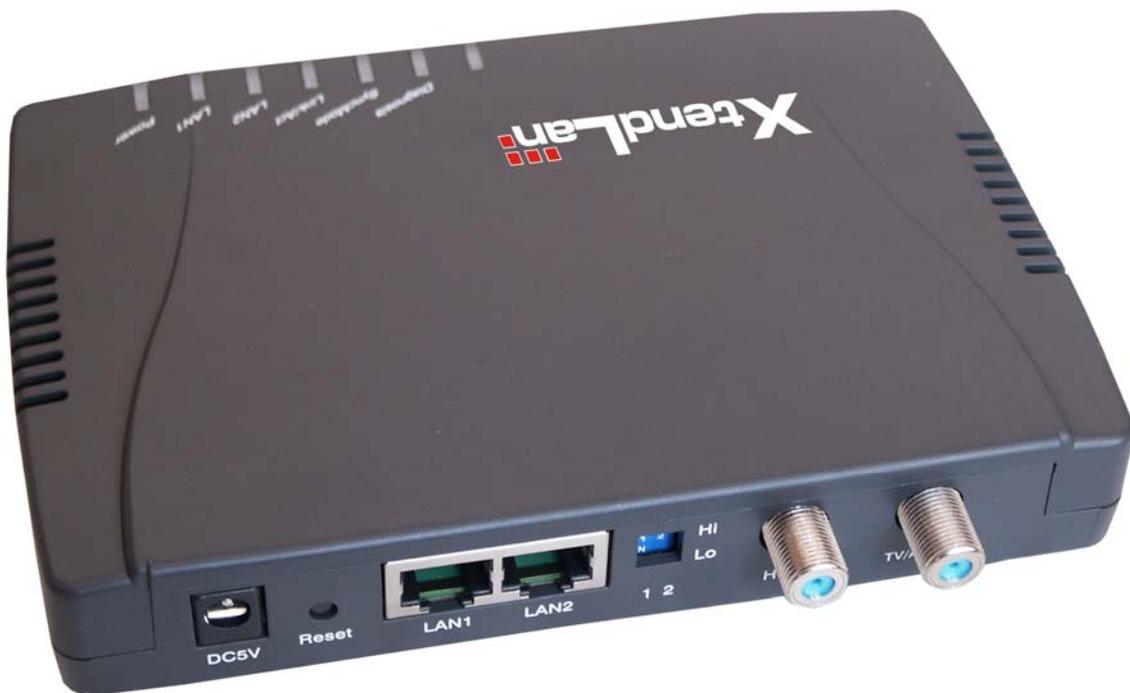




# ***XL-HBW128C***

HomePNA3.0 Coax Master Bridge in MDU



User's Guide

# Statement

**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

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

# INTRODUCTION

This chapter describes the features of your HomePNA3.0 over Coax to Ethernet Master (Management) Bridge -- XL-HBW128C.

Refer to "HomePNA3.0 over Coax" as HCNA from this point.

## Features

- One HCNA Port for Driving HomePNA3.0 Signal into Existing Coaxial Cable.
- One TV/Antenna Port for TV Set Connection or for Signal from TV VHF/UHF Antenna.
- Two Fast Ethernet Port with Auto-Detect MDIX Function(Auto Crossover) and Auto-Negotiating Half/Full Duplex 10M/100M for Expansion or Link to FTTH/xDSL Modem
- Priority Queue based QoS Support for 802.1p, IP TOS, UDP/TCP Protocols
- Supports up to **15 EP (Endpoint, as XL-HB128C Slave Unit)** Concurrent Connection
- Diagnostic Function for Individual EP Connection.
- Built-in Web Server and Telnet Server to Support Remote Configuration via Web Browser or Telnet Protocol
- Supports Remote HTTP/TFTP Firmware Upgrade Function.
- Supports SNMP Function(Reserved)
- Equipped with Reset Button and DIP Switch for Versatile Configuration.

## Glossary

- HCNA HomePNA3.0 over coaxial cable
- MDU Multiple Dwelling Unit
- Coax Coaxial cable
- SyncMode HCNA device operates in Synchronous mode
- AsyncMode HCNA device operates in Asynchronous mode
- Master Master HCNA device in one coax network
- Slave Slave HCNA device in one coax network
- EP Endpoint, equivalent to Slave HCNA device
- QoS Quality of Service
- M/C Fiber-Optic Ethernet Media Converter
- 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



*Endpoint XL-HB128C*

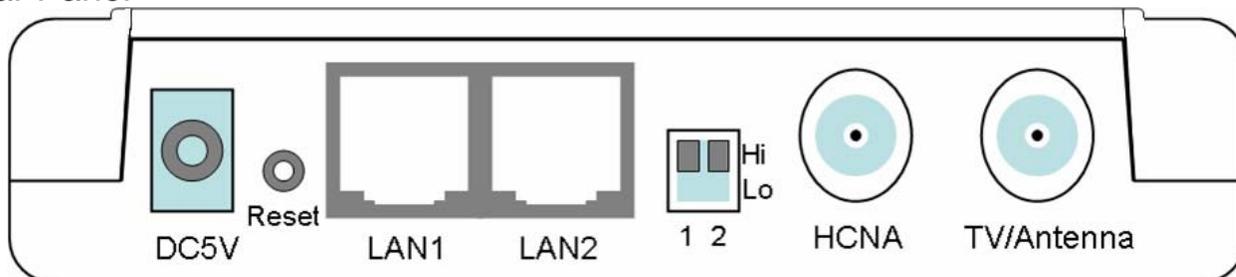
This chapter describes the installation procedure for your bridge.

