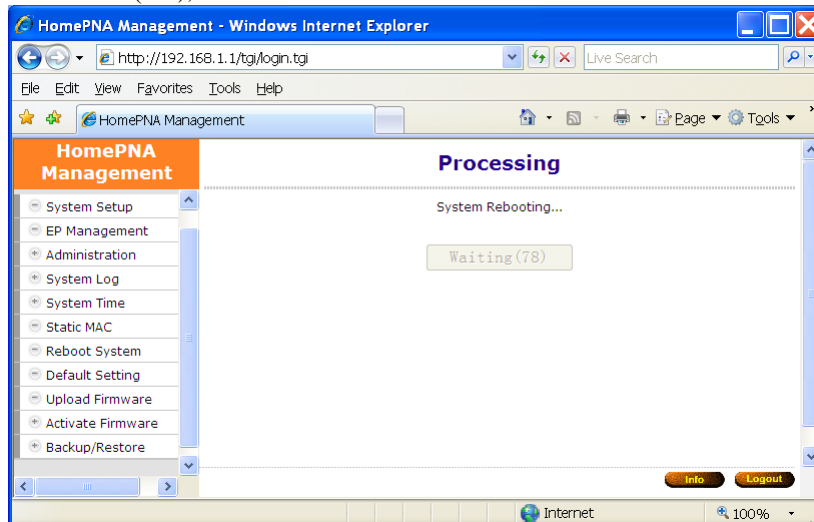
A progress counter for upgrade XL-HCW224C system firmware, XL-HCW224C will reboot after

upgrade has completed, New system firmware version '3.06' shown on the 'Information' window,
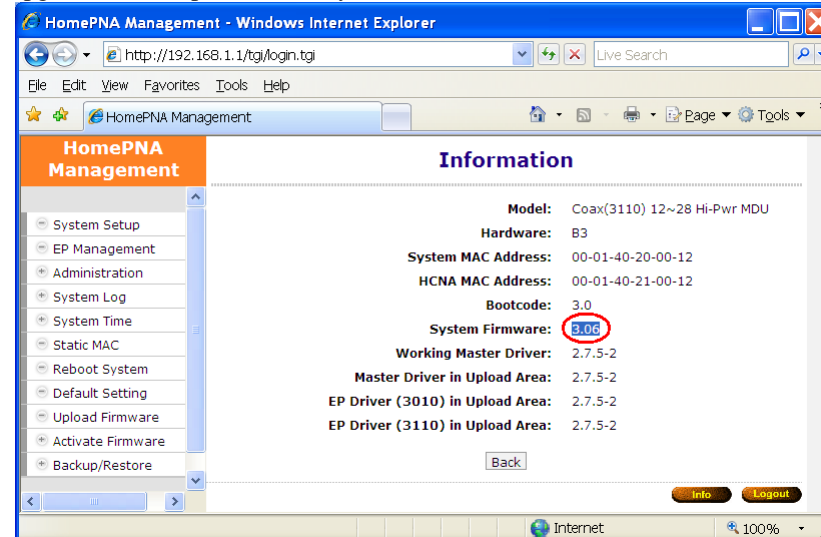
HCNA Driver

Upload the New Master/EP HCNA Driver

Follow the similar procedures as to upload new system firmware, start from the '**Upload Firmware**' window…

