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HPNA Solution

The HPNA networking solution delivers cost-effective, high-performance broadband access to multiunit buildings (hotels, apartment, and multi-tenant unit office buildings) and enterprise campus environments such as manufacturing, educational campuses, and medical facilities. HPNA technology dramatically extends Ethernet over existing Category 1/2/3 wiring at speeds 1Mbps (Half duplex) and distances up to 500 meters. The HPNA technology delivers broadband service on the same lines as Plain Old Telephone Service (POTS), digital telephone, and ISDN system. In addition, HPNA supports modes compatible with symmetric digital subscriber line , allowing service providers to provision HPNA to buildings where broadband services already exist.

The HPNA solution includes HPNA Concentrator as Central Office(CO) device, and HPNA Converter as Customer Premise Equipment (CPE) device.

The HPNA solution delivers everything needed to quickly deploy an Ethernet-based network with the performance required to deliver high-speed Internet access at much greater distances and drive services like IP telephony and audio/video streaming. With this technology, a broad range of customers can benefit from lower operating costs and rapid deployment. The HPNA solution provides multicast, Layer 2 quality of service (QOS), MAC filtering security, GVRP, IGMP for VOD (Video on demand) and SNMP RMON management and Web-based Switch network management.

The HPNA concentrator is a bridge between external Internet backbone through a router for IP sharing and the building 110D telephone rack or telephone box. It utilizes the available telephone wire to enable high-speed Internet access to building residents.

The HPNA concentrator uses the phone line networking technology endorsed by the HPNA (Home Phoneline Network Alliance), and the HomePNA concentrator utilizes the already existing telephone wire to deliver 1 Mbps Internet access on each RJ-11 port.

This gives users a low-cost, end-to-end solution and eliminates the need to train installation teams on multiple systems.

HPNA CONCENTRATOR



Figure 1:HPNA CONCENTRATOR

The HPNA CONCENTRATOR has 8x 1Mbps HPNA ports and 2 x 10/100M Ethernet ports. The switch is an one rack-unit (1RU) high, 10-inches deep. It is a standard Rack mounted size.

HPNA CONCENTRATOR delivers dedicated bandwidth per port at rates up to 1 Mbps. HPNA transmissions coexist with POTS and ISDN, and can be compatible with ADSL/HomePNA traffic in the same building. The switches can be configured on a per-switch basis to support 500 meters.

The HPNA Concentrator provides fast and easy connectivity into building patch panels with RJ-11 connector. The 10/100 Ethernet ports can be used to connect servers, Ethernet switches. These connectivity options provide multiple price/performance options to meet building and budget requirements. The HPNA concentrator provides the important features necessary for robust networks:

- **Quality of Service:** 802.1p QoS support. Provides high-and low-priority queuing on a per-port basis.
- **Supports: IGMP** Snooping by 512 IP multicast table for VOD (Video on demand)
- **Security: 802.1Q** tagging-based and 802.1V protocol-based and port base virtual local-area network (VLAN) support. Private VLAN access, assuring port security without requiring a VLAN per port, and also supports GVRP dynamic VLAN setting.
- **Network Management:** This HPNA concentrator's technology supports Telnet and Web-based Management, easy-to-use configuration and ongoing monitoring. This software is embedded in the HPNA CONCENTRATOR and delivers remote, intuitive management of HPNA concentrator and connect HPNA converter through a single IP address.

HPNA concentrators are easy-to-configure and deploy, and offer a compelling option in terms of cost, performance, scalability and services compared to traditional ATM-based xDSL solutions.

- **Port Mirroring:** HPNA concentrator supports port mirroring for HPNA port, this function can special monitor client side as duplicate mail, Http.....etc, but need to be used with the application software.
- **Speed :** Supports 0.7/1M speed settings.
- **Power Level :** Supports High/Low power level settings.
- **Spanning tree:** Supports IEEE-802.1d spanning tree to avoid loop and MAC bridge with redundant link
- **MAC address filtering:** Supports MAC address filtering security, and MAC learning enable/disable.
- **TFTP Firmware upgrade:** Supports TFTP protocol for remote firmware upgrade using.
- **SNMP:** Supports very strong SNMP function, as RFC-1213 MIBII; RFC-1493 Bridge MIB; RFC-1643 Ether like MIB; RFC-1757 RMON MIB, and support 1,2,3,9 RMON groups.
- **Configuration setting value backup and restore:** Supports setting value backup and restore through TFTP function.
- **Default value setting:** Supports recovery manufacturing setting value function.
- **Remote reboot:** Supports remote reboot machine through HTTP and Telnet.
- **Telnet and console setup time limit:** If on Login setup manual without keying in any words within 10 seconds time period, it will be auto logged out.
- **Preventing Hacker :** To avoid hacker to enter management system through client side, it will filter system IP from client side for preventing hacker attacking.
- **Web browsers:** Supports multiple web browsers: IE/Mozilla/Netscape under WINDOWS O/S, Mozilla & Netscape under Linux O/S.

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1.Unpacking Information

Check List

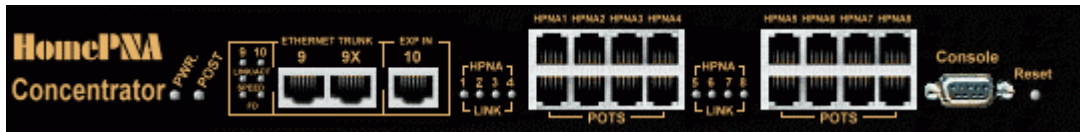
Carefully unpack the package and check its contents against the checklist.

Package Contents

1. 1*8 ports HPNA CONCENTRATOR
 2 x10/100 Base-T N-way Ethernet ports and 8 x 1Mbps
 HPNA ports
2. Users manual CD
3. AC Power Cord
4. 2x Rack Mounting Brackets
5. 4x Screws
6. 4x Plastic feet

Please inform your dealer immediately for any missing, or damaged parts. If possible, retain the carton, including the original packing materials. Use them to repack the unit in case there is a need to return for repair service.

Product Guide



Product Name : 2ports 100 Mbps Fast Ethernet plus 8Ports

HPNA With SNMP Management Concentrator

◆ *Application : MDU/MTU*

Product Features

- ◆ Compliant with HomePNA Ver. 1.1 and IEEE 802.3 and 802.3u
- ◆ Provides 2 x 10/100Mbps Fast Ethernet RJ-45 Ports plus 8 x 1Mbps RJ-45 HPNA ports (Note : Connecting Ethernet equipments to the HomePNA RJ-45 ports(1~8, HomePNA ports) is prohibited. The HomePNA RJ-45 port can connect with both RJ-11 & RJ-45 wires for voice & HomePNA Data Transmission.)
- ◆ Build in POTS/ISDN filter(splitter)
- ◆ Driver power up to 500 meters with 24 gauge phone wire
- ◆ Supports high/low speed select
- ◆ Supports Power Hi/Lo select
- ◆ Supports Port Enable/Disable
- ◆ Supports Link Status
- ◆ Supports Traffic monitor
- ◆ Supports Auto - adjust noise floor
- ◆ Supports IEEE802.1Q Tag V-LAN with 256 groups
- ◆ Supports port base V-LAN
- ◆ Supports protocol base V-LAN
- ◆ Supports IEEE-802.1p QOS
- ◆ Supports IP Multicast / IGMP v1/2 with 512 groups
- ◆ Supports IEEE 802.1d Spanning trees for MAC bridge with redundant link
- ◆ Supports port Mirroring(Sniffer)
- ◆ Supports Broadcast Storm filtering
- ◆ Supports port security with MAC address filtering
- ◆ Supports HPNA client port can't control security for WEB/Telnet management in order to avoid prevent Hacker intrush
- ◆ Supports Web Base and Telnet for remote control access
- ◆ Supports POST(Power On Self Testing) LED

