XtendLan

XL-HB14128M

HomePNA3.0 Switch

User's Guide

Version 1.1
Apr 2005

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

This equipment complies with 47 CFR **Part 68** Rules.

On the bottom of this equipment is label that contains, among other information, the ACTA registration Number and Ringer equipment Number (REN) for the equipment. If requested, this information must be given to the Telephone Company.

The REN is useful to determine the quantity of devices you may connect to your telephone line and still have those entire devices ring when your telephone number is called. In most, but not all areas, the sum of the REN's of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you're local telephone company to determine the maximum REN for you're calling area. If your telephone equipment cause harm to the telephone network, the Telephone Company may discontinue your service temporarily. If possible, they will notify you in advance. But is advance notice isn't practical; you will be informed of your right to file a complaint with the ACTA.

Your telephone company may changes in its facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance to given you and opportunity to maintain uninterrupted telephone service. If you experience trouble with this telephone equipment, please contact the following address and phone number for information on obtaining service or repairs. The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning. This equipment may not be used on coin service provide by the telephone company. Connection to party lines is subject to state tariffs

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

TABLE OF CONTENTS

INTRODUCTION

This chapter describes the features of your HomePNA3.0 switch XL-HB14128M.

Features

- 14-Port HomePNA3.0 Connection

- Two Gigabit Ethernet Port with Auto-Detect MDIX Function and Auto-Negotiating Half/Full Duplex 10M/100M/1000M for Expansion or Link to Switch/Hub/Router

- Port-Based VLAN Security Support

- Tag-Based (802.1Q) VLAN Security Support

- QoS (Quality of Service) Support for Port-Based Priority, 802.1P, IP TOS, UDP/TCP Protocols

- Rate Control for both Upstream and Downstream on HomePNA Port

- IP Multicast and IGMP V1/V2/V3 Snooping Support, up to 32 Multicast Groups and 16 Members per Group

- Supports Local Configuration via RS-232 Console Port

- Built-in Web Server and Telnet Server to Support Remote Configuration via Web Browser or Telnet Protocol

- Supports SNMP Function and MIB Statistics Counters

- Coexist with POTS, V92, ISDN, ADSL G.Lite and G.DMT

- 8K MAC Address Table with MAC Address Filtering

- Store and Forward Switching Architecture

- Standard Rack-Mount 1U Size

INSTALLATION

This chapter describes the installation procedure for your switch.

Packing List

Your package should come with the equipment listed below,

- One HomePNA Switch XL-HB14128M
- One AC Power Cord
- One RS-232 Console Cable (DB9-MiniDin8)
- One Cascaded Console Cable (MiniDin8-MiniDin8)
- One Cascaded Ethernet CAT-5 Cable
- Assembly Pack for Rack Mount and Four Rubber Pads
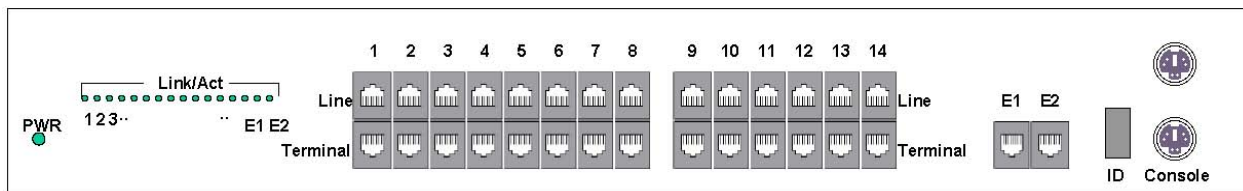
Front Panel

See the following Figure 1.

Figure 1 Front panel of XL-HB14128M

Connectors

1. 1 to 14: Fourteen HomePNA ports with dual-row RJ-45 connector labeled '1' to '14'. Each HomePNA port has one 'Line' connector (upper row) and one 'Terminal' connector (bottom row).

2. E1, E2: Two Gigabit Ethernet ports are used to cascade with other XL-HB14128M or standard Ethernet Switch/Hub. See the following section "Connecting the Cables" in this Chapter.

3. Console IN: The console IN port may connect to the serial COM port of PC for local configuration by the RS-232 Console Cable. See "Connecting the Cables".

4. Console OUT: If you stack more XL-HB14128M in one MDU/MTU (Multiple Dwelling Unit/Multiple Tenant Unit) system, one XL-HB14128M will be selected to output the **MAP Sync Clock**. All other switches will synchronize to the same MAP Sync Clock input from Console IN port. It is necessary to connect the selected switch Console OUT port to all other switches Console IN port in order to coordinate all the transmissions in HomePNA 3.0 **Synchronous MAC** protocol. Cascaded Console Cable is used to connect the console IN/OUT port through a lot of switches in one MDU/MTU system. See "Connecting the Cables".

NOTE: HomePNA 3.0 always adopt the **Synchronous MAC** protocol layer in MDU/MTD system to eliminate **Cross-Talk** effect in a bundle of multi telephone wiring. It is crucial to MDU/MTD system.

LED Indicators

1. PWR: Lighting up when power on.

2. Link/Act (1 to 14): Each led represents the responding HomePNA port. Flashing when there is any data traffic.

3. Link/Act (E1, E2): Lighting up when the Ethernet link is active, and flashing when there is any data traffic.
4. ID: 7-segment led shows the switch status. Display '1' for OK, or display the other status code of self-diagnosis in booting.