## Packing List

Your package should come with the equipment listed below,

- One Main Unit (HCNA to Ethernet Master Bridge) XL-HBW128C
- One DC 5V Power Adaptor
- One F-Type Coaxial Cable (RG-59U)
- One RJ-45 Ethernet Cable (CAT-5)

## Rear Panel



**Figure 1 Rear panel of XL-HBW128C**

## Connectors

1. DC5V: Connect to the power adapter plug.
2. Reset: While XL-HBW128C is up, press and release this button will reboot XL-HBW128C. 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'.
3. LAN1/LAN2: Two fast Ethernet ports to connect Switch/FTTH/xDSL Modem for Internet access.
4. DIP Switch 1 2: Reserved for different operation mode.
5. HCNA: Attach to existing coaxial cable and use it as the networking backbone in one or more MDU. XL-HBW128C is the HCNA Master device and controls the other Slave HCNA devices (refer to Endpoint or EP, as XL-HB128C) on the same coax network. Refer "Connecting the Cables" for more details.
6. TV/Antenna: Connect to TV Set. Or connect to VHF/UHF Antenna or CATV to bypass TV signal to HCNA port.

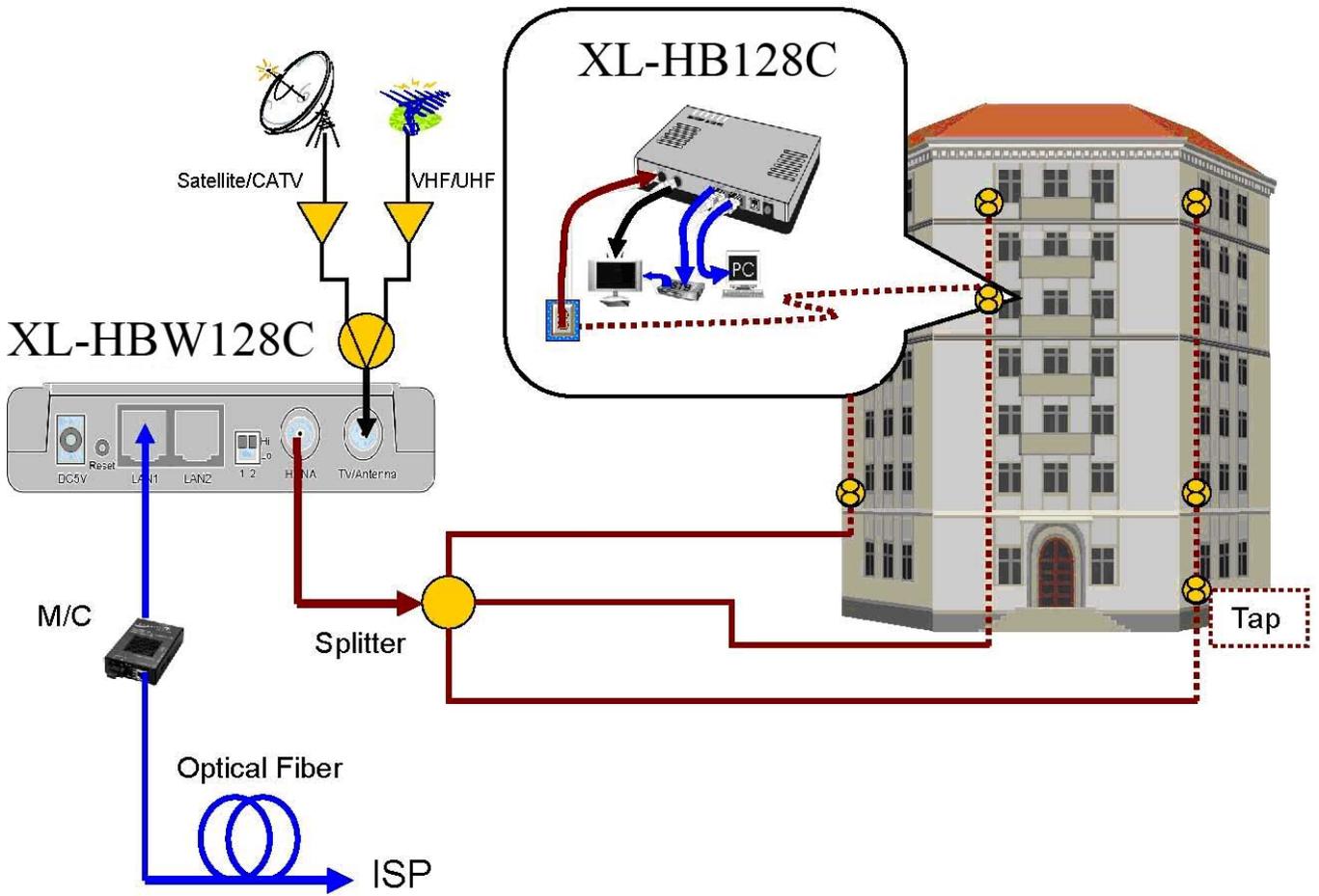
## LED Indicators

1. Power: Lighting up when power on.
2. LAN Link/Act-1: Lighting up when LAN1 port is active, and flashing when there is any data traffic.
3. LAN Link/Act-2: Lighting up when LAN2 port is active, and flashing when there is any data traffic.
4. HCNA Link/Act: Lighting up when HCNA port is active, and flashing when there is any data traffic.
5. HCNA SyncMode: Lighting up when HCNA port is working in HCNA Synchronous MAC mode.
6. HCNA Diag: Lighting up when XL-HBW128C is diagnosing EP.

NOTE: HCNA always adopt the Synchronous MAC protocol layer in coax system in order to coordinate all the transmissions and eliminate any collisions.