- ◆ Supports SNMP v1 RFC-1493 Bridge MIBs
RFC-1643 Ether like MIBs
RFC-1213 MIB II
- ◆ Supports RMON groups 1(Statistics), 2(Alarm), 3(Event),
9(History)/ RFC-1757
- ◆ Supports back up and restore for setting vlaue
- ◆ Supports Remote reboot
- ◆ Supports TFTP/XMODEM for firmware upgrade
- ◆ Supports In-Band/Out-of-Band Management

Product Specifications :

- Compliant with HomePNA 1.1 / IEEE 802.3 & 802.3u Ethernet Standards
- 10/100Mbps Ethernet ports : 2 x RJ-45
- MDI Ethernet port : 1 x RJ-45
- 1 Mbps symmetrical HPNA port : 8 x RJ-45
- POTS/ISDN Splitter port : 8 x RJ-45
- MAC address table: : 8K Entries
- Switching method : Store-and-forward
- Flow control method by IEEE802.3x for Full Duplex & Back Pressure for Half Duplex
- Compliant with GVRP IEEE 802.1p/q port-base VLAN with 256 groups static
VID or 4094 dynamic VID
- Compliant with IEEE 802.1v protocol-base VLAN classification
- Compliant with IEEE 802.1d Spanning trees
- Multicast IP table : 512 groups
- Compliant with IEEE 802.1p QOS by class of service with 2-level priority queuing
- RS-232 console port : : DB-9Pin Female / 9600bps
- SNMP v1 RFC-1493 Bridge MIBs
RFC-1643 Ether like MIBs
RFC-1213 MIB II
Enterprise MIBs
- Supports RMON groups 1(Statistics), 2(Alarm), 3(Event), 9(History)
- Port security by MAC address filtering
- LED indication : Power On Self Testing LED
Link/Active/Speed/Full Duplex Status for Ethernet port.
Link for HPNA port.

8 PORTS MANAGED HOME PNA CONCENTRATOR USER MANUAL VER. A9

- HPNA Band Pass filter Spectrum :

Transmitter : 5.5 ~ 9.5 MHz

Receiver : 5.5 ~ 9.5 MHz

- POTS/ISDN Low pass filter Spectrum : 0 ~ 1Mhz

- Internal switching power adapter Input : AC 85-265 volts/50-60Hz/1A .

- Dimensions: 435 x 230 x 44 mm

- Weight : About 3 Kgs

- Operating Temperature : 0°C ~ 50°C (32F ~ 122F)

- Storage Temperature : - 20°C ~ 65°C (-4F ~ 149F)

- Humidity : 10%~90% non-condensing

- EMI : FCC, CE Mark

2. General Description

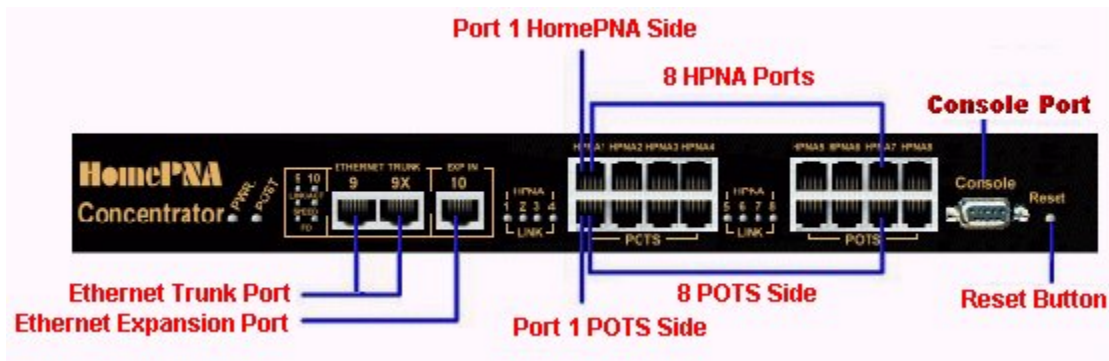
Hardware Description

This section describes the important parts of the Concentrator. It features the front and rear panel drawings showing the LED, connectors, and switches.

Front Panel

The following figure shows the front panel.

Figure Chapter 2.1 Front Panel description



Front panel.

- (1) "PWR.": Power Led light
- (2) "POST": System boot OK Led light
- (3) 2X10/100 Mbps auto-sensing N-way Ethernet ports
- (4) 8X1 Mbps HPNA Ports.
- (5) 8XPOTS Ports.
- (6) RS-232 Console Port
- (7) Reset Button

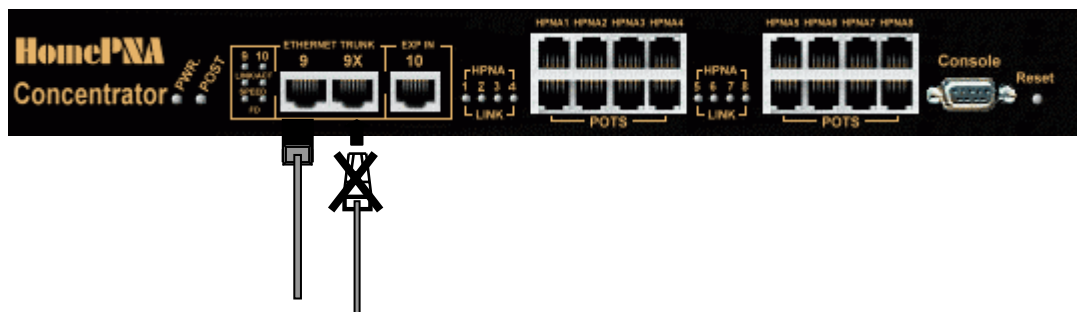
HPNA CONCENTRATOR has embedded Splitter between every HPNA ports and POTS ports. It permits you to delivers broadband service on the same lines as Plain Old Telephone Service (POTS), PBX, ISDN traffic and HPNA Signal.

Several LED indicators for monitoring the device itself, and the network status. At a quick glance of the front panel, the user would be able to tell if the product is receiving power; if it is monitoring another HPNA concentrator; or if a problem exists on the network.

Each port is labeled with a port number.

MDI port labeled with "TX" is shared from port T.
Do not use the same section bearing the markings of T and TX port otherwise, failure will occur.

Figure Chapter 2.2



The "TX" port is used for connecting another hub through an ordinary straight-wired twisted-pair cable by running one end of straight cable to "TX" port and the other end to another HPNA concentrator or hub's station port.

LED Indications

The following describes the function of each LED indicator.