Click '**Start**' button to upload the file (**XL-HCW224C_Driver_V2.7.5-3.bin**) onto your XL-HCW224C**,**
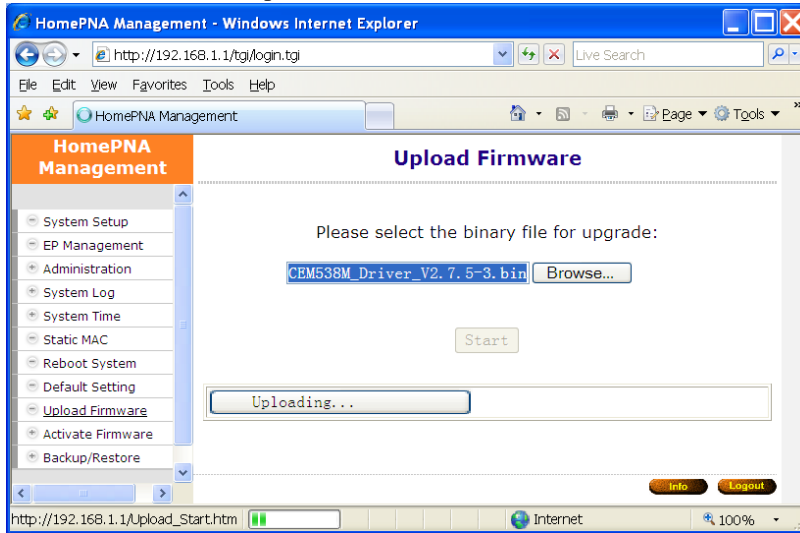
And complete,
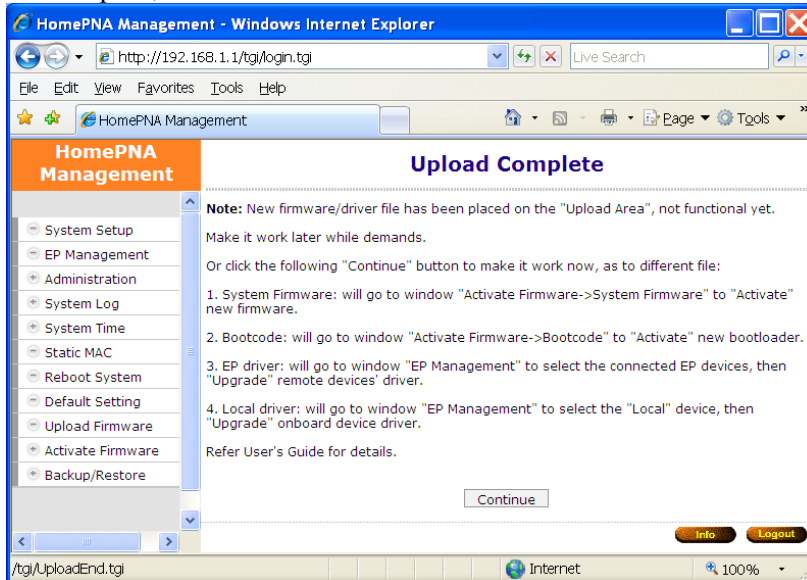
New HCNA driver version '**2.7.5-3**' shown on the '<u>Information</u>' window,
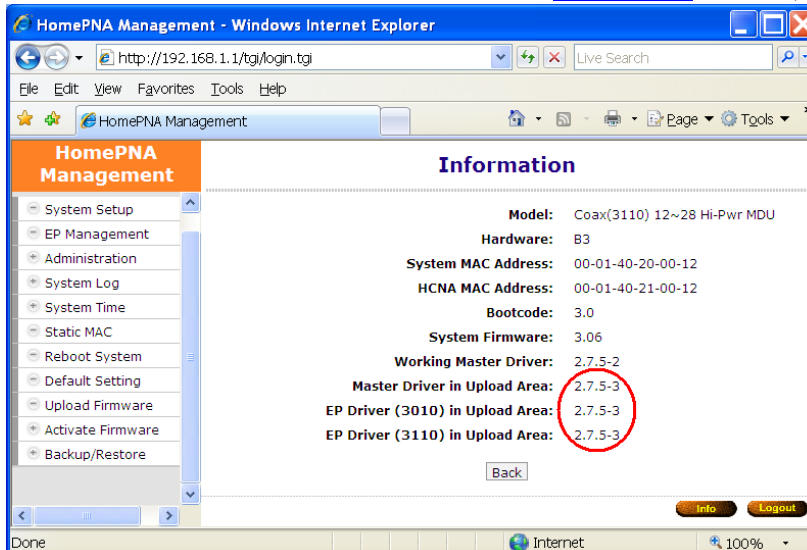
Also shown on '<u>EP Management</u>' window ('**Upload Area**'),
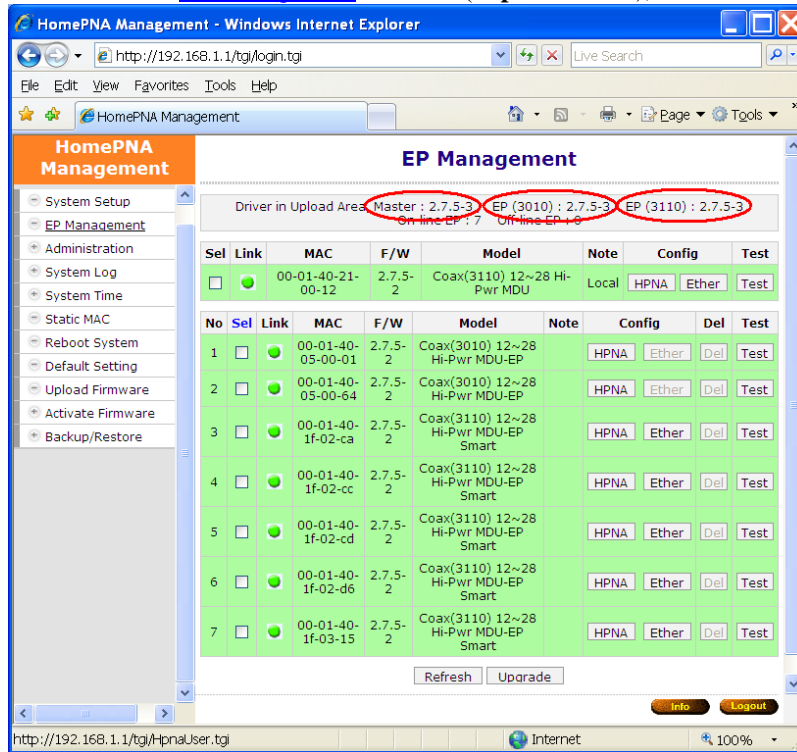
Upgrade the New HCNA Driver

Designate the targeted Master/EPs for driver upgrade from version '**2.7.5-2**' to '**2.7.5-3**',
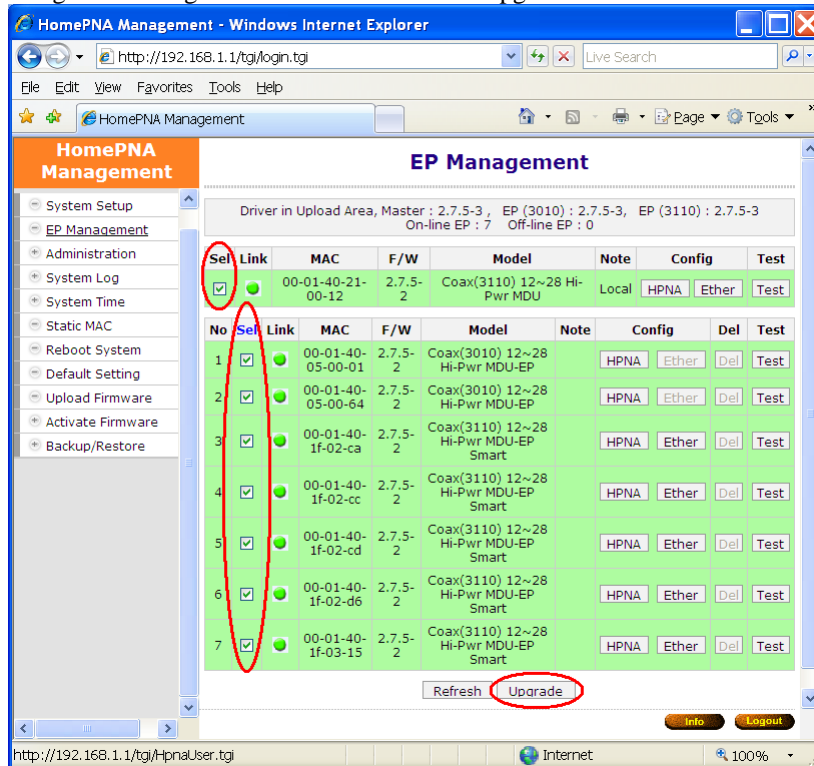
Click '**Upgrade**' button to proceed,
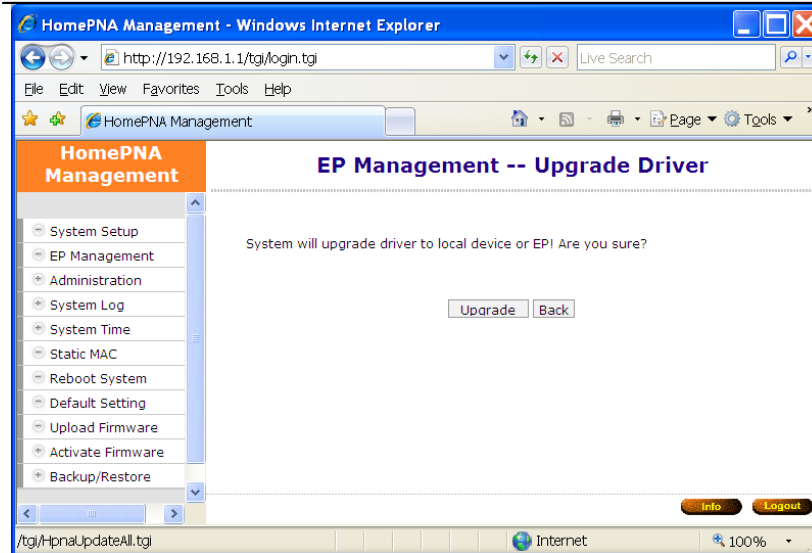
Then '**Upgrade**' button again to confirm,