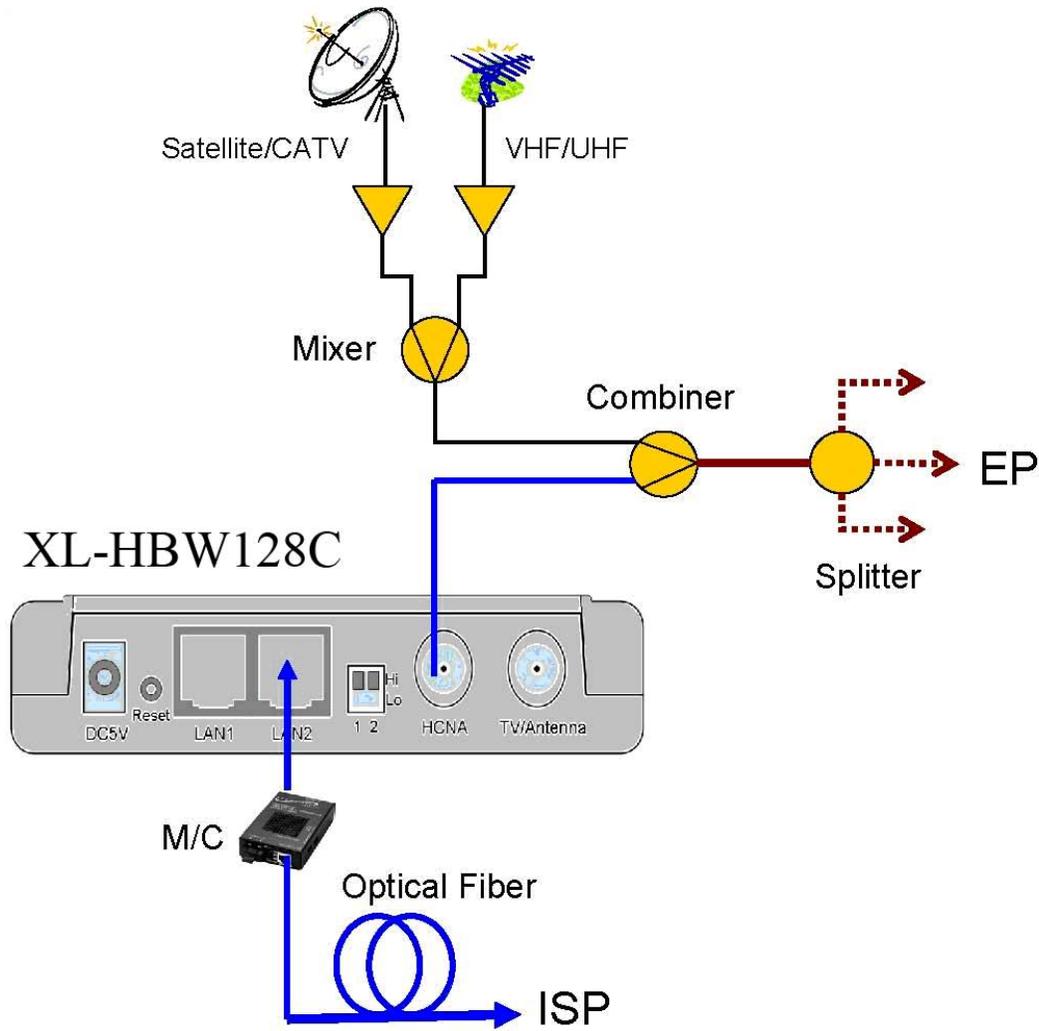
## Connecting the Cables

To establish a new coax networking system by XL-HBW128C, reroute the CATV/Antenna signal source over coax toward XL-HBW128C 'TV/Antenna' port and connect XL-HBW128C 'HCNA' port to the original coax entrance to building. XL-HBW128C 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 2 for the detail cabling in one MDU,



*Figure 2 Detail cabling of XL-HBW128C*

You can also use other Combiner or Mixer-Splitter with XL-HBW128C to build the same system, see the following Figure 3 for different cabling,



**Figure 3 Cabling of XL-HBW128C**

NOTE: After power up XL-HBW128C, the led 'HCNA SynMode' will always be glowing, and led 'HCNA Link/Act' will light up for at least one EP is detected on the HCNA network. A dimmed led 'HCNA Link/Act' shows no EP attached to the HCNA network.

## Verification

After you have finished the installation, you should be able to access XL-HBW128C through Ethernet link or through HCNA link (via Host PC behind EP) to verify the installation is completed. (See next Chapter for details).

This chapter describes the configuration procedure for your bridge.