Connecting the Cables

The HomePNA 'Terminal' port (1 to 14) requires standard twisted phone wiring for user attached to the same phone line via the HomePNA adapter. The HomePNA 'Line' port (1 to 14) connects to the PSTN/PABX for your original phones. The Ethernet port (E1 and E2) is unshielded twisted pair (UTP) 1000Base-T cabling. All 16 ports work as a standard 16 ports Managed Ethernet switch in the LAN (Local Area Network) environment. See Figure 2 for the detail cabling of one HomePNA switch XL-HB14128M.
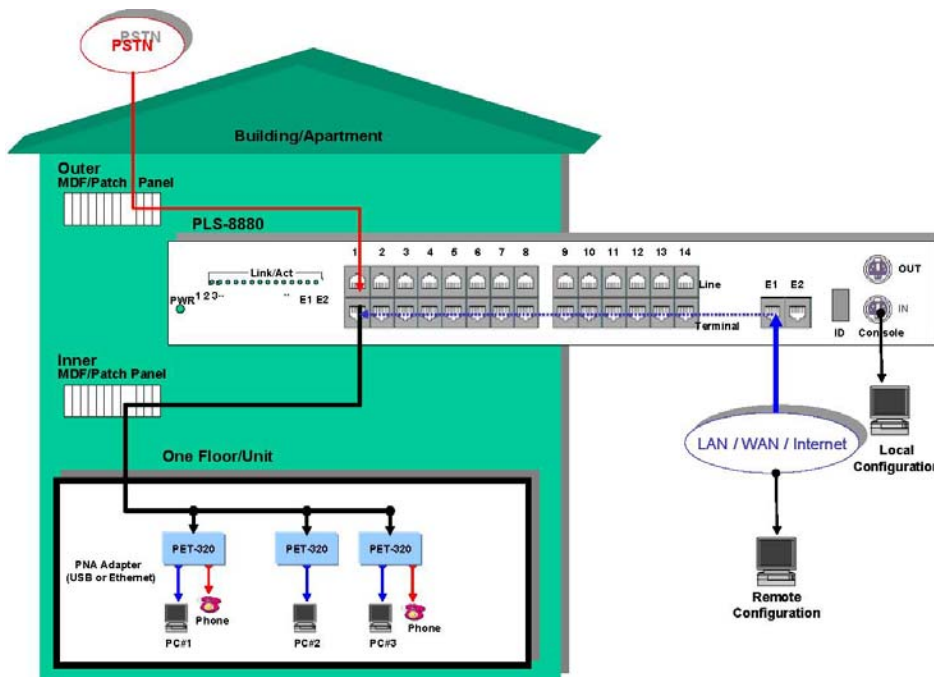

Figure 2 Detail cabling of XL-HB14128M

On each HomePNA 'Terminal' (port 1 to 14) you can connect maximal 24 HomePNA 3.0 adaptors (XL-HB128M). Totally could be used up to 336x XL-HB128M per each switch. For best performance we recommend to use as maximum of four XL-HB128M units per 'Terminal'.

Stacking

You can stack more XL-HB14128Ms to accommodate more HomePNA users by cascading XL-HB14128M's Ethernet port in one MDU/MTU system. For example, connect two or three XL-HB14128M with Ethernet cable from one switch's port E1 to the next switch's port E2. And cascade their console port together for the MAP Sync Clock to coordinate all switches. See Figure 3 for the cabling of cascaded HomePNA switches.
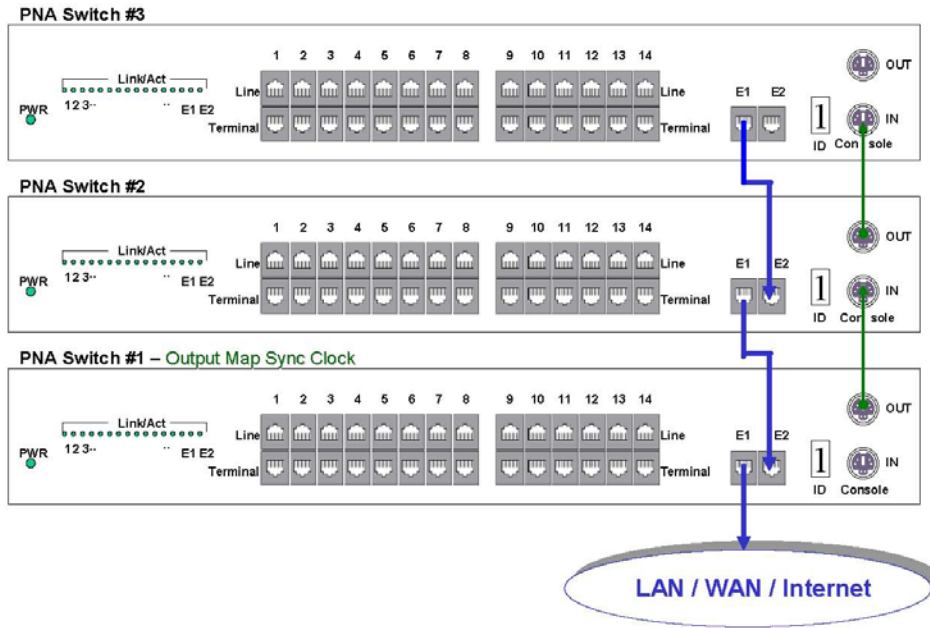
Figure 3 Cabling of more XL-HB14128M in single MDU/MTU system