LEDs	Status	Descriptions
PWR. (Power LED)	Steady Green	This LED light is located at the left side on the front panel. It will light up (ON) to show that the product is receiving power. Conversely, no light (OFF) means the product is not receiving power.
POST	Steady	POST(Power On Self Test) POST Led will light to show system is booting now. When system is ready the led will light off.
LINK/ACT (Link LEDs)	Steady Green Flashing	Each RJ45 station port on the Ethernet is assigned an LED light for monitoring port "Good Linkage". Each LED is normally OFF after the power on operation, but will light up steadily to show good linkage. And Flashing to show data transmission.
Speed (Speed 100 LEDs)	Steady Yellow	Indicates that communications have been set 100 Mbps. Each port on the hub is assigned an LED light for 100 Base-TX connecting.
FD (Full-Duplex LEDs LEDs)	Steady Yellow Steady Yellow	Indicates that communications have been set to full-duplex operation for the indicated port The indicator lights up working in Full Duplex And light down working in Half Duplex
LINK	Steady Green	RJ11 LED is lit up to show "Link". The indicator both CO and CPE side connecting OK, and light down which Meaning is no connection.

Rear Panel

The following figure shows the rear panel

Figure Chapter 2.3 Rear Panel



AC Power Socket

The power cord should be plug into this socket. The AC Socket accepts AC power 100 to 240 voltage. 1A.

3. Installation

Hardware Installation

This chapter describes how to install the 8 ports HPNA concentrator. To establish network connection, you may install the HPNA concentrator on any level surface (table, shelf, 19 inch rack or wall mounting). However, please take note of the following minimum site requirements before you begin.

Pre-Installation Requirements

Before you start actual hardware installation, make sure you can provide the right operating environment, including power requirements, sufficient physical space, and proximity to other network devices that are to be connected. Verify the following installation requirement:

- Power requirements: AC 100V to 240 V at 50 to 60 Hz.
The Switching power supply automatically adjusts to the input voltage level.
- The HPNA concentrator should be placed in a cool dry location, with at least 10cm/4 inch of space at the front and back for well ventilation.
- Place the HPNA concentrator out of direct sunlight, and away from heat sources or areas with a high amount of electromagnetic interference.
- Check if network cables and connectors needed for installation are available.

General Rules

Before making any connections to the HPNA concentrator, note the following rules:

Ethernet Port (RJ-45)

All network connections to the concentrator's Ethernet port must be made using Category 5 UTP for 100Mbps and Category 3,4 UTP for 10Mbps.

No more than 100 meters (about 328 feet) of cabling may be use between HPNA concentrator or with HUB or an end node.

- HPNA Port (RJ-11)
All home network connections to the HPNA Port made using 24 ~ 26 Gauge phone wiring.
- We do not recommend using 28 Gauge or above phone line.

Connecting the concentrator

The 8 ports HPNA concentrator has 2 10/100 Mbps N-way ports which support connection to 10Base-T Ethernet or 100Base-TX Fast Ethernet. Support full or half-duplex operation. The transmission mode is using auto-negotiation. Therefore, the devices attached to these ports must support auto-negotiation unless they will always operate at half duplex. If transmissions must run at full duplex, but the attached device does not support auto-negotiation, then you should upgrade this device to a newer version that supports auto-negotiation.

Use "T" port to connect to devices such as a cable modem, server, bridge or router. You can also cascade to another compatible MUX or hub by connecting the UP-Link port to an "MDI" port (e.g., port TX on this switch) on the other device.

Connecting "MDI-X" Station Port

1. You can connect the "T" port on the concentrator to any device that uses a standard network interface such as a Cable modem, ADSL modem, Ethernet Switch, workstation or server, or also to a network interconnection device such as a bridge or router (depending on the port type implemented).
 2. Prepare the network devices you wish to connect. Make sure you have installed suitable HPNA Modem before making a connection to any of the HPNA CONCENTRATOR (1-8) station ports. You also need to prepare 18 ~ 26 gauge one twist pair phone Line wiring with RJ-11 plugs at both ends.
 3. Connect one end of the cable to the RJ-11 port of the Home Access network adapter, and the other end to any available (1~8) station port on the HPNA. Every port supports 1 Mbps connections. When inserting an RJ-11 plug, be sure the tab on the plug clicks into position to ensure that it is properly seated.
- Do not plug a RJ-11 phone jack connector into the Ethernet port (RJ-45 port). This may damage the HPNA. Instead, use only twisted-pair cables with RJ-45 connectors that conform the FCC standards.

Notes:

1. Be sure each twisted-pair cable (RJ-45) is not over by 100 meters (328 feet).
2. RJ-11 port use 18 ~ 26 gauge phone wiring, 28 gauge or above is not recommended.
3. We advise using Category 5 cable for Cable Modem or router connections or to attach to any high bandwidth device to avoid any confusion or inconvenience.

Connecting “MDI” Port (TX)

Prepare straight through shielded or unshielded twisted-pair cables with RJ-45 plugs on both ends. Use 100Ω Category 5 cable for connections. Connect one end of the cable to “TX” port of the concentrator, and the other end to a standard RJ-45 station port on cable modem, ADSL router, wireless bridge, etc. When inserting an RJ-45 plug, be sure the tab on the plug clicks into position to ensure that it is properly seated.

Notes:

Make sure the length of twisted-pair cable is not over by 100 meters (328 feet)

4. Management Configuration

4.1 In-Band Management

Console port (RS-232) Configuration

(Change IP Address By Terminal)

You can configure the product with the local serial console port, If one of the RJ11 port is not in use, you can disable it, that procedure is to connect a notebook computer to the RS-232 port, then boot windows @95/98/ME/2000 system, and run “Hyper-terminal” program into terminal window, and setup step are as follow.



1. Set “Bits per second” at 9600 to the content window.
2. Set “Flow control” at None
3. Connects PC with the concentrator, you will find login manual window on the screen then enter
Login name : **”admin”** ; password : **”123”**
you will find user manual window on the screen of the following :

```

Main Menu
*****

Display and Counter
Switch Static Configuration
Protocol Related Configuration
Reboot Switch
Command Line
Logout

Show the status of the switch.
Tab#Next Item    BackSpace#Previous Item    Enter#Select Item
```

4. Operation Button:

Tab=Next Item ;

BackSpace=Previous Item

Enter=Select Item

5. Set IP Address: Please follow the following steps

- (1) Choose **HPNA concentrator Static Configuration**, you can enter next page



- (2) Choose **Administration Configuration**, you can enter next page



- (3) Choose **IP Configuration** you can enter IP configuration page



- (4) a. Choose **Edit** item to Change IP address, Subnet Mask and Gateway
- b. Use **CTRL+A** button to back actions choice
- c. Choose **Save** item to save change and back to System Configuration page
- d. Choose **Previous Menu** item to quit System Configuration page
- e. Choose **Main Menu** item to quit HPNA concentrator's Configuration page and back to Main Manual
- f. Choose **Reboot HPNA concentrator** item
- g. Choose **Restart** item to reboot your HPNA Concentrator.