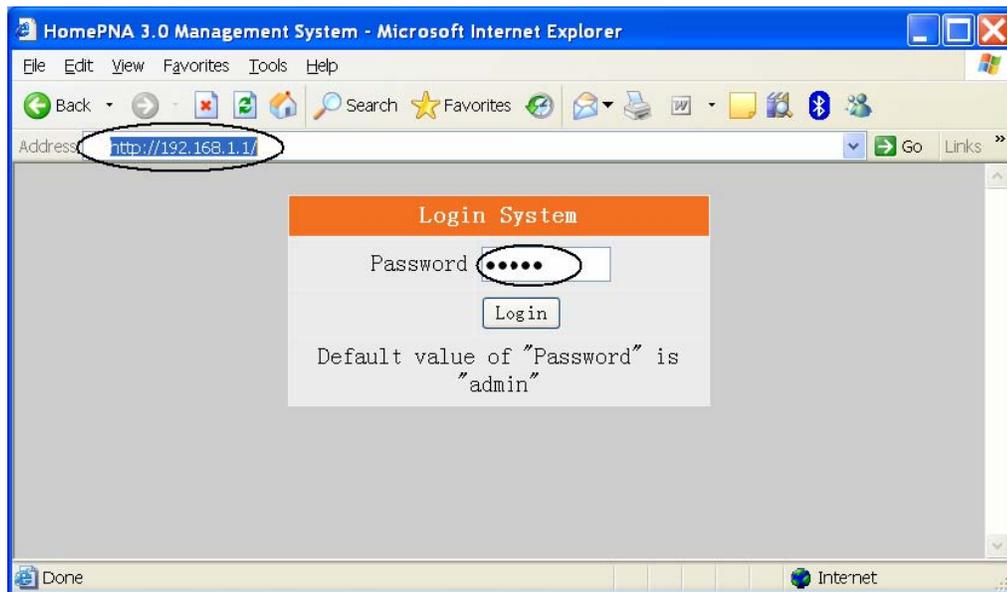
## Configuration Methods

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

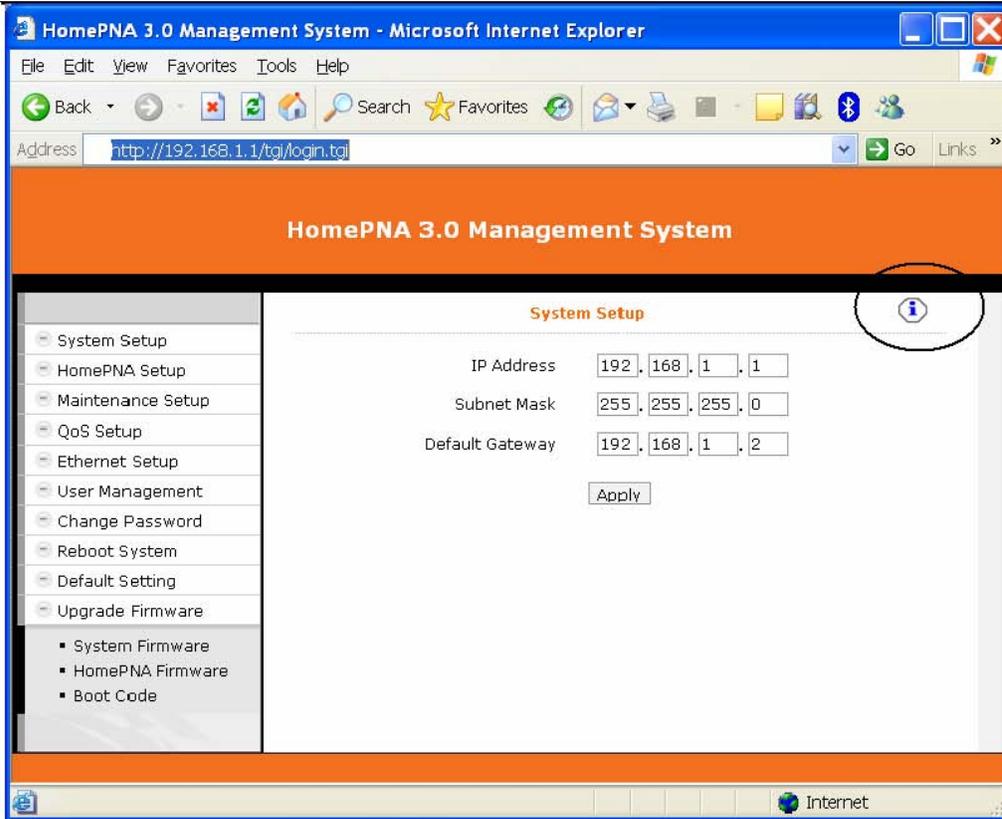
- Use Web Browser
- Use Telnet Program

## Use Web Browser

Web browser is the easiest tool to configure the bridge. The factory default IP address of XL-HBW128C 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 IP network as the bridge XL-HBW128C. That is, your PC's IP address should be as "192.168.1.xxx". For instance, you may connect one 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](http://192.168.1.1) in your browser's website navigating field, as the following,

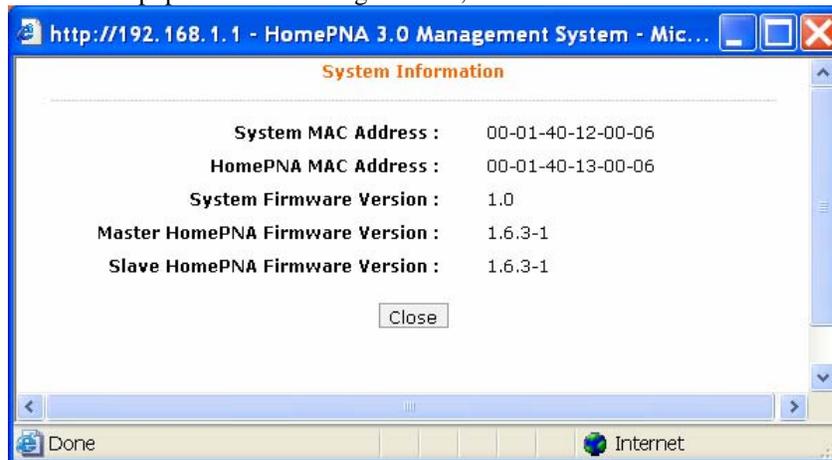


The bridge will prompt you a window for password authorization. The factory default Password for XL-HBW128C is 'admin'. Please change it to a more secured password after you login successfully. Here shows the main configuration menus on the browser,



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.