Upgrade EP one by one, will keep the Master (Local) for the last,
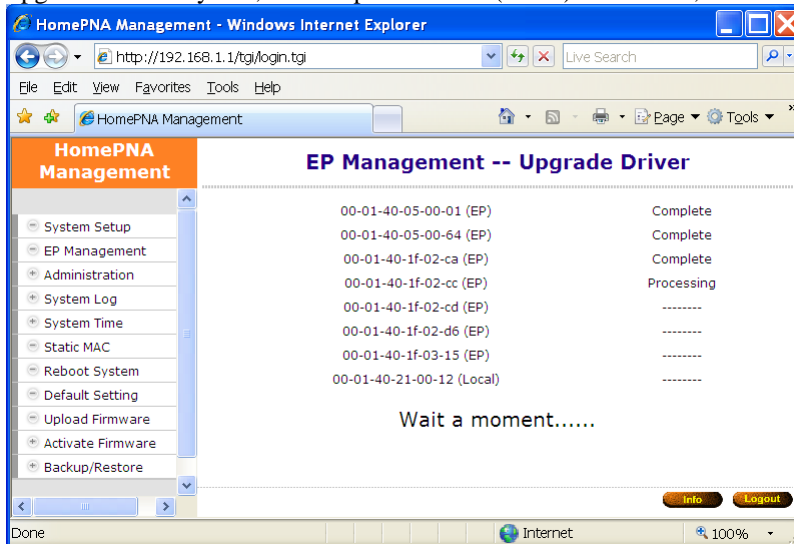
Master/EP runs the New HCNA Driver
The 'EP Management' window that queries the properties from each HCNA device,
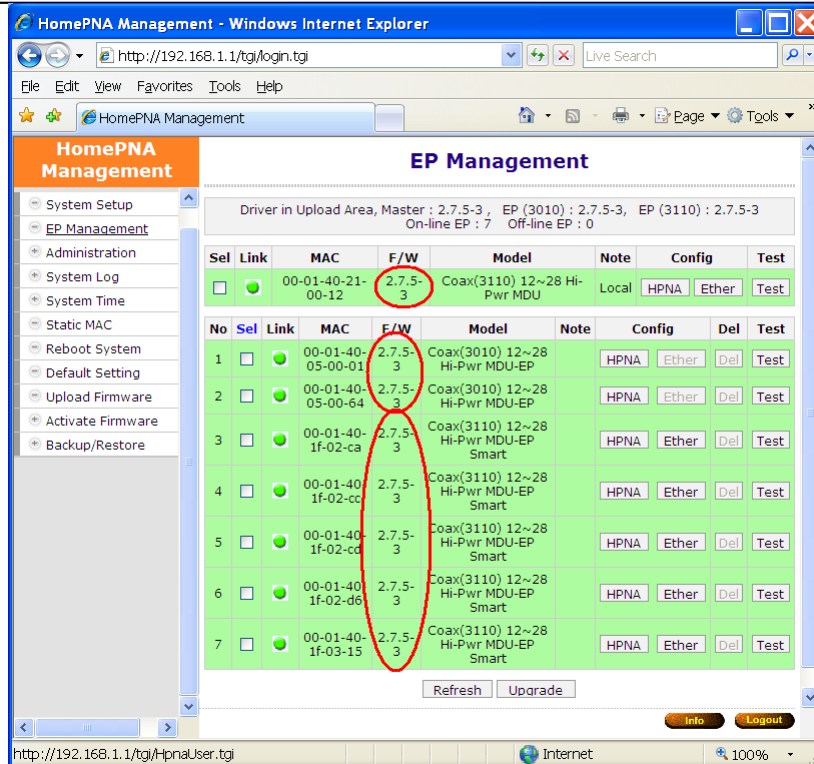
Indicate the new driver version '**2.7.5-3**' is working.
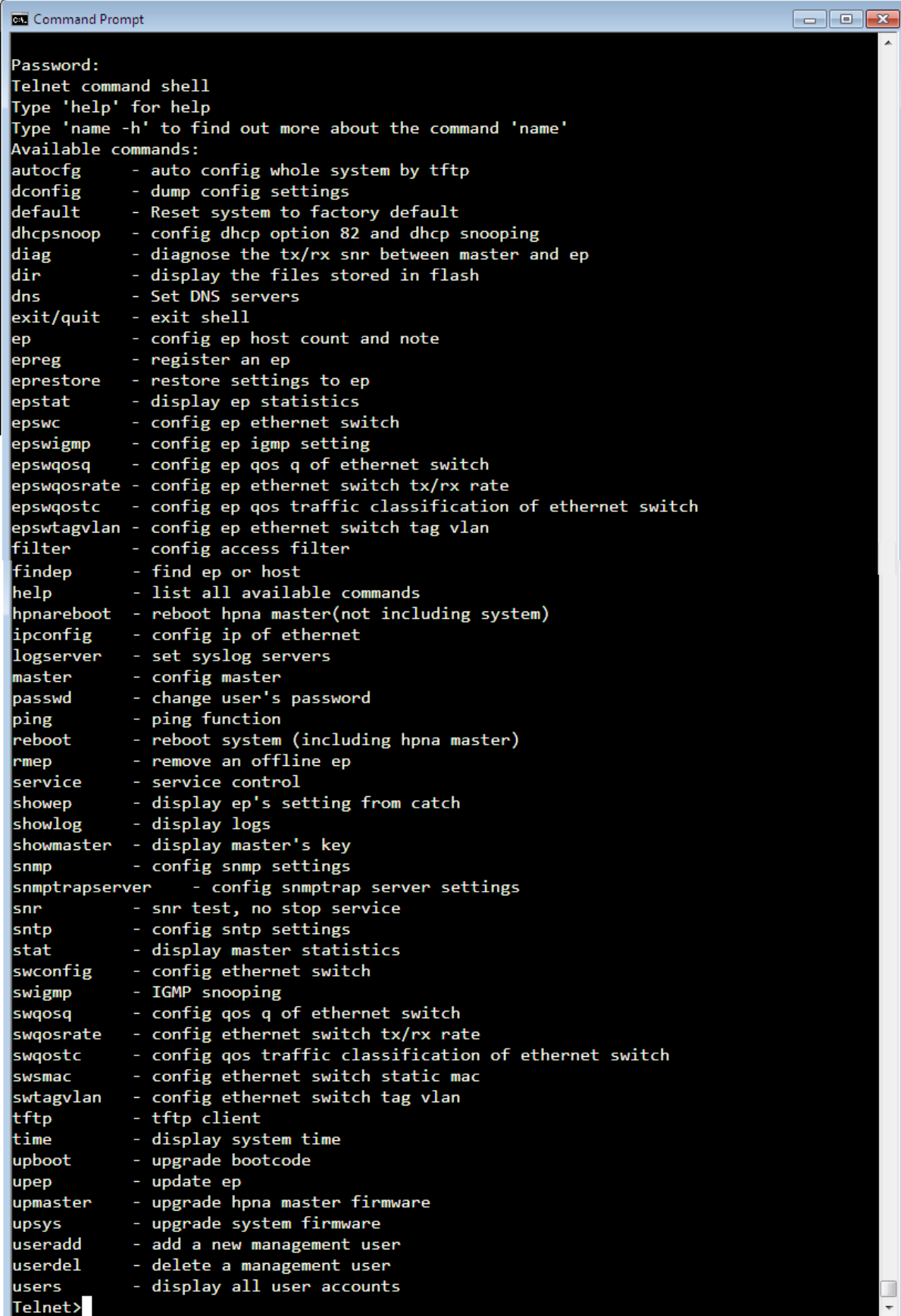
System Firmware and HCNA Driver Version after Upgrade