4.2 Remote Network Management

4.2.1 IP Setting

You must setup the “IP Address” with the local serial console port (RS-232 Port), and then you can use this IP address to control this HPNA Concentrator by **Telnet** and **WEB**. Or you can change your computer’s IP domain same with HPNA concentrator. Then use the default IP address to control this HPNA concentrator.

一、 Remote control by “Telnet”

To enter Telnet, type the IP address of the HPNA concentrator to connect management system. And type User name and password.

Default User Name: admin

Default Password: 123

Note:

1. For security reason, we limit the user login number on Telnet and Console port. So you can't login Telnet and Console port in the same time. But you can login Telnet and Console port in the different time, if you login in Consol manual, But without key in any word 10 second period, system will be auto logo out.
2. WEB Login don't limit user login numbers.
When you want to close console port control you must logout to leave.
Otherwise you can't login by Telnet.

二、 Network control by “WEB”

4.2.2 Web Management Function

1. Provide a Web browser to manage and monitor the switch, the default values as follows:

If you need change IP address in first time, you can use console mode to modify it.

IP Address: 192.168.16.250

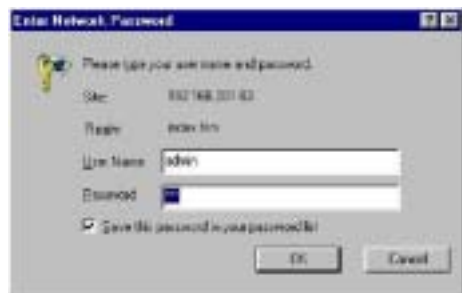
Subnet Mask: 255.255.255.0

Default Gateway: 192.168.16.1

User Name: admin

Password: 123

2. You can browse [http:// 192.168.16.250](http://192.168.16.250), type user name and password as above.



4.2.2-1. Web Management Home Overview

This is HPNA Home Page.



4.2.2-2. Port status

1. This page can see every port status

State: Display port status disable or enable, disable is unlink port, enable is link port.

Link Status: Down is "No Link", UP is "Link"

Auto Negotiation: Switch auto negotiation mode

Speed status: Port 9、10 are 10/100Mbps or and Port 1- 8 are 1Mbps,

Configure: Display the state of user setup,

Actual: Display the negotiation result.

Duplex status: Display full-duplex or half-duplex mode.

Configure: Display the user setup,

Actual: Display the negotiation result.

Flow control: Display flow control status enable or disable mode



Port Status

The following information provides a view of the current status of the unit.

Port Num	State		Link Status	Power Level		Speed Status		Duplex Status		Flow Control	
	Config	Actual		Config	Actual	Config	Actual	Config	Actual	Config	Actual
1	On	On	Up	Low	Low	0.7/1	1	Half	Half	On	On
2	On	On	Up	Low	Low	0.7/1	1	Half	Half	On	On
3	On	On	Up	Low	Low	0.7/1	1	Half	Half	On	On
4	On	On	Up	Low	Low	0.7/1	1	Half	Half	On	On
5	On	On	Up	Low	Low	0.7/1	1	Half	Half	On	On
6	On	On	Up	Low	Low	0.7/1	1	Half	Half	On	On
7	On	On	Up	Low	Low	0.7/1	1	Half	Half	On	On
8	On	On	Up	Low	Low	0.7/1	1	Half	Half	On	On
9	On	On	Up	----	----	10/100	100	Full	Full	On	Off
10	On	On	Up	----	----	10/100	100	Full	Full	On	On

User can see single port counter as follows

Port	9
State	On
Link	Up
TxGoodPkt	3537
TxBadPkt	0
RxGoodPkt	2603
RxBadPkt	0
TxAbort	0
Collision	0
DropPkt	85

4.2.2-3. Port Statistics

1. The following information provides a view of the current status of the unit.

Port Statistics

The following information provides a view of the current status of the unit.

Port	State	Link	TxGoodPkt	TxBadPkt	RxGoodPkt	RxBadPkt	TxAbort	Collision	DropPkt
1	On	Up	66508336	0	513162	345	0	1001917	446
2	On	Up	66334976	0	627738	352	0	1071288	754
3	On	Up	66258448	0	604440	219	0	1107206	454
4	On	Up	66212805	0	620949	361	0	1040092	1069
5	On	Up	66467958	0	596199	364	0	1025448	1294
6	On	Up	66203127	0	608666	366	0	1029071	1432
7	On	Up	66327459	0	558936	374	0	1013501	1650
8	On	Up	64039338	0	763082	1169	0	6492082	1795
9	On	Up	4910012	0	898347174	0	0	0	369512442
10	On	Up	1047438	0	25903	0	0	0	3577

4.2.2-4. Administrator

There are many management function, include:

IP address

Switch setting

Console port information

Port controls

Link aggregation

Filter database

VLAN configuration

Spanning tree

SNMP

Security Manager

System Manager

Configuration backup

Reset system and reboot

4.2.2-4-1. IP Address

1. User can configure the IP Settings and fill in the new value, than clicks apply button.
2. User must be reset switch and use new IP address to browser this web management.

IP Address	192.168.16.116
Subnet_Mask	255.255.255.0
Gateway	192.168.16.1

Apply	Help
-------	------

Default IP is 192.168.16.250

4.2.2-4-2. Switch Setting

2-4-2-1. Basic

1. **Description:** Display the device type of name.
2. **MAC Address:** The unique hardware address assigned by manufacturer
3. **Firmware Version:** Display the switch's firmware version.
4. **Hardware Version:** Display the switch's Hardware version.
5. **Default config value version:** Display write to default eeprom value tale version.

Switch Settings



Basic	Advanced
Description	Intelligent 8+2E HPNA Switch
MAC Address	00056e020045
Firmware version	B.1
Hardware version	A.2
Default config value version	v26.00

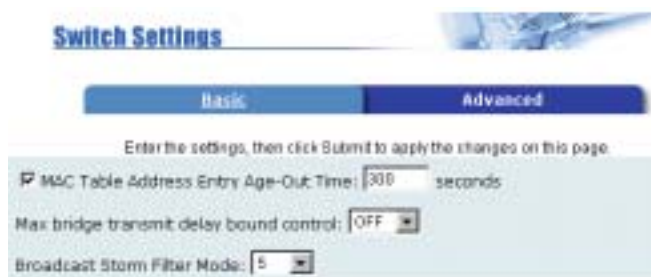
2-4-2-2.Advanceed

Miscellaneous Setting :

MAC Address Age-out Time: Type the number of seconds that an inactive MAC address remains in the switch's address table. The valid range is 300~765 seconds. Default is 300 seconds.

Max bridge transit delay bound control : Limit the packets queuing time in switch. If enable, the packets queued exceed will be drop. This valid value are 1sec, 2 sec, 4 sec and off. Default is 2 seconds.

Broadcast Storm Filter: To configure broadcast storm control, enable it and set the upper threshold for individual ports. The threshold is the percentage of the port's total bandwidth used by broadcast traffic. When broadcast traffic for a port rises above the threshold you set, broadcast storm control becomes active. The valid threshold value are 5%, 10%, 15%, 20%, 25% and off.



Priority Queue Service settings:

First Come First Service: The sequence of packets sent is depend on arrive order.

All High before Low: The high priority packets sent before low priority packets.