The other way to stack more XL-HB14128Ms is applying the Gigabit Ethernet Switch. This connection can achieve the maximum available bandwidth utilization for Gigabit rate up-link trunk. Note that port E1 is the up-link trunk of XL-HB14128M. Also connect their console port together for the MAP Sync Clock to synchronize all switches. See the following Figure 4.
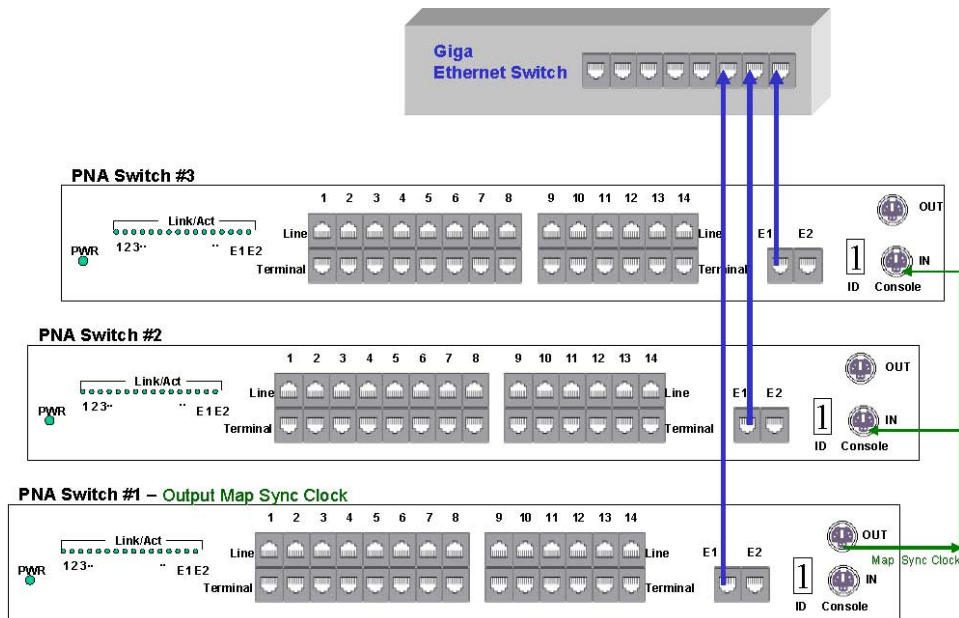

Figure 4. Cabling of more XL-HB14128M by Ethernet Switch

Note that in the stacking switch architecture as Figure 3/Figure 4, the HomePNA switch **'#1'** will generate and output the MAP Sync Clock for all other switches. You can cascade their console port by Cascaded Console Cable as Figure 3; or you can connect all the console port together as Figure 4. You may re-wire the console line in Figure 4 to the wiring way in Figure 3(Change the green wiring).

To configure HomePNA switch **'#2'** or **'#3'** locally**,** unplug the cable from the console IN port and connect RS-232 Console Cable to PC for local configuration. Plug in the previous cable after you have finished the configuration.

The remote configuration function by Web browser or Telnet program can work with switch **'#1'** ,**'#2'** and **'#3'** in Figure3/Figure4 without re-cabling.

NOTE: The 7-segment led shows the switch status code from '**1**','**2**',**…** to '**9**'. The dot (•) symbol shows on the 7-segment's right-bottom corner indicates that the code will plus 10. The code 10 will show '**0.**', and 11 will be '**1.**'. The 19 is '**9.**'. This led should always be '1' after successfully power up.

Verification

After you have finished the installation, you should use the Web Browser to access the switch through **Ethernet** link remotely or through **Console** link locally to verify the installation is completed. (See next Chapter for details).

NOTE: The factory default Port-Based VLAN setting doesn't allow the user to access the switch XL-HB14128M internal Web Server remotely through port E2. Port E2 is designed to cascade the main Gigabit Ethernet Trunk. **You may connect to port E1 of XL-HB14128M with Ethernet UTP cable to your PC** by default IP address '**192.168.0.1**' .

CONFIGURATION

This chapter describes the configuration procedure for your switch.

Configuration Methods

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

♦ Use Web Browser
♦ Use Telnet Program
♦ Use RS-232 Console Cable with a terminal emulation program as HyperTerminal in Windows.

Using Browser or Telnet Program is considered as **Remote Configuration**. RS-232 Console Cable connection is called **Local Configuration**.