As shown on the '**Information**' window for summary.
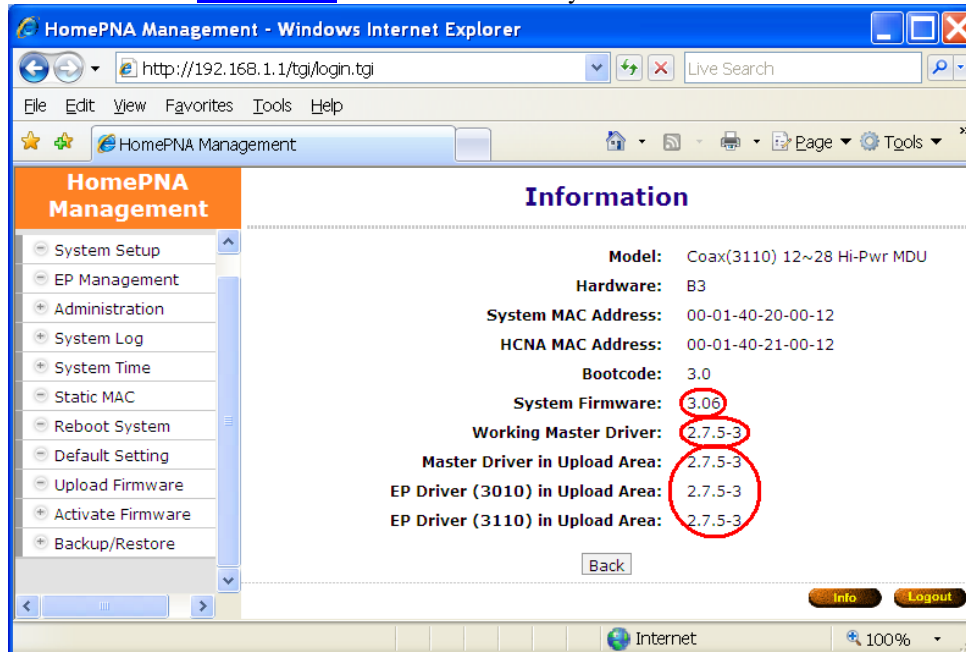
Use Telnet

Any popular Telnet client could use to configure the bridge remotely. For example, run Windows built-in Telnet to configure the bridge,

```
Command Prompt

Password:
Telnet command shell
Type 'help' for help
Type 'name -h' to find out more about the command 'name'
Available commands:
autocfg      - auto config whole system by tftp
dconfig      - dump config settings
default      - Reset system to factory default
dhcpsnoop    - config dhcp option 82 and dhcp snooping
diag         - diagnose the tx/rx snr between master and ep
dir          - display the files stored in flash
dns          - Set DNS servers
exit/quit    - exit shell
ep           - config ep host count and note
epreg        - register an ep
eprestore    - restore settings to ep
epstat       - display ep statistics
epswc        - config ep ethernet switch
epswigmp     - config ep igmp setting
epswqosq     - config ep qos q of ethernet switch
epswqosrate  - config ep ethernet switch tx/rx rate
epswqostc    - config ep qos traffic classification of ethernet switch
epswtagvlan  - config ep ethernet switch tag vlan
filter       - config access filter
findep       - find ep or host
help         - list all available commands
hpnareboot   - reboot hpna master(not including system)
ipconfig     - config ip of ethernet
logserver    - set syslog servers
master       - config master
passwd       - change user's password
ping         - ping function
reboot       - reboot system (including hpna master)
rmep         - remove an offline ep
service      - service control
showep       - display ep's setting from catch
showlog      - display logs
showmaster   - display master's key
snmp         - config snmp settings
snmptrapserver   - config snmptrap server settings
snr          - snr test, no stop service
sntp         - config sntp settings
stat         - display master statistics
swconfig     - config ethernet switch
swigmp       - IGMP snooping
swqosq       - config qos q of ethernet switch
swqosrate    - config ethernet switch tx/rx rate
swqostc      - config qos traffic classification of ethernet switch
swsmac       - config ethernet switch static mac
swtagvlan    - config ethernet switch tag vlan
tftp         - tftp client
time         - display system time
upboot       - upgrade bootcode
upep         - update ep
upmaster     - upgrade hpna master firmware
upsys        - upgrade system firmware
useradd      - add a new management user
userdel      - delete a management user
users        - display all user accounts
Telnet>
```

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Input any command with '**-h**' argument will show you the usage, as '**showep –h**' will explain the function and usage of command '**showep**'.