Weighted Round Robin: Select the preference given to packets in the switch's high-priority queue.

These options represent the number of high priority packets sent before one low priority packet is sent. For example,5 High : 2 Low means that the switch sends 5 high priority packets before sending 2 low priority packet.

Enable Delay Bound: Limit the low priority packets queuing time in switch. Default Max Delay Time is 255ms. If the low priority packet stays in switch exceed Max Delay Time, it will be sent. The valid range is 1~255 ms.

NOTE: Make sure of "Max bridge transit delay bound control" is enabled before enable Delay Bound, because Enable Delay Bound must be work under "Max bridge transit delay bound control is enabled" situation.

Qos Policy: High Priority Levels: 0~7 priority level can map to high or low queue.

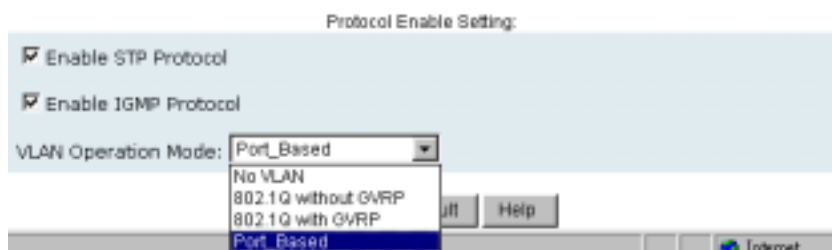


Protocol Enable Setting :

Enable Spanning Tree Protocol : Default recommend to enable STP

Enable Internet Group Multicast Protocol: enable IGMP protocol

VLAN Protocol: 802.1Q(Port_Based) without GVRP VLAN mode



GVRP (GARP [Generic Attribute Registration Protocol] VLAN Registration Protocol)

GVRP allows automatic VLAN configuration between the switch and nodes. If the switch is connected to a device with GVRP enabled, you can send a GVRP request using the VID of a VLAN defined on the switch, the switch will automatically add that device to the existing VLAN.

4.2.2-4-3. Console Port Information

1. Console is a standard UART interface to communicate with Serial Port.

User can use windows HyperTerminal program to link the switch. Connect To->Configure

Bits per seconds: 9600

Data bits: 8

Parity: none

STOP BITS: 1

Flow control: none

4.2.2-4-4. HPNA Speed Control and port Enable/Disable

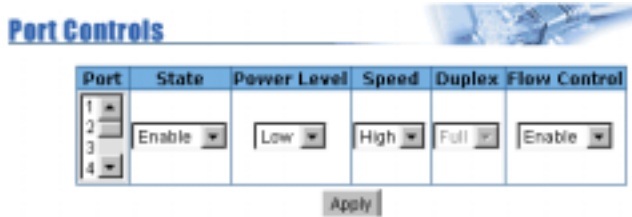
This page can Change every port status and speed mode

State: You can disable or enable HPNA port control

Speed: You can change HPNA Speed modes by 0.7Mbps, 1Mbps

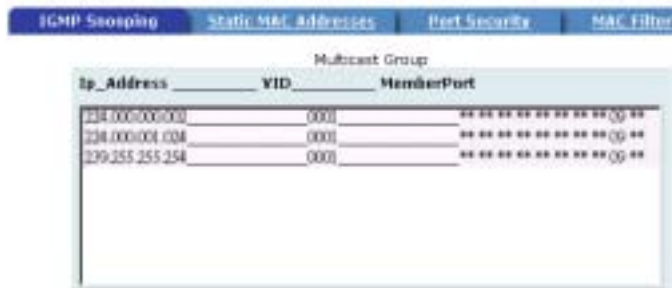
Change Speed procedure:

- a. Confirm the HPNA port is linking which you want change speed mode.
- b. Make sure HPNA port has been connecting to HPNA Modem and Link up OK.
- c. Select the port
- d. Select the speed mode(High is 1Mbps, Low is 0.7Mbps)
- e. Click "Apply"
- f. HPNA port will link up again during the new speed mode.



4.2.2-4-6. Filter Database

2-4-6-1. IGMP Snooping



The HPNA CONCENTRATOR supports IP multicast , you can enable IGMP protocol on web management's switch setting advanced page, then display the IGMP snooping information in this page, you can view difference multicast group ,VID and member port in here, IP multicast addresses range from 224.0.0.0 through 239.255.255.255.

The Internet Group Management Protocol (IGMP) is an internal protocol of the Internet Protocol (IP) suite.

IP manages multicast traffic by using switches, routers, and hosts that support IGMP. Enabling IGMP allows the ports to detect IGMP queries and report packets and manage IP multicast traffic through the switch. IGMP have three fundamental types of message as follows:

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Message	Description
Query	A message sent from the queries (IGMP router or switch) asking for a response from each host belonging to the multicast group.
Report	A message sent by a host to the queries to indicate that the host wants to be or is a member of a given group indicated in the report message.
Leave Group	A message sent by a host to the queries to indicate that the host has quit to be a member of a specific multicast group.

2-4-6-2. Static MAC Address

Static addresses currently defined on the switch are listed below.
Click Add to add a new static entry to the address table.

MAC Address	PORT

MAC Address

Port Num

Vlan ID

When you add a static MAC address, it remains in the switch's address table, regardless of whether the device is physically connected to the switch. This saves the switch from having to re-learn a device's MAC address when the disconnected or powered-off device is active on the network again.

1. To add a static MAC address
2. From the main menu, click administrator, then click Filter Database.
3. Click Static MAC Addresses. In the MAC address box, enter the MAC address to and from which the port should permanently forward traffic, regardless of the device's network activity.
4. In the Port Number box, select a port number.
5. If tag-based (IEEE 802.1Q) VLANs are set up on the switch, static addresses are associated with individual VLANs. Type the VID (tag-based VLANs) to associate with the MAC address.
6. Click add

2-4-6-3. Port Security

Port	Enable Security (disable for MAC Learning)	Port	Enable Security (disable for MAC Learning)
1	<input type="checkbox"/>	6	<input type="checkbox"/>
2	<input type="checkbox"/>	7	<input type="checkbox"/>
3	<input type="checkbox"/>	8	<input type="checkbox"/>
4	<input type="checkbox"/>	9	<input type="checkbox"/>
5	<input type="checkbox"/>	10	<input type="checkbox"/>

A port in security mode will be “locked” without permission of address learning. Only the incoming packets with SMAC already existing in the address table can be forwarded normally. User can disable the port from learning any new MAC addresses, then use the static MAC

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addresses screen to define a list of MAC addresses that can use the secure port. enter the settings, then click Submit to apply the changes on this page.

2-4-6-4. MAC filtering

Specify a MAC address to filter.



The image shows a web-based configuration form for MAC filtering. At the top, there is a large vertical text input field labeled "MAC Address". Below this, there are two smaller horizontal text input fields: "Mac Address" and "Vlan ID". The "Vlan ID" field contains the text "N/A". At the bottom of the form, there are three buttons: "Add", "Delete", and "Help".

MAC address filtering allows the switch to drop unwanted traffic. Traffic is filtered based on the destination addresses. For example, if your network is congested because of high utilization from one MAC address, you can filter all traffic transmitted from that MAC address, restoring network flow while you troubleshoot the problem.