Use Web Browser

Web browser is the easiest tool to configure the switch. The factory default IP address of XL-HB14128M is '**192.168.0.1**' and the default subnet mask is '**255.255.255.0**'. To access the switch with default IP, your PC should be within the same IP network as the switch XL-HB14128M. That is, your PC's IP address should be as "192.168.0.xxx". For instance, you may connect one PC with the switch directly by one Ethernet cable between your PC's Ethernet adapter and switch's port E1. Also configures your PC's TCP/IP setting to fixed IP as "192.168.0.xxx", subnet mask as "255.255.255.0", disable DHCP option. Make your PC and the switch within the same "192.168.0.xxx" network. Type in **192.168.0.1** in your browser's website navigating field, as the following,
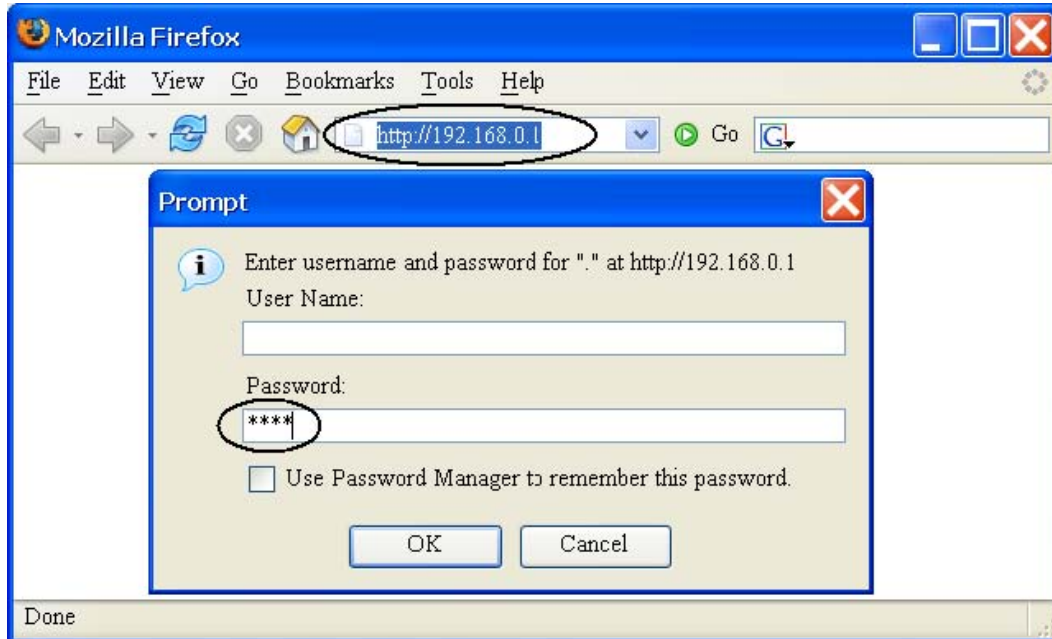
The switch will prompt you a window for username and password authorization. The factory default **Password** for XL-HB14128M is '**root**'. Please change it to a more secured password after you login successfully. Here shows the main configuration menus on the browser.
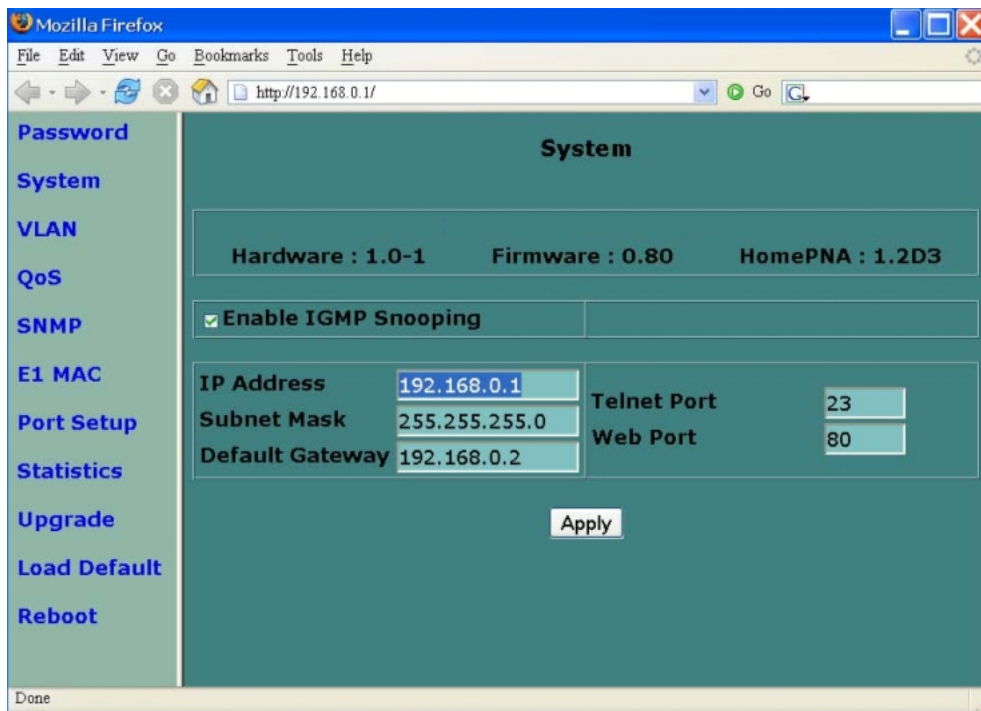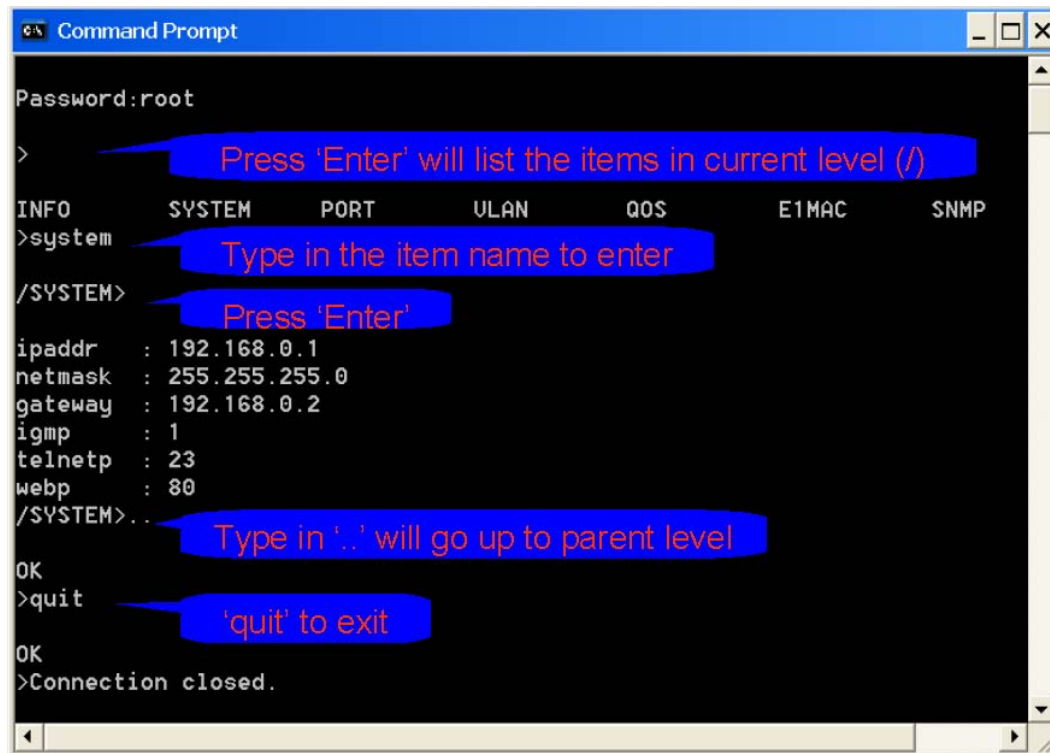