For security consideration, please disable the '**Telnet Server**' if the bridge is not to be configured via Telnet.
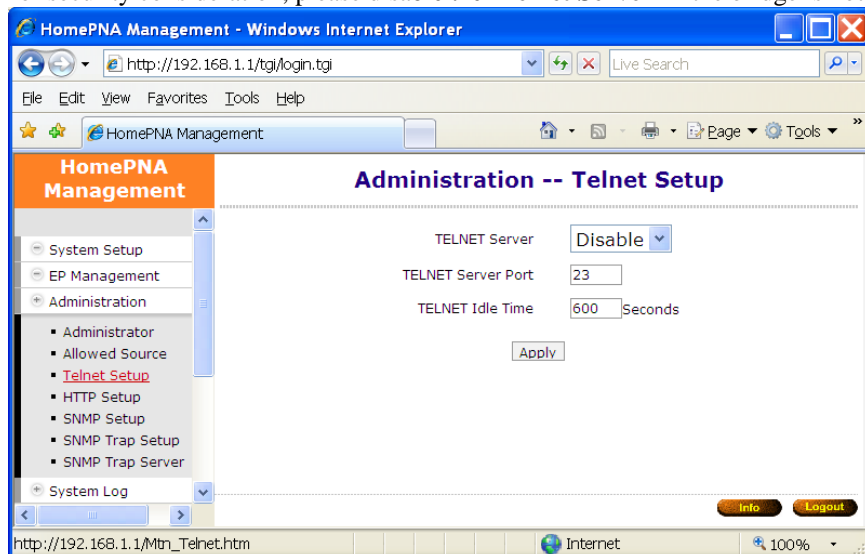
Note that Telnet connection will be terminated automatically if the telnet client doesn't input any command for 5 minutes; i.e. the console idle timer is 10 minutes (600 Sec).

Command Sets for Telnet Console

The following table lists all commands for Telnet console. The third column '**Description**' explains what happen when you run the '**Commands**' in the first column and also explains the versatile options of the second column '**Arguments**'.

Some common formats for arguments are:

<mac>	MAC address, format in 'nn-nn-nn-nn-nn-nn where nn=00~FF'. As '00-01-40-13-03-36'.
<ip>	IPv4 address, format in 'nnn.nnn.nnn.nnn where n=0~9'. As '192.168.1.1'. Also applicable for <**mask**>, <**default gateway**>
<interface>	Network interface name, '**eth0**' for LAN1/LAN2 interface, '**hpna0**' for HCNA interface.
<fid>	Flash ROM file id represented different firmware/driver, '**n** where **n**=0~12',

'n=0': System bootcode (bootloader)
'n=1': System firmware (OS)
'n=2': Master HCNA driver
'n=3': EP HCNA driver
'n=10': EP diagnosis utility

Only lowercase letter can be accepted. Typing commands followed by pressing 'ENTER' will execute the command. Run any command with '**-h**' argument will show you the usage

Commands	Arguments [ ] is optional	Description
autocfg	[-t <on/off>] [-s <ip>] [-p <path>]	Set up auto configuration by TFTP. -t: on(enable)/off(disable) auto configuration mode -s: TFTP server IP address -p : directory path resides at TFTP server
dconfig		Dump all configurations/settings.
default		Reset all settings to factory default, include Password.
dhcpsnoop	[-m <0/1/2>]	Set up DHCP snooping function. -m 0:disable (default), 1:enable dhcp option 82, 2:enable dhcp option 82 and snooping

diag	-t <mac> -r <mac>	EP connection Offline Diag, this will stop service for 10~20 seconds. Alike doing "Tx Diag"& "Rx Diag" test from Web. -t: downstream SNR diagnosis(from Master to EP) -r: upstream SNR diagnosis(from EP to Master) <mac>: EP MAC <mac> to be diagnosed
dir		Show detail file information resides in flash ROM. Include 'Working Area' and 'Upload Area', refer Figure 6. The listed filenames are, 'bootcode': boot loader 'sysfw4m': system firmware 'G2C44H25M': Master HCNA driver 'G2C44H21Ep': EP HCNA driver 'diagsw': diagnosis utility file 'Accompanying with file id, file version, file date, and file size.
dns	[-s <pri/sec> <ip>]	Display or set up DNS server setting. -s pri <ip>: set up Primary DNS server's IP -s sec <ip>: set up Secondary DNS server's IP
exit		Close the Telnet console.
quit		Close the Telnet console.
ep	[-c <hostcnt>] [-n <note>] <mac>	Set up the EP HomePNA Properties related setting values. <hostcnt>: EP Host Limit setting value (0~11), default 5 <note>: EP footnote Note setting value <mac>: designated EP MAC to configure
epreg	-m <mac>	Add an EP profile, alike Add EP
eprestore	-m <mac>	Restore EP settings, alike ReConfig EP
epstat	-m <mac> [-r]	Display remote EP port statistics of port LAN1/LAN2/HCNA. -r: reset all port statistics counter to 0
epswc	-m <mac> [-t] [-u] [-r] [-d] [-p <lan1/lan2/hpna> [-l <up/down>] [-s <auto /10h /10f /100h /100f>] [-f <on/off>]]	Display or set up remote EP built-in switch Ethernet properties -t: display EP switch settings -u: display EP switch/port status -r: reset EP switch -d: reset EP switch's settings to factory default -p: configure EP port LAN1/LAN2/HCNA -l: link, <up/down>: force current port to link up or down, i.e. enable/disable current port -s: current port Ethernet mode setting, <auto>: auto-negotiation mode <10h/10f/100h/100f>: 10/100Mbps, half/full-duplex mode -f: current port Ethernet flow-control setting, <on/off>: turn on /off flow control
epswigmp **epswqosq** **epswqosrate** **epswqostc** **epswtagvlan**	-m <mac>	Refer respected command 'swigmp', 'swqosq', 'swqosrate', 'swqostc', 'swtagvlan' or the same functionality, but operate on remote EP with designated MAC address <mac>
filter	[-s <set> [-c <act/deact>] [-a <ip> -m <mask>] [-t <allow/deny>] [-w <allow/deny>] [-n <allow/deny>] [-p <allow/deny>]]	Display or set up the filter rule set, refer the section "Allow Source" for IP <ip> and Subnet Mask setup <mask>. <set>: filter set index, total 16 set (0~15) <act/deact>: activate or de-activate the rule set <allow/deny>: allow or deny the protocol -t: telnet -w: http/web -n: snmp -p: reply to ICMP ping
help		Display all commands with brief description
hpnareboot		Reset Master HCNA device'

ipconfig	[-a <ip> -m <mask> -g <default gateway>]	Display or set up system IP network, include IP address <ip>, subnet mask <mask>, and default gateway <default gateway>.