4.2.2-4-7. VLAN configuration

A Virtual LAN (VLAN) is a logical network grouping that limits the broadcast domain. It allows you to isolate network traffic so only members of the VLAN receive traffic from the same VLAN members. Basically, creating a VLAN from a switch is logically equivalent of reconnecting a group of network devices to another Layer 2 switch. However, all the network devices are still plug into the same switch physically.

The HPNA SWITCH support port-based and protocol-base VLAN in web management page, In the default configuration, VLAN support is enable and all ports on the switch belong to default VLAN, VID is 1.

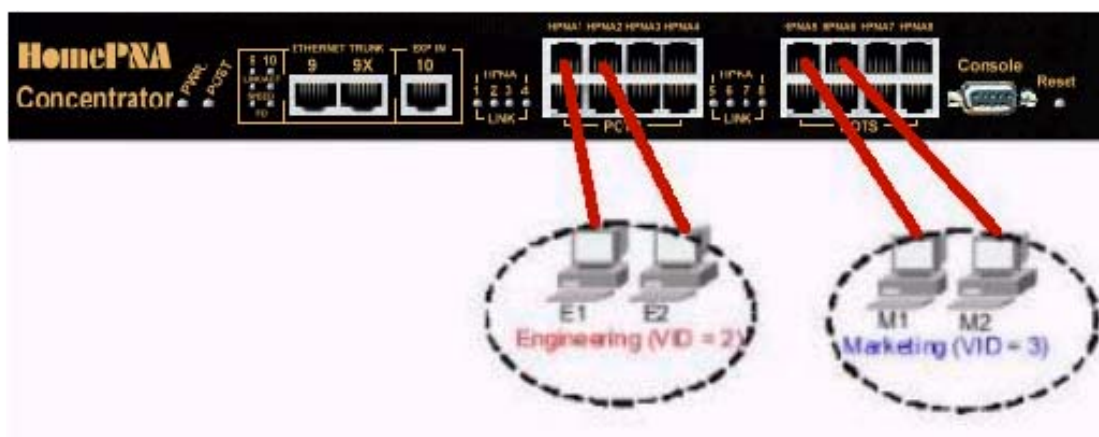
Support Tagging-based VLANs (IEEE 802.1Q VLAN)

Port-based Tagging rule VLAN is an IEEE 802.1Q specification standard. Therefore, it is possible to create a VLAN across devices from different switch vendors. IEEE 802.1Q VLAN uses a technique to insert a “tag” into the Ethernet frames. Tag contains a VLAN Identifier (VID) that indicates the VLAN numbers.

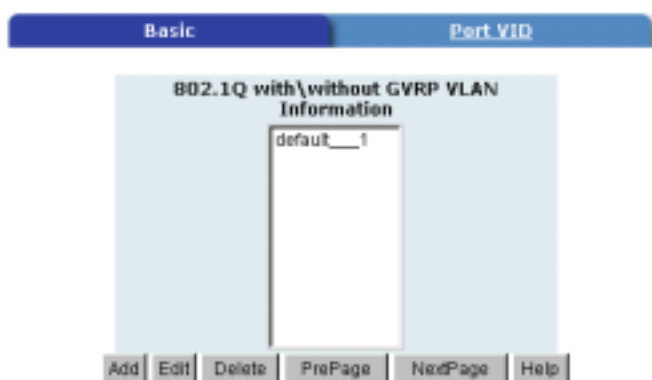
Support Protocol-based VLAN

In order for an end station to send packets to different VLANs, it itself has to be either capable of tagging packets it sends with VLAN tags or attached to a VLA N-aware bridge that is capable of classifying and tagging the packet with different VLAN ID based on not only default PVID but also other information about the packet, such as the protocol.

HPNA CONCENTRATOR will support protocol-based VLAN classification by means of both built-in knowledge of layer 2 packet formats used by selected popular protocols, such as Novell IPX and AppleTalk’s EtherTalk, and some degree of programmable protocol matching capability.



2-4-7-1. Basic



Create a VLAN and add tagged member ports to it.

1. From the main menu, click administrator -- VLAN configuration.
2. Click Add
3. Type a name for the new VLAN.
4. Type a VID (between 2-4094). The default is 1.
5. From the Available ports box, select ports to add to the switch and click Add.
6. Click Apply

2-4-7-2. Port VID

Basic				Port VID			
Assign a Port VLAN ID (1~4094) for untagged traffic on each port, then click Submit to apply the changes on this page.							
No.	PVID	Ingress Filtering 1	Ingress Filtering 2	NO	PVID	Ingress Filtering 1	Ingress Filtering 2
1	1	Enable ▾	Disable ▾	6	1	Enable ▾	Disable ▾
2	1	Enable ▾	Disable ▾	7	1	Enable ▾	Disable ▾
3	1	Enable ▾	Disable ▾	8	1	Enable ▾	Disable ▾
4	1	Enable ▾	Disable ▾	9	1	Enable ▾	Disable ▾
5	1	Enable ▾	Disable ▾	10	1	Enable ▾	Disable ▾
<p>Ingress Filtering Rule 1 (Forward only packets with VID matching this port's configured VID)</p> <p>Ingress Filtering Rule 2 (Drop Untagged Frame)</p>							
<input type="button" value="Apply"/> <input type="button" value="Default"/> <input type="button" value="Help"/>							

Configure port VID settings

From the main Tag-based (IEEE 802.1Q) VLAN page, click Port VID Settings.

Port VID (PVID)

Sets the Port VLAN ID that will be assigned to untagged traffic on a given port. For example, if port 10's Default PVID is 100, all untagged packets on port 10 will belong to VLAN 100. The default setting for all ports is VID 1.

This feature is useful for accommodating devices that you want to participate in the VLAN but that don't support tagging. Only one untagged VLAN is allowed per port.

Ingress Filtering

Ingress filtering lets frames belonging to a specific VLAN to be forwarded if the port belongs to that VLAN.

HPNA SWITCH have two ingress filtering rule as follows :

Ingress Filtering Rule 1 :Forward only packets with VID matching this port's configured VID

Ingress Filtering Rule 2 :Drop Untagged Frame

4.2.2-4-8. Spanning Tree

The Spanning-Tree Protocol (STP) is a standardized method (IEEE 802.1d) for avoiding loops in switched networks. When STP enabled, to ensure that only one path at a time is active between any two nodes on the network.

You can enable Spanning-Tree Protocol on web management's switch setting advanced item, select enable Spanning-Tree protocol. We are recommended that you enable STP on all switches ensures a single active path on the network.