The main window contains the left sub-window for the items to be configured, and the right sub-window displays the contents for the selected item. Click your mouse on the item in the left window will pop out the corresponding item-window in the right side. Click on the '**Apply**' button (or '**OK**' button in some screens) will submit your new

setting into the switch and will take effect immediately.

Use Telnet Program

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

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.

Use RS-232 Console Cable

To configure your XL-HB14128M switch by local console, do the following:

1. Connect 'Console Cable' to front panel Console 'IN' connector and then connect the cable to your PC serial port, as COM1 or COM2.
2. Run a terminal emulation program as HyperTerminal in Windows. Its serial communication parameters should be set to 115200bps baud rate, none parity bit, 8 data bit, one stop bit and none flow-control. As the following:
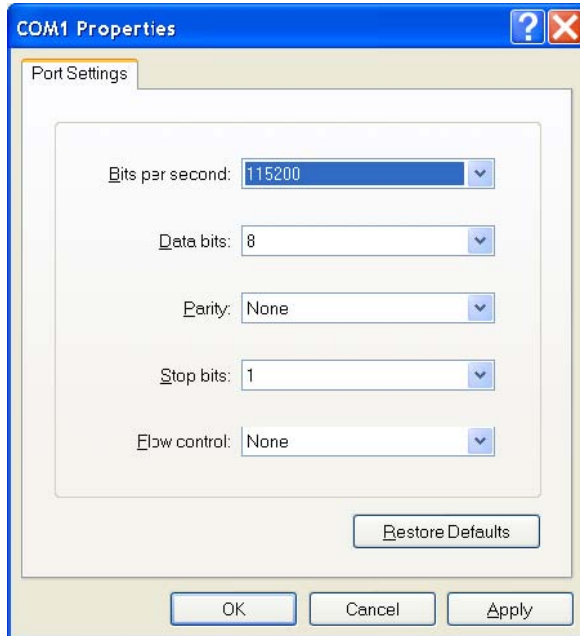
3. Press 'Enter' to get the prompt for 'Password" and login the switch.
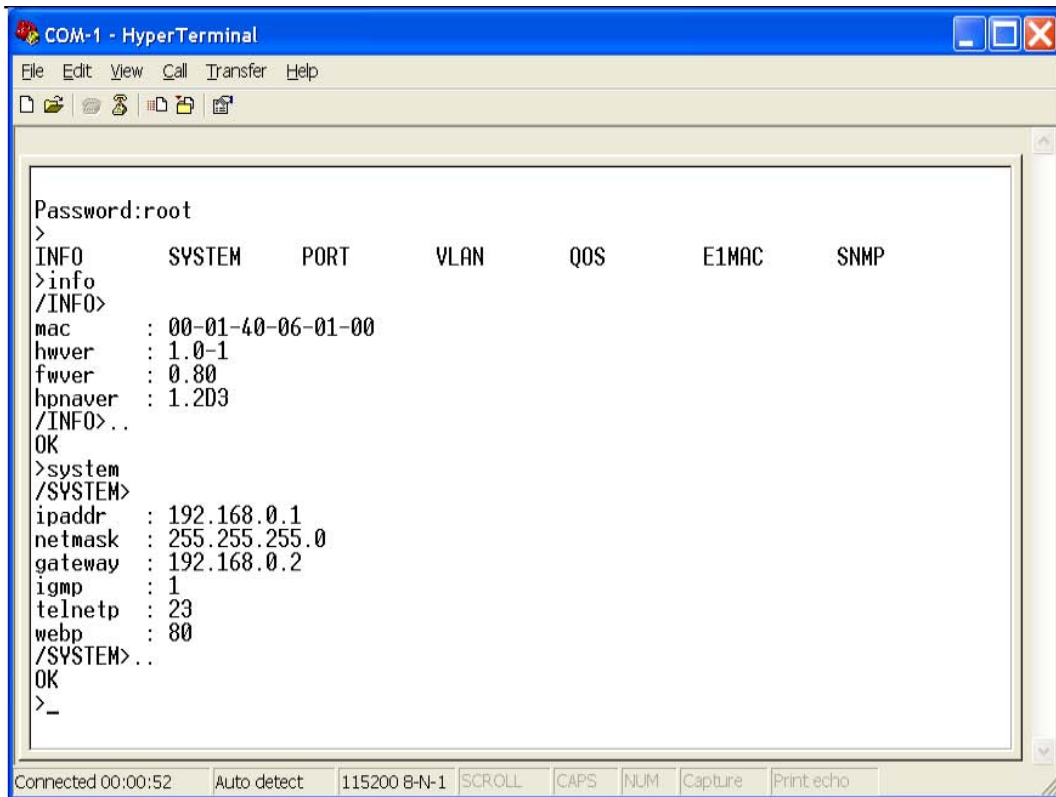
4. The command shell works the same way as Telnet console.