logserver	[-s <set>
	  [-c <act/deact>]
	  [-a <ip>
	   -v <severity>]]
		Display or set up Unix-like **Syslog** servers(max 5 set)
		<set>: server index, at most 5 servers (0~4)
		<act/deact>: activate or de-activate the server with IP address <ip>
		<severity>: select the severity level, refer section "System Log", default level 6 (info)

master	[-m <on/off>] [-k <key(0x…)>] [-n <note>]	Set up Master HCNA device Privacy Mode setting values. Use command 'upmaster' to take effect on Master device. (replace the working values with the setting ones) Use command 'upep' to upgrade EP with the new 'Privacy Mode/Key'. <on/off>: set 'Privacy Mode' to ON or OFF, default OFF <key(0xnnnn)>, n is 0~F: 4-digit 'Privacy Key' in hexadecimal, default 0x0 <note> Master footnote Note, max 32 chars
passwd	[name] -o <oldpasswd> -n <newpasswd>	Change user's password, user can update its own password. Only superuser has the privilege to rewrite other's password, [name]: user's account name, default to current login name if not supplied <oldpasswd>: old password, superuser can bypass this parameter <newpasswd>: new password
ping	[-n <count>] [-w <timeout>] [-l <pktlen>] address	ICMP ping function, <count>: number of ping requests(max 65535) <timeout>: expiry timer in each reply(1~60 sec) <pktlen>: sent packet length(64~1500) address: target IP address
reboot		Reboot system
rmep	<mac>	Remove designated EP Properties Profile. <mac>: EP MAC <mac> to be removed

service	[-s <telnet/http>
	  [-c <on/off>]
	  [-p <port)>]
	  [-t <idle>]]
		Display or set up Telnet and Http service.
		<telnet/http>: configure Telnet or Http
		<on/off>: enable or disable this service
		<port>: TCP port number (0~65535)
		<idle>: expiry timer to logoff automatically (0~32767 sec) default 300 seconds

showep	[-f] [-n <note>] [-m <mac>]	Display EP connection status and properties, and check if it matches the stored Properties Profile in XL-HCW224C. -f: force to re-scan all connected EPs -n: display EP with matched <note> -m: display EP with MAC address <mac>
showlog		Display the (Syslog) logged messages.
showmaster		Display Master HCNA information, include driver version, properties(Privacy Mode, Privacy Key)
snmp	[-c <act/deact>] [-p <port>] [-n <name>] [-t <contact>] [-l <location>] [-r <rcomm>] [-w <wcomm>]	Display or set up basic SNMP system configuration. <act/deact>: activate(enable) or de-activate(disable) SNMP agent <port>: SNMP UDP port number (0~65535), default 161 <name>: SNMP system name <contact>: SNMP system contact information <location>: SNMP system location information <rcomm>: SNMP system read-only community name, default 'public' <wcomm>: SNMP system read-write community name, default 'private'

snmptrapserver	[-s \<set>
	   [-c \<act/deact>]
	   [-p \<port>]
	   [-a \<ip>]
	[-m \<community>]]
		Display or set up SNMP trap server(s) configuration.
		\<set>: trap server index, at most 5 servers (0~4)
		\<act/deact>: activate or de-activate trap server IP \<ip>
		\<port>: SNMP trap UDP port number (0~65535), default 162
		\<ip>: trap server IP address
		\<community>: trap server community name, default 'public'

snr	-m \<mac> -e \<mac> [-n \<samples>] [-p \<period>]	Online Diag EP connection -m: Master Mac address -e: EP Mac address -n: number of samples (default 1 sample) -p: period between two samples (default 10 sec)
sntp	[-c \<act/deact>] [-r \<refresh time>] [-z \<time zone>] [-s \<set> -a address]	Display or set up SNTP configuration for System Time. \<act/deact>: activate or de-activate SNTP service for system time \<refresh time>: query SNTP server period, default 60 minutes \<time zone>: '+hh:mm' or '-hh:mm' to GMT time, hh for hours and mm for minutes, default '+00:00' \<set>: 2 registered SNTP server set(0~1) address: SNTP server host name or IP address in current set
stat	[-r]	Display Master port statistics for port LAN1/LAN2/HCNA. -r: reset all port statistics counter to 0

swconfig	[-p \<lan1/lan2>
	  [-s \<auto /10h /10f
	  /100h /100f>]]
		Display or set up Ethernet port LAN1/LAN2 properties
		\<lan1/lan2>: configure LAN1 or LAN2 port
		\<auto>: auto-negotiation mode
		\<10h/10f/100h/100f>: 10/100Mbps, half/full-duplex mode

swigmp	[-c \<on/off>]	Display or set up Master IGMP v2 snooping configuration \<on/off>: enable or disable built-in IGMP v2 snooping function, default is off
swqosq	[-t \<strict/wfq/mix>]	Display or set up the QoS Queue Scheduling. strict: strict priority wfq: weighted fair queue Q3/Q2/Q1/Q0 service weight =8/4/2/1 mix: Q3 is strict, Q2/Q1/Q0 service weight=4/2/1

swqosrate	[-p \<lan1/lan2>
	  [-d \<tx/rx>]
	  [-c \<on/off>]
	  [-r \<N (1~3125
	   rate=N*64kbps)>]]
		Display or set up the LAN1/LAN2 maximum rate.
		refer Bandwidth Control for more.
		\<lan1/lan2>: configure LAN1 or LAN2 port
		\<tx/rx>: direction, incoming(rx) or outgoing(tx)
		\<on/off>: enable or disable control on this direction
		\<N>: the setup max rate (multiply value by 64kbps). Range from 1 to 3125, bandwidth control is invalid if N >= 3125 (>200Mbps)

swqostc	[-s \<set>
	  [-c \<act/deact>]
	  [-p \<port>
	   -q \<queue>]]
		Display or set up the QoS configuration for TCP/UDP traffic classification, to assign higher priority for total 8 different TCP/UDP protocols
		\<set>: rule set index, at most 3 set (0~2)
		\<act/deact>: activate or de-activate this set
		\<port>: TCP/UDP port number (0~65535),
		\<queue>: select queue index (0~3) for this rule set, as q0(lowest priority)/q1/q2/q3(highest priority)