- 1. You can view spanning tree information about the Root bridge. such as follow screen.**

Root Bridge Information

Priority	32768
Mac Address	004063800030
Root_Path_Cost	0
Root Port	we are root
Max Age	20
Hello Time	2
Forward Delay	15

- 2. You can view spanning tree status about the switch . such as follow screen.**

STP Port Status

PortNum	PathCost	Priority	PortState
1	10	128	DISABLED
2	10	128	DISABLED
3	10	128	DISABLED
4	10	128	DISABLED
5	10	128	DISABLED
6	10	128	DISABLED
7	10	128	DISABLED
8	10	128	DISABLED
9	10	128	FORWARDING
10	10	128	DISABLED

3. You can setting new value for STP parameter , then click set Applybutton to modify .

Configure Spanning Tree Parameters

Priority (1-65535)	<input type="text" value="32768"/>
Max Age (6-40)	<input type="text" value="20"/>
Hello Time (1-10)	<input type="text" value="2"/>
Forward_Delay_Time(4-30)	<input type="text" value="15"/>

Parameter	Description
Priority	You can change priority value, A value used to identify the root bridge. The bridge with the lowest value has the highest priority and is selected as the root. Enter a number 1 through 65535.
Max Age	You can change Max Age value, The number of seconds a bridge waits without receiving . Spanning-Tree Protocol configuration messages before attempting a reconfiguration. Enter a number 6 through 40.
Hello Time	You can change Hello time value, the number of seconds between the transmission of Spanning-Tree Protocol configuration messages. Enter a number 1 through 10.
Forward Delay time	You can change forward delay time, The number of seconds a port waits before changing from its Spanning-Tree Protocol learning and listening states to the forwarding state. Enter a number 4 through 30.

4.The following parameter can be configured on each port , click set Apply button to modify .

Configure Spanning Tree Port Parameters

Port Number	Priority (0 - 255; Default 128)	Path Cost (1 - 65535; Default 10)
<input type="button" value="1"/> ▲ <input type="button" value="2"/> <input type="button" value="3"/> <input type="button" value="4"/> <input type="button" value="5"/> ▼	<input type="text" value="128"/>	<input type="text" value="10"/>

Parameter	Description
Port Priority	You can make it more or less likely to become the root port, the rage is 0-255,default setting is 128 the lowest number has the highest priority. If you change the value, you must reboot the switch.
Path Cost	Specifies the path cost of the port that switch uses to determine which port are the forwarding ports the lowest number is forwarding ports, the rage is 1-65535 and default value base on IEEE802.1D 10Mb/s = 50-600 100Mb/s = 10-60 1000Mb/s = 3-10 If you change the value, you

	must reboot the switch.
--	-------------------------

4.2.2-4-9. Port Sniffer

The Port Sniffer is a method for monitor traffic in switched networks. Traffic through ports can be monitored by one specific port. That is, traffic goes in or out monitored ports will be duplicated into sniffer port.

Roving Analysis State: Enable or disable the port sniffer function.

Analysis Port: Analysis port can be used to see all monitor port traffic. You can connect sniffer port to Lan Analysis, Session Wall or Netxray.

Monitor Ports: The ports you want to monitor. All monitor port traffic will be copied to sniffer port. You can select max 9 monitor ports in the switch. If you want to disable the function, you must select monitor port to none.

Monitor Rx: Monitored receive frames from the port.

Monitor Tx: Monitored send frames from the port.

Roving Analysis State:	DISABLE ▾	
Analysis Port:	None ▾	
Monitor Ports	Monitor Rx	Monitor Tx
1	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>
9	<input type="checkbox"/>	<input type="checkbox"/>
10	<input type="checkbox"/>	<input type="checkbox"/>
Apply	Default	Help

4.2.2-4-10. SNMP

Any Network Management running the simple Network Management Protocol (SNMP) can management the switch, Provided the Management Information Base (MIB) is installed correctly on the management station. The SNMP is a Protocol that governs the transfer of information between management and agent. The HPNA CONCENTRATOR supports SNMP V1.

1. Use this page to define management stations as trap managers and to enter SNMP community strings. User can also define a name, location, and contact person for the switch. Fill in the system options data, and then click Apply to update the changes on this page

Name: Enter a name to be used for the switch.

Location: Enter the location of the switch.

Contact: Enter the name of a person or organization.

System Options

Name :	<input type="text"/>
Location :	<input type="text"/>
Contact :	<input type="text"/>

2. Community strings serve as passwords and can be entered as one of the following:

Community Strings

Current Strings :	<input type="button" value="Add"/>	New Community String :
<input type="text" value="public__RO"/>	<input type="button" value="Remove"/>	String : <input type="text"/>
		<input checked="" type="radio"/> RO <input type="radio"/> RW

Read only: Enables requests accompanied by this string to display MIB-object information.

Read write: Enables requests accompanied by this string to display MIB-object information and to set MIB objects.

3. Trap Manager

Trap Managers

Current Managers : (none)	New Manager : IP Address : <input type="text"/> Community : <input type="text"/>
<input type="button" value="Remove"/>	<input type="button" value="Add"/>

A trap manager is a management station that receives traps, the system alerts generated by the switch. If no trap manager is defined, no traps are issued. Create a trap manager by entering the IP address of the station and a community string.

Enterprise MIB contains two traps:

- a. When HPNA concentrator's internal temperature is greater than 70°C, system will send a "Temperature alarm" trap.
- b. When HPNA concentrator's internal cooling FAN doesn't run, the system will send a "FAN speed alarm" trap.

4.2.2-4-11. Security Manager

1. Use this page; user can change web management user name and password.

User name: Admin

Password: 123

Security Manager

User Name:	<input type="text" value="admin"/>
Assign/Change password:	<input type="password" value="***"/>
Reconfirm password:	<input type="password" value="***"/>
	<input type="button" value="Apply"/>

4.2.2-4-12. TFTP Update Firmware

1. The following menu options provide some system control functions to allow a user to update firmware and remote boot switch system:

- * Install TFTP Turbo98 and execution.
- * Copy firmware update version image.bin to TFTP Turbo98 directory.
- * In web management select administrator—TFTP update firmware.
- * Download new image.bin file then in web management press <update firmware>.

TFTP Download New Image



TFTP Server IP Address	<input type="text" value="192.168.223.99"/>
Firmware File Name	<input type="text" value="image.bin"/>

4.2.2-4-13. Configuration Backup

2-4-13-1. TFTP Restore Configuration

TFTP Configuration



TFTP Restore Configuration **TFTP Backup Configuration**

TFTP Server IP Address	<input type="text" value="192.168.223.99"/>
Backup File Name	<input type="text" value="flash.dat"/>

Use this page to set tftp server address. You can restore EEPROM value from here, but you must put back image in tftp server, switch will download back flash image.

2-4-13-2. TFTP Backup Configuration

TFTP Configuration



TFTP Restore Configuration **TFTP Backup Configuration**

TFTP Server IP Address	<input type="text" value="192.168.223.99"/>
Backup File Name	<input type="text" value="flash.dat"/>

Use this page to set tftp server ip address. You can save current EEPROM value from here, then go to the TFTP restore configuration page to restore the eeprom value.

4.2.2-4-14. Reset System

Reset HPNA concentrator to default configuration

4.2.2-4-15. Reboot

Reboot the HPNA concentrator in software reset

5. Applications

The HPNA provides home network architecture. Transforming an apartment into a Multiple-Family Home network area, sharing a single internet account for multiple users via Router & Cable Modem, it can provide unlimited access time in the internet at a reasonable low price.