Command Sets for Telnet and RS-232 Console

The following table lists all commands for Telnet and RS-232 console. The first column 'Location Hierarchy' is the place where the command resides within the directory-like command shell. It is the place where command can be accepted. An empty field means you can run the command anywhere.

The third column 'Description' explains what happen when you run the 'Commands' in the second column. Typing commands followed by pressing 'ENTER' will execute the command.

Either capital letter or lowercase letter can be accepted. Switch responses 'OK' message after a successful command, 'ERROR' if any mistake. Denote [ENTER] in the following table for pressing 'ENTER' only.

Location Hierarchy	Commands	Description
	/	Return to root level ' / '
	..	Go up to parent level
	save	Save current setting permanently (Keep in EEPROM)
	default	Reset all setting to factory default, except Password
	quit	Logout and Exit
	reboot	Reboot switch as power-on state
	upsysfw	Upgrade switch firmware
	uphpnafw	Upgrade HomePNA3,0 chip set firmware
	password	Change your password
/	INFO	Enter directory level '/INFO'
/	SYSTEM	Enter directory level '/SYSTEM'
/	PORT	Enter directory level '/PORT'
/	VLAN	Enter directory level '/VLAN'
/	QOS	Enter directory level '/QOS'
/	E1MAC	Enter directory level '/E1MAC'
/	SNMP	Enter directory level '/SNMP'
/INFO	[ENTER]	Display MAC address, hardware version, firmware version and HomePNA3.0 chip set firmware version of switch itself. These parameters are read-only.
/SYSTEM	IPADDR=nnn.nnn.nnn.nnn	Set IP address, n=0~9 (default 192.168.0.1)
/SYSTEM	NETMASK= nnn.nnn.nnn.nnn	Set subnet mask, n=0~9 (default 255.255.255.0)
/SYSTEM	GATEWAY= nnn.nnn.nnn.nnn	Set default gateway for switch, n=0~9 (default 192.168.0.2)
/SYSTEM	IGMP=n	Control switch IGMP snooping function n=0: Disable IGMP snooping n=1: Enable IGMP snooping (default)
/SYSTEM	TELNETP=n	TELNET port number, n=0~65535 (default 23)
/SYSTEM	WEBP=n	HTTP port number, n=0~65535 (default 80)
/PORT	RCON=n	Control switch rate control function, n=0: Disable rate control (default) n=1: Enable rate control
/PORT	Px	Enter directory level '/PORT/Px'. For example, '/PORT/P1' represents PORT 1. x=1~14
/PORT/Px	SERVICE=n	n=0: Disable HomePNA port x

		n=1: Enable HomePNA port x (default)
/PORT/Px	UPBAND=n	Maximum upstream bandwidth for HomePNA port x (in bits per second), n=0: unlimited (default) n=1: 16M n=2: 8M n=3: 4M n=4: 2M n=5: 1M n=6: 512K n=7: 256K n=8: 128K n=9: 64K
/PORT/Px	DOWNBAND=n	Maximum downstream bandwidth HomePNA port x (in bits per second), n=0: unlimited (default) n=1: 16M n=2: 8M n=3: 4M n=4: 2M n=5: 1M n=6: 512K n=7: 256K n=8: 128K n=9: 64K
/PORT/Px	NOTE=s	Notes on HomePNA port x, maximum length of s is 8, s='' (default empty string)
/VLAN	TYPE=n	Control switch operation VLAN type, n=0: Port-Based VLAN mode (default) n=1: Tag VLAN mode
/VLAN	Px	Enter directory level '/VLAN/Px'. For example, '/VLAN/P1' represents PORT 1. x=1~14
/VLAN	E1	Enter directory level '/VLAN/E1' for PORT E1.
/VLAN/Px	VID=n	Set default 802.1Q VID for HomePNA port x, n=1~4094 (default n)
/VLAN/Px	PRIORITY=p	Set default 802.1P value for HomePNA port x, p=0~7 (default p=0)
/VLAN/Px	ACTION=n	Set Egress Action for packets outgoing from HomePNA port x, n=1: Pass, let packet pass through untainted n=2: Tag, add 802.1Q/P Tag for untagged packets n=3: Untag, remove 802.1Q/P for tagged packets
/VLAN/E1	VID=n	Set default 802.1Q VID for Ethernet port E1, n=1~4094 (default n)
/VLAN/E1	PRIORITY=p	Set default 802.1P value for Ethernet port E1, p=0~7 (default p=0)
/VLAN/E1	ACTION=n	Set Egress Action for packets outgoing from Ethernet port E1, n=1: Pass, let packet pass through untainted n=2: Tag, add 802.1Q/P Tag for untagged packets n=3: Untag, remove 802.1Q/P for tagged packets
/QoS	QoSON=n	Control switch QoS function, n=0: Disable QoS (default) n=1: Enable QoS
/QoS	PCS=n	Set QoS classifying sequence