swsmac	[-m \<mac>] [-c \<lan1/lan2/off/del>]	Display or set up the static MAC entry, total 8 entries of MAC addresses can be setup, refer Static MAC \<mac>: max 8 entries \<lan1/lan2>: bind the current MAC entry to LAN1 or LAN2 port, i.e. enable this MAC entry as static MAC \<off>:disable this MAC entry, neither bind to LAN1 nor LAN2 \<del>: remove the current MAC entry, invalid this MAC entry to default 00-00-00-00-00-00

swtagvlan	[-c \<on/off>]
	[-p \<lan1/lan2/hpna>
	  [-r \<priority(0~7)>]
	  [-v \<vid(1~4095)>]
		Display or set up the LAN1/LAN2/HCNA Tag VLAN. Refer Tag VLAN for more.
		\<lan1/lan2/hpna>: configure LAN1 or LAN2 or HCNA port
		\<priority>: 802.1p value, 0~7

|		

	[-i <all/tag>]
	[-o <untag/
	    tag/
	    bypass >]]
		<vid>: 802.1Q VID, 1~4095
		<all/tag>: ingress rule -- accept all incoming packets or accept incoming tagged packets only, reject other incoming packets.
		<untag/tag/bypass>: egress rule: un-tag or tag or bypass the outgoing packet
		-c: enable Tag VLAN mode or not
		-p: the port in Tag VLAN mode
		-r: 802.1p in Tag VLAN mode
		-v: VID of 802.1Q in Tag VLAN mode
		-I: ingress rule for the port in Tag VLAN mode
		-o: egress rule for the port in Tag VLAN mod

tftp	-s <ip> -c <get/put> -f <file>	Run TFTP client to get file (upload file onto XL-HCW224C) or to put file (retrieve file from XL-HCW224C) from TFTP server IP <ip>. <get/put>: run TFTP command 'get' or 'put'
time		Display current system time.
upep	[-a] [-m <mac>] [-n <note>]	Upgrade EP HCNA driver (stored in Upload Area), this operation also synchronize EP with EP Properties Profile stored in XL-HCW224C, -a: upgrade all on-line EP at once -m: upgrade the EP with matched MAC <mac> -n: upgrade (matched MAC <mac>) EP 'Note' property <note>
upmaster		Upgrade Master HCNA driver (stored in Upload Area), this operation also synchronize Master HCNA device with its setting values in Properties Profile.
upsys		Upgrade the uploaded system firmware (stored in Upload Area), then reboot.
useradd	name -p <password> -r <ro/rw>	Create new management user account. name: user name -p: login password -r: 'ro' for user has read-only privilege, 'rw' for user has read-write privilege
userdel	name	Delete the management user account by name. name: user name
users		Display all user accounts.

Use SNMP

The **SNMP Agent** resides in XL-HCW224C will handle requests from remote **SNMP Manager**. The XL-HCW224C SNMP agent supports standard SNMP community-based operations (SNMP V1/V2c) as 'SET', 'GET' and 'TRAP'.

You need to specify the correct **Read-Only Community Name** into bridge before any SNMP 'GET' operation can work. Also set up the **Read/Write Community Name** for SNMP 'SET' operation. 'SET' operation can modify the setting within XL-HCW224C. While 'Get' is read-only operation used to report the requested SNMP data to SNMP manager.

You may need the accompanying proprietary **MIB file** for some popular SNMP/MIB manager software to manage the bridge system. The XL-HCW224C bridge system may also be integrated into your original SNMP management system by this MIB file. Refer '**XL-HCW224C Application Notes**' for more SNMP configuration details.

Each SNMP manager will assign the name of the community it belongs to in its 'GET', 'SET' and 'TRAP' operations. The community name could be unique to allow set of SNMP managers to access one SNMP agent, any operation with mismatched community name will be rejected by agent. For security consideration, you should either change the factory default community name or disable SNMP function in XL-HCW224C.

The default 'GET' community name of XL-HCW224C is '**public**', and default 'SET' community name is '**private**'.
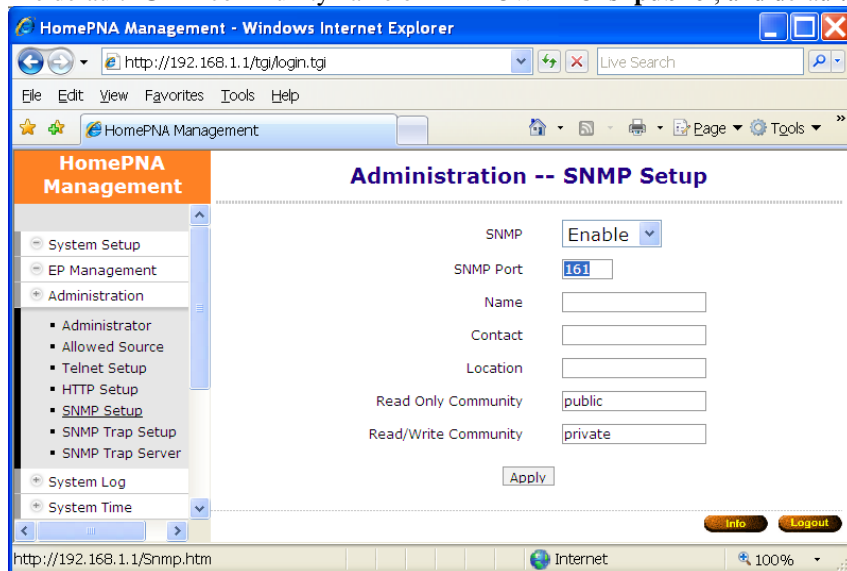
For the following example, the two '**TRAP Server'** with IP address '**192.168.1.100**' and '**192.168.1.101**' will capture all traps emitted from XL-HCW224C SNMP agent,