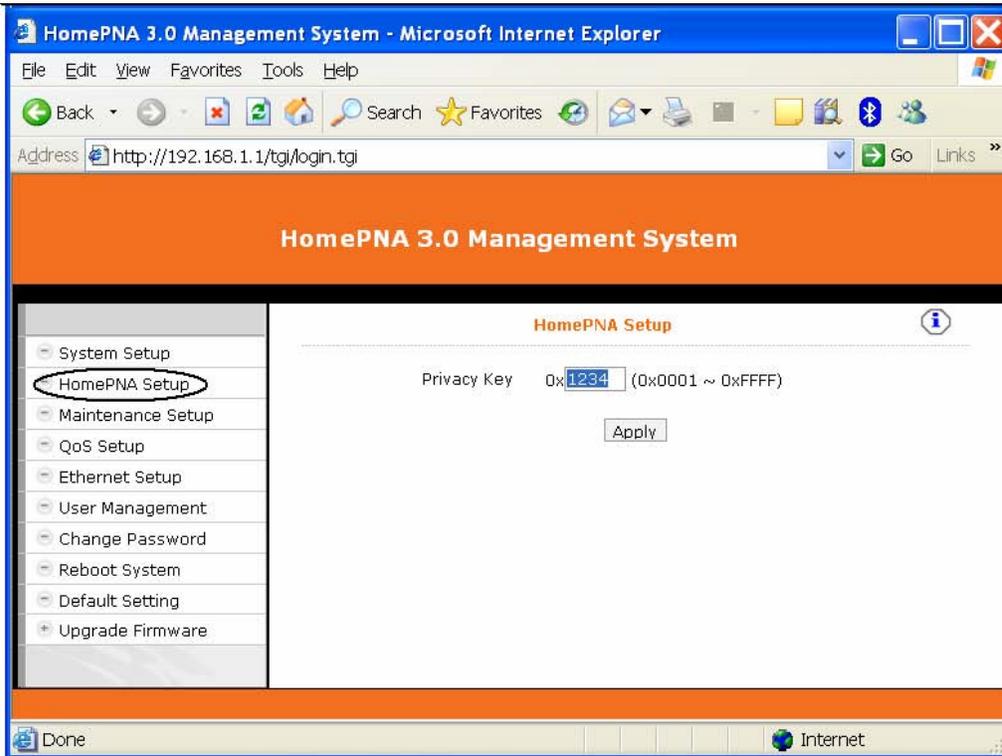
Click on the upper-right 'i' icon will pop out the following window,



Following describes the basic web configuration items,

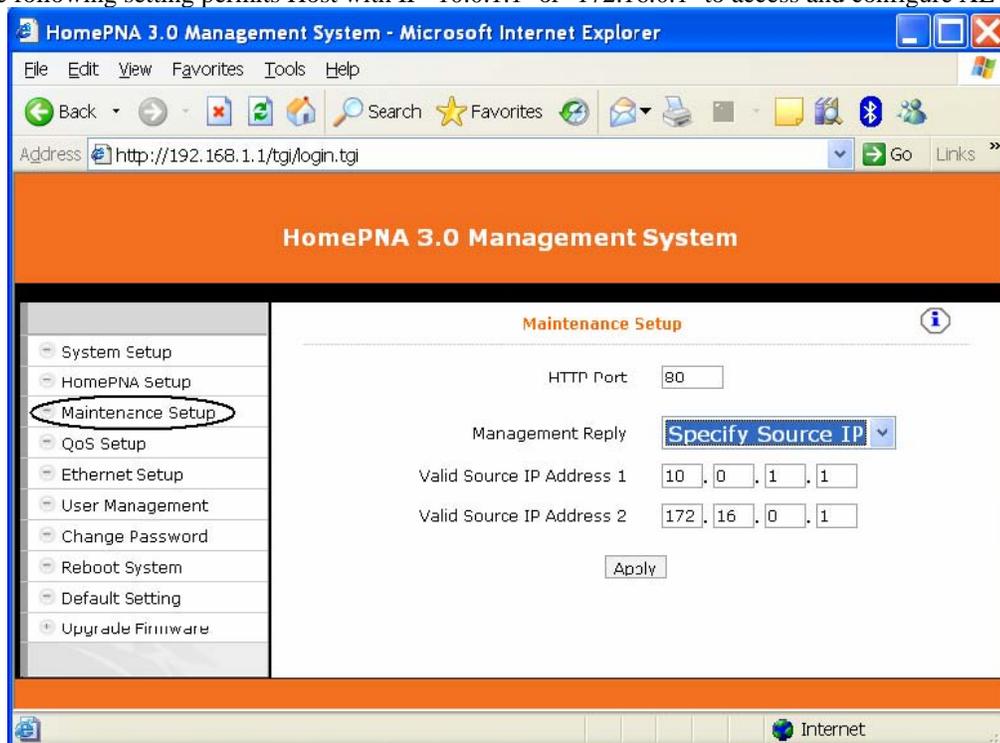
### HomePNA Setup

XL-HBW128C will communicate with EPs if they share the same Privacy-Key. There should be only one key in one coax networking system. EP with unmatched key will not be allowed to transmit any packets through XL-HBW128C. The factory default key is '1234' (hexadecimal). Once you change the key in XL-HBW128C, you need to upgrade all EPs with this new key before they can access the network controlled by XL-HBW128C.



### Maintenance Setup

Setup the allowable Host with specified source IP to access and manage XL-HBW128C by protocol HTTP/TELNET/ICMP... For example, the following setting permits Host with IP '10.0.1.1' or '172.16.0.1' to access and configure XL-HBW128C.