		n=0: Port-Based Priority -> 802.1P -> IP TOS -> TCP/UDP port number. (default) n=1: Port-Based Priority -> IP TOS -> 802.1P -> TCP/UDP port number.
/QoS	TOSBits=n	Set QoS classifying bits for "TOS value" n=0: Use "IP Precedence bit7~bit5" as "TOS value". (default) n=1: Use "TOS value bit4~bit2" as "TOS value".
/QoS	PORTBASE	Enter directory level '/QoS/PORTBASE'
/QoS	8021P	Enter directory level '/QoS/8021P'
/QoS	TOS	Enter directory level '/QoS/TOS'
/QoS	TCPUDP	Enter directory level '/QoS/TCPUDP'
/QoS/PORTBASE	PPRION=n	Control switch Port-Based priority function, n=0: Disable Port-Based priority (default) n=1: Enable Port-Based priority
/QoS/PORTBASE	PxPRI=p	Set HomePNA port x priority value n, x=1~14 p=0~7 (7 is the highest priority)
/QoS/8021P	1PxPRI=p	Set priority p for packet with 802.1P value x (x is 0~7). p=0~7 (default p=x)
/QoS/TOS	TOSxPRI=p	Set priority p for packet with "TOS value" x (x is 0~7). p=0~7 (default p=x)
/QoS/TCPUDP	SETxPORT=n	Controlling Setx (x is 0~7, total 8 set) work for packet with TCP/UDP port number n. n=0~65535 (default n=0)
/QoS/TCPUDP	SETxPRI=p	Set priority p for packet with TCP/UDP port number n (specified in controlling Setx, x is 0~7). p=0~7 (default p=0)
/E1MAC	MACx=nn-nn-nn-nn-nn-nn	Set secured MAC addresses preserved on port E1, up to 8 MAC addresses (x is 0~7). nn=00~FF (default nn=00)
/SNMP	NAME=s	Set managed switch name, up to 16 characters, s=' ' (default s is 'XL-HB14128M')
/SNMP	CONTACT=s	Set SNMP managed switch contact information, up to 16 characters s=' ' (default s is empty)
/SNMP	LOCATION=s	Set SNMP managed switch location information, up to 16 characters s=' ' (default s is empty)
/SNMP	ROCOM=s	Set switch read-only community name, for SNMP 'Get' command, up to 16 characters s=' ' (default s is 'public')
/SNMP	RWCOM=s	Set switch read-write community name, for SNMP 'Get'/'Set' command, up to 16 characters. Empty(null) string will not allow 'Set' command, i.e. default SNMP setting supports read-only mode. s=' ' (default s is empty)
/SNMP	SNMPP=n	Set switch SNMP UDP port number, for SNMP 'Get'/'Set' command n=0~65535 (default n=161)
/SNMP	TRAPON=n	Control switch SNMP trap function, n=0: Don't emit any trap (default) n=1: Enable trap function
/SNMP	TRAPP=n	Set switch SNMP UDP port number, for SNMP 'Trap' command

|		n=0~65535 (default n=162)
/SNMP	TRAPIPx=nnn.nnn.nnn.nnn	Set SNMP trap server x IP address (x is 1~2) n=0~9 (default is 0.0.0.0)
/SNMP	TRAPCOMx=s	Set SNMP trap community name for server TRAPIPx (x is 1~2), up to 16 characters s=' ' (default s is 'public')

ADVANCED FEATURES

This chapter describes the advanced features offered by your switch.

Port-Based VLAN

The main purpose of VLAN is security, to prevent HomePNA user to access each other directly in the switch system. Only the ports within the same VLAN group can access each other directly.

Default VLAN Configuration

Refer to Figure 3 in Chapter 2, the cascaded Ethernet link acts as a traffic trunk to aggregate all HomePNA port traffic. The straightforward VLAN configuration should let each HomePNA port (1 to 14) can communicate with the trunk for LAN/WAN connectivity, but can't communicate with each other directly. In this configuration, Port E1 acts as **Trunk Link** port; Port E2 gathers the traffic from other cascaded switch **Up-Link** port. The following figure shows the data flow of default Port-Based VLAN in XL-HB14128M,
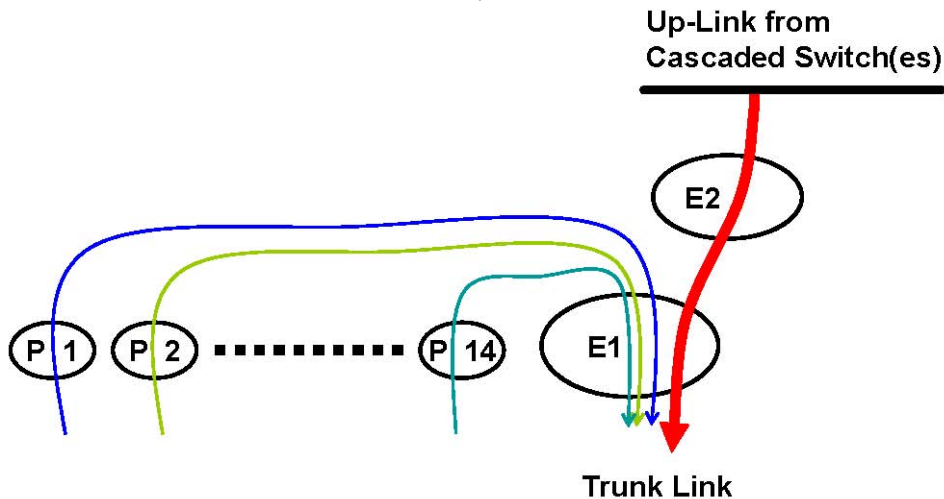
The default Port-Based VLAN configuration in the switch XL-HB14128M allows each HomePNA user to group with port E1 only. For each HomePNA user, to access the main Ethernet trunk E1 is allowed, to access other user (port 1 to port 14, cascaded users on port E2) is forbidden. HomePNA port (1 to 14) and port E2 aren't within the same VLAN group. Only port 1 to port 14 and port E1 are allowed to access XL-HB14128M for Remote Configuration.