4
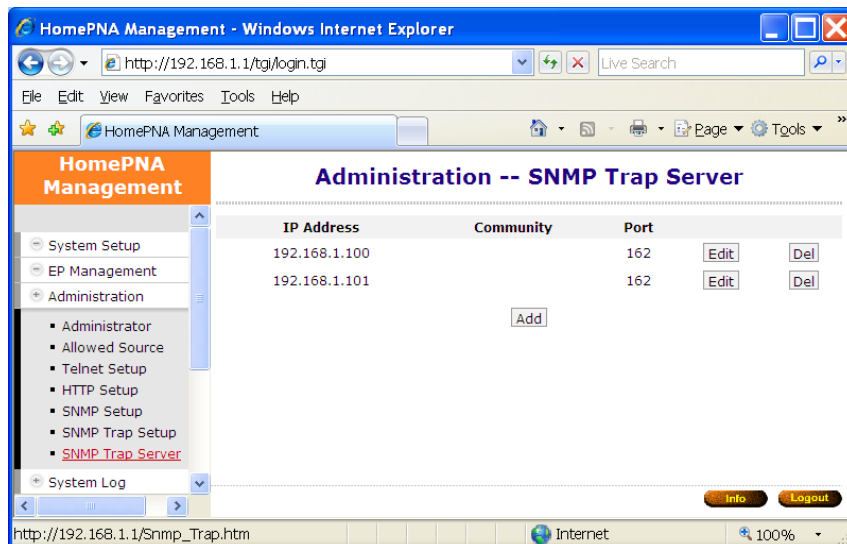
ADVANCED FEATURES

This chapter describes the advanced features offered by your bridge. And they are applicable to both XL-HCW224C and connected EP as XL-HCW224C.

QoS

Quality of Service is enforced by assigning each incoming packet with a predefined priority value. Packet with higher priority should be processed as soon as possible (fast forwarding). In shortage of buffers, some low priority packets should be discarded to smooth the high priority traffic flow. Higher priority traffic will have higher data rate and lower possibility of being discarded.

The numbering priority value ranges from 0 to 7, and 7 represents the highest priority level. XL-HCW224C supports priority scheme as 802.1p, IP TOS/TC and TCP/UDP protocol.

There are 4 priority queues for packet. Packet with priority value 0 or 1 goes to the same queue, denoted as **Queue0**. **Queue1** has priority value 2 and 3, **Queue2** has priority value 4 and 5, and **Queue3** has priority value 6 and 7. Totally 4 levels of service are provided. **Queue3** need to have higher "**Service Weight**", i.e. packets reside in **Queue3** will be send out faster. Packets in **Queue0** are classified as less important.

Queue Scheduling

Decide how fast the packets in different queues are forwarded.

Strict Priority (SP) – default mode

Always transmit packets in higher priority queue first. Packets in lower priority will be forwarded after the higher priority queue gets empty.

Weighted Fair Queue (WFQ)

Service weight for Q3/Q2/Q1/Q0 is fixed to 8/4//2/1.That is, forward 8 packets in Q3, then 4 packets in Q2, 2 packets in Q1, l packet in Q0. And repeat the sequence.

Mixed (SP & WFQ)

Transmit packets in Q3 first alike **Strict Priority**, packets in Q2/Q1/Q0 follows fixed service weight 4/2/1 as **WFQ**.

802.1p – default is on

Tagged packet has the 3-bit (value 0~7) 802.1p field for priority mapping. The default priority mapping scheme is usually suitable and should work for most applications--for example, to map 802.1p value 7 to priority 7, to map value 0 to priority 0, and so on. It takes effect in both downstream and upstream.

IPv4 TOS/IPv6 TC – default is on

Bit7 to bit2 of TOS byte in IPv4 or TC byte in IPv6 is treated as the priority mapping filed. By default, XL-HCW224C takes the precedence 2 bits in this field for the priority queue (Q3/Q2/Q1/Q0) mapping. For example,

Bit[7:2] of TOS/TC	0x00~0x3C	0x40~0x7C	0x80~0xBC	0xC0~0xFC
Queue	0	1	2	3

TCP/UDP Port Number – default is empty

Different TCP or UDP port number usually states for different protocol. You may raise the priority for important application with specified TCP or UDP port number. In XL-HCW224C, you can assign higher priority for total 3 different TCP/UDP protocols.

A

SPECIFICATIONS

NETWORK INTERFACE

- HomePNA3.1 over Coax(HCNA) Compliant

- IEEE 802.3ab 1000Mbps Gigabit Ethernet

- IEEE 802.3u 100Mbps Fast Ethernet

- IEEE 802.3 10Mbps Ethernet

- IEEE 802.3x Flow Control

- 10/100/1000Mbps Auto-Negotiation Support

- MDI/MDX Auto-Detection Support

NETWORK MANAGEMENT

- Remote Management by HTTP / TELNET / SNMP Protocols

- Firmware and HCNA Driver are Upgradeable via HTTP or TFTP

- Auto Configuration via DHCP/TFTP Client

- Enable/Disable Endpoint Service

- Subscriber Host (PC) Number Control in Endpoint

- Diagnosis of HCNA Interface

- Bandwidth Control

- 802.1Q Tag VLAN Support

- IGMP v2 Snooping

- DHCP Snooping

- Ethernet Statistics and Status

QUALITY OF SERVICE

- Priority Based on 802.1p, IP TOS/TC and TCP/UDP Port

- Based on HomePNA Parameterized QoS

TRANMISSION POWER AND SPECTRUM

- 15 +/- 1dBm

- 12~44MHz (54MHz Filter in XL-HCW224C)

TRANMISSION SPEED AND RANGE

- Up to 224Mbps for XL-HCW224C

- Min Attenuation to Endpoint: 6dB

- Max Attenuation to Endpoint: 60dB (-176dBm/Hz Noise Floor)

CONNECTORS

- Ethernet LAN Port: 2 Ports, RJ45 Jack

- HCNA Port: 1 F-Type Port to HCNA Coax Network

- TV/Antenna Port: 1 F-Type Port to TV Set or from CATV/Antenna

LED INDICATOR

- Power

- Ethernet LAN Link/Activity per Port

- HCNA Link/Activity

- HCNA Connection Quality

- HCNA Endpoint Diagnosis

TERMINAL DEVIce (ENDPOINT)

- Cooperate with HCNA Ethernet Bridge Endpoint (as XL-HC224C)

- Support up to 61 Endpoints

POWER REQUIREMENT

- 12V DC Input

- Power Consumption (Exclude 12V DC Output): < 6 Watts

- 12V DC Output: < 1 Amp

ENVIRONMENTAL CONDITION

- Operation: 0 °C~ 55 °C (32 °C~ 131 °C)

- Storage: -10 °C ~ 70 °C (14 °C~ 158 °C)

- Humidity: 10% ~ 95% Non-condensing

PHYSICALS

- Dimensions: 180(W) x 140(D) x 33(H) mm

- Weight: 430g