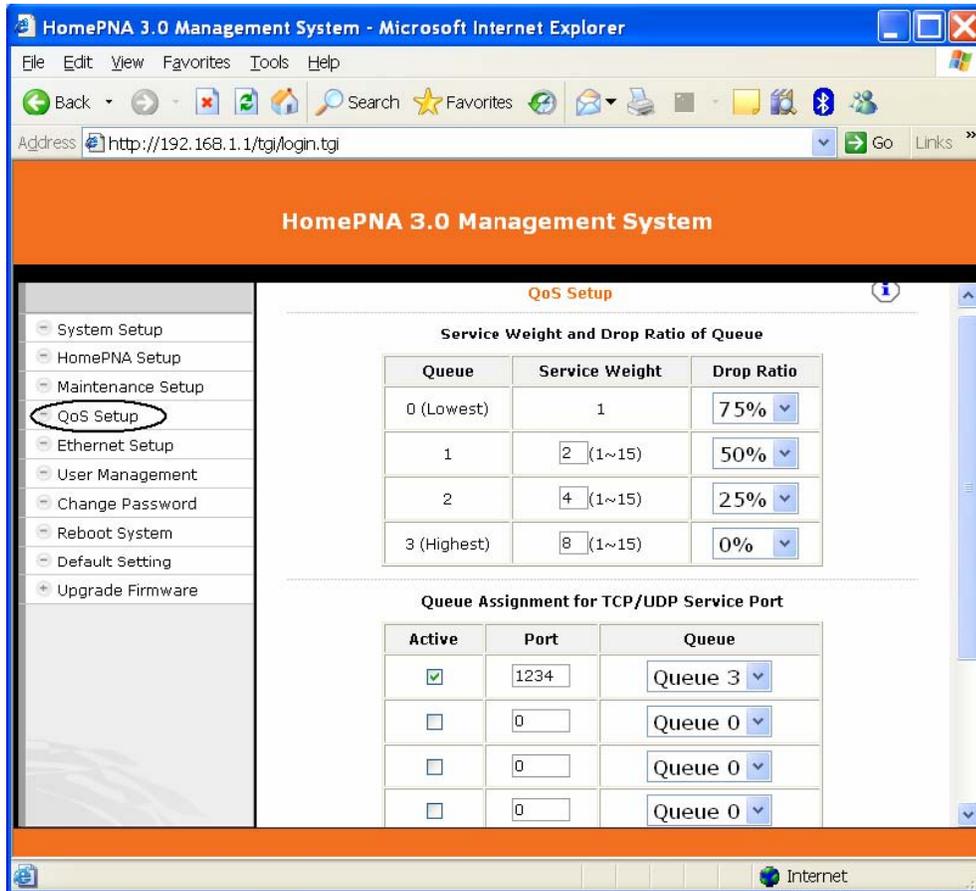
### QoS Setup

Total 4 prioritized queues are provided, denoted as Queue0 (lowest priority), Queue1, Queue2 and Queue3 (highest priority). You may assign the different packet dropping ratio and service weight for different queue. Refer Chapter "ADVANCED FEATURES" for more XL-HBW128C QoS mechanism details.

For example, here we classify TCP/UDP packet with port '1234' (decimal) as the highest priority packet goes to Queue3. Queue3

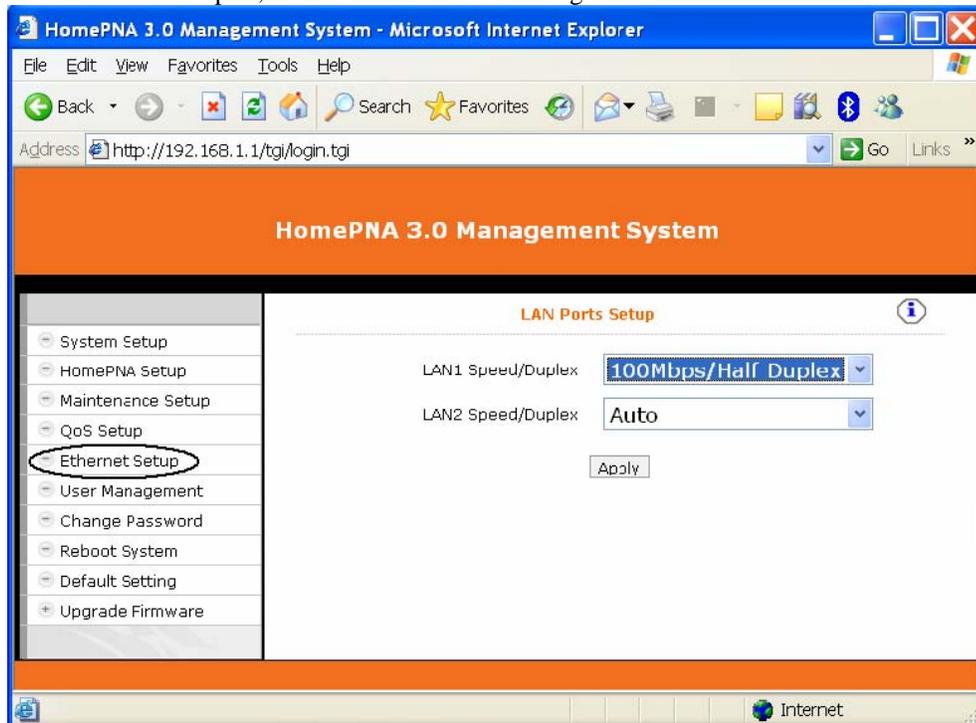
## XL-HBW128C User's Guide

will not discard any packet (Drop Ratio 0%), and packets in Queue3 is transmitted 8 times faster than packets in Queue0 according to their 'Service Weight'. Packets in Queue0/Queue1/Queue2 will be discarded according to their 'Drop Ratio' in case of any congestion.



## Ethernet Setup

Configure the LAN1/LAN2 Ethernet port, default is 'Auto' for auto-negotiation.



## User (EP) Management

Identify each EP by its MAC address, click on [MAC address](#) can change each EP's parameters, click on 'Test' button can diagnose EP. Click on 'Sel' will select all listed EPs at once for Upgrade.