Close VLAN

If you wish to get ride of the VLAN restriction, users locate in the same LAN can access each other freely and make the switch work as a standard switch. Adopt Tag VLAN mode and set each port with the same VID.

Tag VLAN

Please refer 802.1Q for Tag VID operation and 802.1P for Tag Priority operation. The switch can accept and forward tagged packet with the matched VID, it can also tag the untagged packet with default VID and Priority.

Each HomePNA port (1 to 14) should be assigned a unique VID. Packets from port E1/E2 trunk with the matched VID

can be forwarded to the correct destined HomePNA port. Terminals attached on port 1 to port 14 should be able to receive tagged/untagged packet and can transmit tagged/untagged packet.

NOTE: The connection may be terminated abnormally while Tag VLAN is being turned on and the terminal (PC) can't recognize/receive tagged packets, especially while you configure the VID/Priority setting on port E1.

SNMP

SNMP Agent inside XL-HB14128M will handle request from **SNMP Manager**. The agent supports standard SNMP operations as 'SET', 'GET' and 'TRAP'.

XL-HB14128M SNMP is setting to read-only mode by default. You need to specify the **Read/Write Community Name** into switch before any SNMP 'SET' operation can work. Default setting will only allow agent to monitor the switch and 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 switch system. Or to integrate the XL-HB14128M switch system into your original SNMP management system by this specific MIB file.

Each SNMP manager must indicate the name of the community it belongs in all 'GET', 'SET' and 'TRAP' operations. The community name could be unique to allow set of SNMP managers to access to the agent. The default 'GET' and 'TRAP' community name of XL-HB14128M is '**public**'.

Rate Control

You may impose the restriction of maximum available data rate on HomePNA port for either upstream or downstream traffic. Rate control disabled by default, and each port could have the maximum possible data rate.

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 discarding.

The numbering priority value ranges from 0 to 7, and 7 represents the highest priority level. XL-HB14128M supports priority scheme as Port-Based, 802.1P, IP TOS and TCP/UDP protocol.

Priority in Downstream

There are 4 priority queues for upstream packet. Packet with priority value 0 or 1 goes to the same queue, denoted as Q0. Q1 has priority value 2 and 3, Q2 has priority value 4 and 5, and Q3 has priority value 6 and 7. Totally 4 level of service are provided. Q3 will always be the first one to service, i.e. packets reside in Q3 will be send out first. Packets in Q0 will be discarded first in congestion situation since it is classified as less important.

Priority in Upstream

3 levels of service can be provided. With priority value 0 and 1 is regarded as the basic level. Priority value 2 and 3 is a higher level. Priority value 4, 5, 6, and 7 is the highest level.

Port-Based Priority

Assign each HomePNA port (1 to 14) with a value within 0 to 7. Packet enter high priority port (for example, port with priority value 6 or 7) will go out faster than packet enter low priority port (as priority value 0 or 1). It takes effect in the upstream direction.

802.1P

Tagged packet contains the 3-bit (0~7) 802.1P field regarded as priority. The default priority mapping setting is usually workable. For example, to map 802.1P value to priority 7, to map value 0 to priority 0, and so on. It takes effect in both downstream and upstream.

IP TOS

The bit7 to bit5 of Type Of Service byte in IP packet is treated as TOS precedence value (0~7). By default, XL-HB14128M uses the precedence value for priority. Instead, it may adopt the TOS value (bit4 to bit2 of TOS byte) as priority.

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-HB14128M, you can assign higher priority for total 8 different TCP/UDP ports.

E1 Static MAC

Port E1 can secure and preserve up to 8 set of predefined MAC address. To bind some servers' MAC addresses to port E1 for security reason.

SPECIFICATIONS

NETWORK INTERFACE

- HomePNA3.0 128Mbps 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
- Port-Based VLAN Support
- 802.1Q/802.1P Tag VLAN Support

NETWORK MANAGEMENT

- Remote Management via Ethernet Port or HomePNA Port: by HTTP or TELNET Protocol
- SNMP support
- Local Management via Console Port: by Mini-DIN Port
- QoS Support
- Data Rate Control of HomePNA Port
- Port Enable/Disable
- F/W Upgradeable
- Password for Access Protection

CONNECTORS

- Ethernet Port: 2 Ports, RJ45 Jack
- HomePNA Port: 14 Ports, Two RJ45 per Port, One for HomePNA, Another for Phone-line Bypass
- Console Port: 2 Ports, 8-Pin Mini-DIN Jack, 'IN' for Local Access, 'OUT' for Map-Sync-Clock Output

INDICATOR

- Power
- HomePNA Activity
- Ethernet Link/Activity

- ID Display (7-segment LED, to Display Switch Status by Numbering)

TERMINAL DEVICES

- HomePNA Ethernet Bridge XL-HB128M

POWER REQUIREMENT

- Internal Switching Power Supply
- Full Range 100 – 240 VAC, 50/60Hz
- Power Consumption : < 40 Watts

ENVIRONMENTAL CONDITION

- Operation: $0 – 40\ ^{o}$C
- Storage : $-10 – 65\ ^{o}$C
- Humidity : 10% - 95% Non-condensing

PHYSICALS

- Dimensions: 445 x 190 x 40 mm
- Weight: 3.5 kg