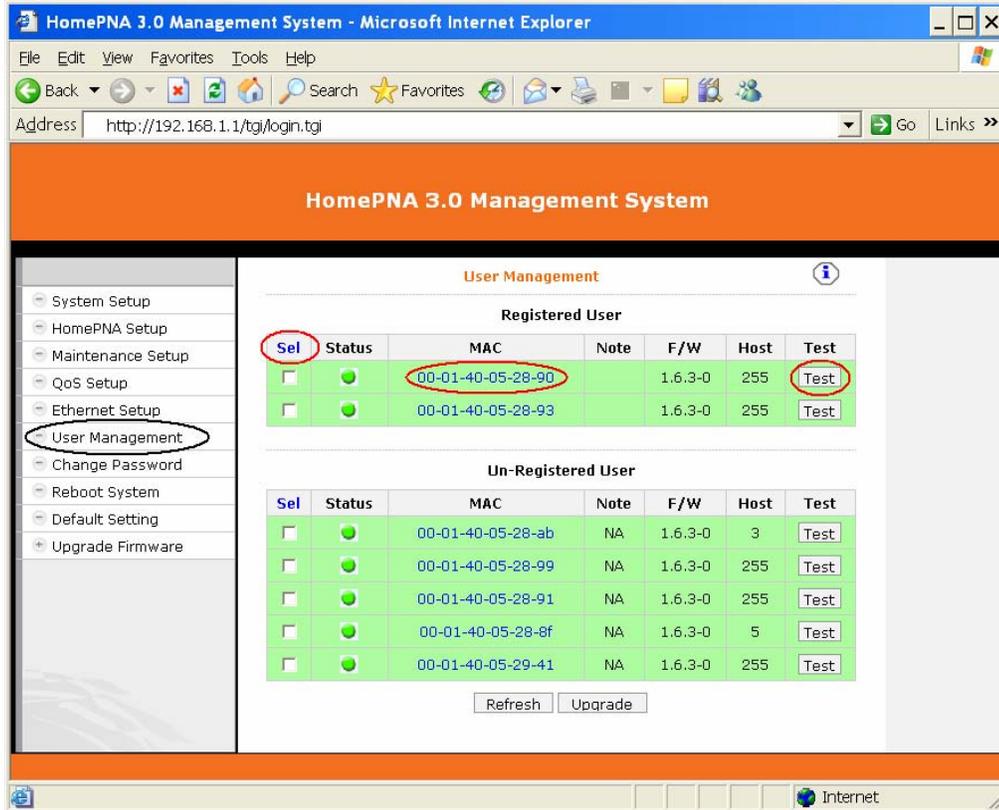
XL-HBW128C will store the setting of individual registered user into nonvolatile memory, include 'MAC', 'Note', 'Host Limited Count'... Registered EP will always has the Status indication monitored by XL-HBW128C; green light in status field means EP is on, gray light else. Other EPs detected on the network will be classified as Un-registered users.

Background color of each listed EP:

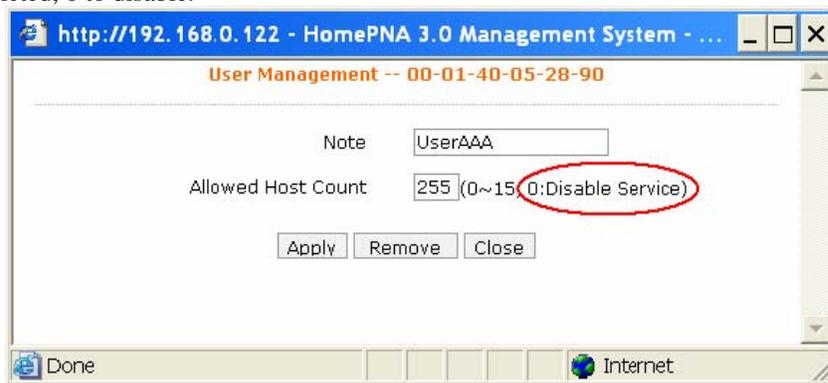
Green: Settings in EP consist with the profile stored in XL-HBW128C, include Privacy-Key.

Yellow: Not all settings are consistent, but Privacy-Key in EP is matched. May upgrades those EPs to have consistent setting with Master.

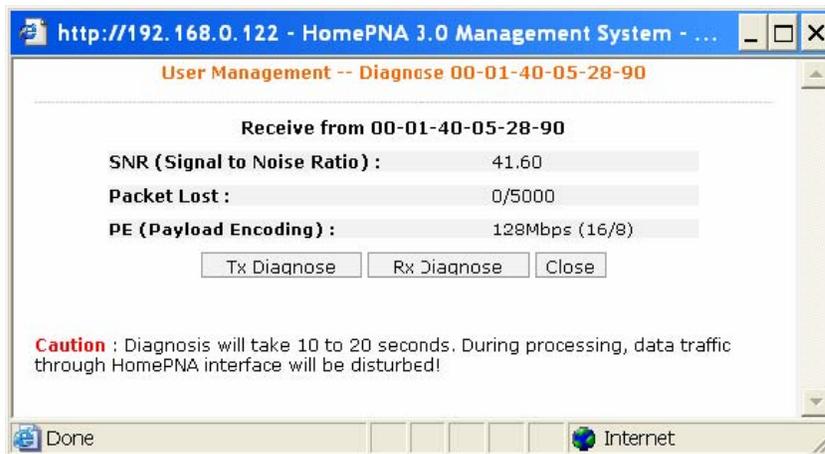
Red: Privacy-Key in EP is not matched or 'Host Limited Count' is 0. XL-HBW128C will reject to serve this EP.



For example, open the window for one EP, item 'Allowed Host Count' specifies the maximum allowable host number attached on this EP—255 for unrestricted, 0 to disable.



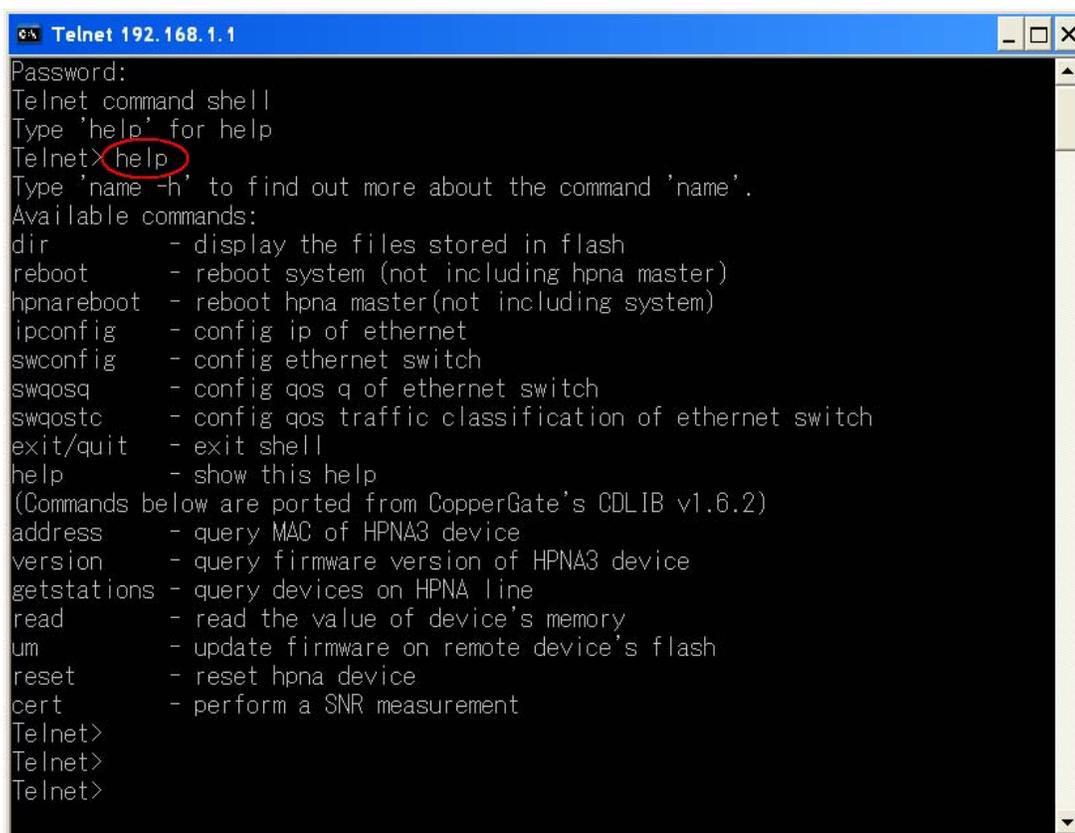
Open 'Test' window for Tx (downstream packets from XL-HBW128C toward EP) or Rx (upstream packets from EP to XL-HBW128C) diagnosis. Include 'SNR', 'Packet Lost' and 'PE' obtained during communication between the selected EP and



NOTE: Unit XL-HBW128C could be converted into EP for MDU infrastructure after loading of right firmware version. If you have XL-HBW128C units already and they are not co-operating with XL-HBW128C please check firmware version.

## Use Telnet Program

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



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 5 minutes.

# ADVANCED FEATURES

This chapter describes the advanced features offered by your bridge.

## SNMP (Reserved)

The SNMP Agent resides in XL-HBW128C will handle request from remote SNMP Manager. The XL-HBW128C SNMP agent supports standard SNMP operations as 'SET', 'GET' and 'TRAP'.

By default, XL-HBW128C SNMP works in read-only mode, only 'SET' and 'TRAP' operations are allowed. You need to specify the Read/Write Community Name into bridge before any SNMP 'SET' operation can work. 'SET' operation can modify the setting within XL-HBW128C. Default read-only mode will let agent monitor the bridge and return 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-HBW128C bridge system may also be integrated into your original SNMP management system by this MIB file. 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.

The default 'GET' and 'TRAP' community name of XL-HBW128C is *'public'*.

## 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 in, fast out). 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-HBW128C supports priority scheme as 802.1p, IP TOS and TCP/UDP protocol.

### Priority in Upstream and Downstream

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 should have larger 'Drop Ratio' in congestion situation since it is classified as less important.

Refer the following table for the detail mechanism to discard packets early according to their priority to prevent resource blocked by the low priority. For example, if 'Drop Ratio' of Queue0 is set to 75%, then XL-HBW128C will discard 50% of incoming packets toward Queue0 if Queue0 is one fourth full(Queue Utilization 25%). And will discard 75% of incoming packets toward Queue0 if Queue0 is half full(Queue Utilization 50%).

Drop Ratio \ Queue Utilization	0%	25%	50%	75%
25%	0%	0%	25%	50%
50%	0%	25%	50%	75%

### 802.1p

Tagged packet has the 3-bit (value 0~7) 802.1p field is used 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 will take effect in both downstream and upstream.

### IP TOS

The bit7 to bit5 of TOS byte in IP packet is treated as TOS precedence value (0~7). By default, XL-HBW128C uses the precedence value to map the priority queue. Please refer RFC-1349.

### TCP/UDP Port Number

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-HBW128C, you can assign higher priority for total 8 different TCP/UDP protocols.

## **NETWORK INTERFACE**

- HomePNA3.0 over Coax(HCNA) Compliant
- IEEE 802.3u 100Mbps Fast Ethernet
- IEEE 802.3 10Mbps Ethernet
- IEEE 802.3x Flow Control
- 10/100Mbps Auto-Negotiation Support
- MDI/MDX Auto-Detection Support

## **NETWORK MANAGEMENT**

- Remote Management by HTTP or TELNET Protocol
- SNMP support (Reserved)
- QoS Support for 802.1p, IP TOS, UDP/TCP Protocols
- Endpoint Enable/Disable
- F/W Upgradeable
- Password for Access Protection

## **CONNECTORS**

- Ethernet 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
- HCNA Link/Activity/SyncMode
- HCNA Endpoint Diagnosis
- Ethernet LAN Link/Activity per Port

## **TERMINAL DEVICES(ENDPOINT)**

- Work with HCNA Ethernet Bridge XL-HB128C
- Support up to 15 Endpoints
- Limited Host (PC) Number on Each Connected Endpoint
- Max Attenuation between Endpoints: 55dB

**POWER REQUIREMENT**

- 5V DC Input
- Power Consumption : < 4Watts

**ENVIRONMENTAL CONDITION**

- Operation: 0 °C– 55 °C (32 – 131 °F)
- Storage : -10 °C – 65 °C (14 – 149 °F)
- Humidity : 10% – 95% Non-condensing

**PHYSICALS**

- Dimensions: 160 x 116 x 30 mm
- Weight: 260g