Bridging Functions – The 8 ports HPNA concentrator provides full transparent bridging function. It automatically connects node addresses, that are later used to filter and forward all traffic based on the destination address. When traffic passes between devices attached to the shared collision domain, those packets are filtered from the HPNA concentrator. But when traffic must be passed between unique segments (i.e., different ports of the HPNA concentrator), a temporary link is set up between the HPNA concentrator's port in order to pass this traffic, via the high-speed HPNA fabric.

Transceiver function

The 8 ports HPNA concentrator supports Ethernet to HPNA convert, It can be transmit or receive packet from Ethernet port to the RJ11 port. Or HPNA port to Ethernet port.

Flexible Configuration–The HPNA concentrator is not only designed to segment your network, but also to provide a wide range of options in the configuration of Home network connections. It can be used as a simple stand-alone HPNA concentrator; or can be connected with another HPNA concentrator, Cable modem, Router, XDSL, ISDN, gateway or other network interconnection devices in various configurations. Some of the common applications of the HPNA concentrator are described in the next page.

Used as apartment for Internet access

The HPNA concentrator provides a high speed, 1Mbps transmission over existing home telephone wiring over a single Internet account to provide simultaneous independent Internet access to multiple users.

No matter ISDN Telephone system or POTS Telephone system you are. HPNA Technology let you can use telephone system and HPNA network system in the same time.

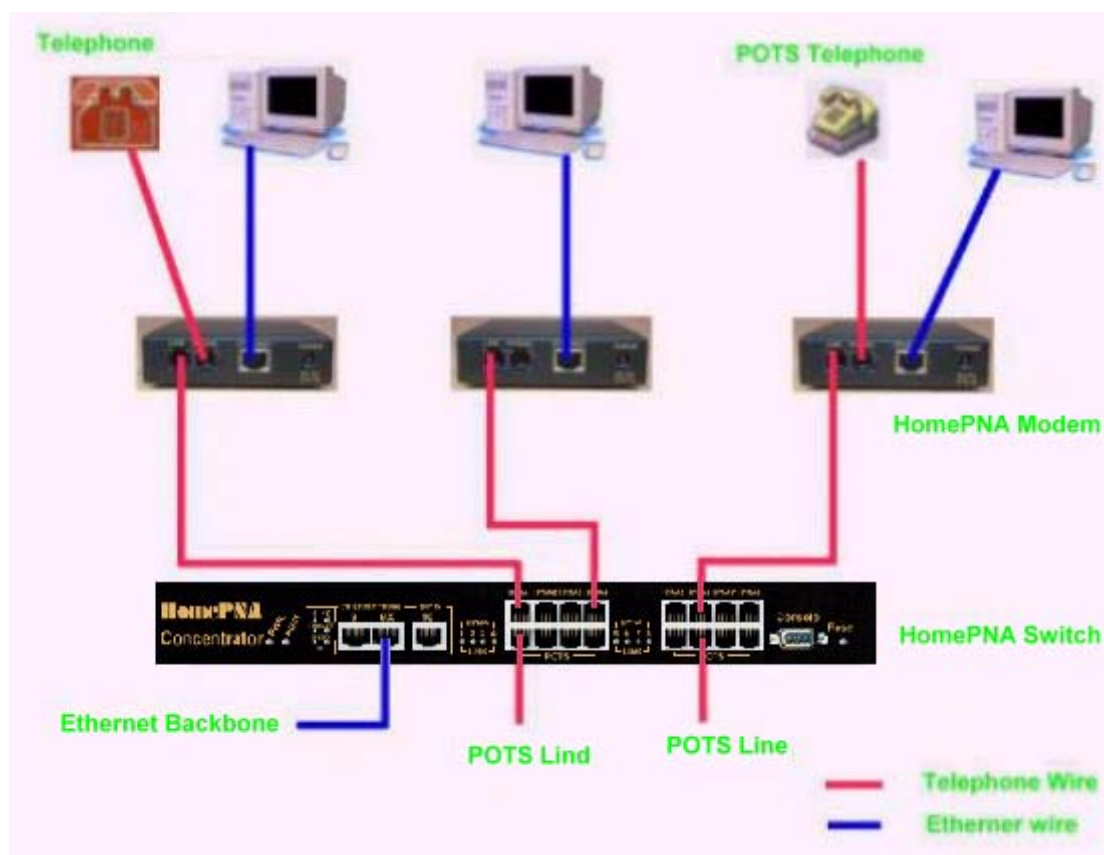


Figure Chapter 4.1

Application for Sharing a single internet account

If multiple users would like to share a single internet account using the HPNA concentrator, which is to be connected to a IP sharing device, then to a xDSL or Cable Modem.

Note:

For network applications that actually require Router (e.g., Interconnecting dissimilar network types), attaching the HPNA concentrator directly to a router can significantly improve overall home networking performance.

High bandwidth backbone ready

The concentrator provides 10/100Mbps auto sensing for external trunk device (Fiber optics, Wireless Bridge, xDSL & other WAN services)

Appendix A: Troubleshooting

Diagnosing HPNA Indicators

The HPNA can be easily monitored through its comprehensive panel indicators. These indicators assist the network manager in identifying problems the 8 ports HPNA concentrator may encounter. This section describes common problems you may encounter and possible solutions

1. **Symptom:** POWER indicator does not light up (green) after power on.

Cause: Defective power outlet, power cord, internal power supply

Solution: Check the power outlet by trying another outlet that is functioning properly. Check the power cord with another device. If these measures fail to resolve the problem, have the unit power supply replaced by a qualified distributor.

2. **Symptom:** Link indicator does not light up (green) after making a connection.

Cause: Network interface (e.g., a network adapter card on the attached device), network cable, or switch port is defective.

Solution: 2.1 Verifies the switch and attached device are powered on.

2.2 Be sure the cable is plug into both the switch and corresponding device.

2.3 Verify that the proper cable type is used and its length does not exceed specified limits.

2.4 Check the adapter on the attached device and cable connections for possible defects.

2.5 Replace the defective adapter or cable if necessary.

3. **Symptom:** I had a HPNA link and the data transmission was OK. A After disconnection & change another port, I got link OK, but data is not transmitted.

Solution: This phenomenon is not a problem, due to this concentrator is designed base on Ethernet switch technologies, as you power on the first time, a MAC learning function will get each port's MAC address, and create a MAC table. That will keep one port to match one MAC address, if you change port or PC, will be cause MAC learning & data transmitting failures, unless to restart the HPNA concentrator or await several minutes (aging time) to clear MAC address.

4. **Symptom:** I cannot control the management of the concentrator from HPNA converter(CPE) side/port.

Solution: This phenomenon is not a problem, it is to prevent client side to enter concentrator's management web page to modify any settings. The administrator can only access to the concentrator's management web page via concentrator's Ethernet ports(9 & 10).

5. **Symptom:** Router hang-up

Case: User uses P2P download AP

Solution: Most of SOHO Routers just support session numbers between 1024 ~ 2048, if you encounter with E-Donkey download AP, due to insufficient session numbers, it will cause Router to hang-up or some users cannot enjoy internet service, you must change a Router with higher session numbers to overcome that,

System Diagnostics

Power and Cooling Problems

If the POWER indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply as explained in the previous section. However, if the unit should turn itself off after running for a while, check for loose power connections, power losses or surges at the power outlet, and verify that the fan on back of the unit is unobstructed and running prior to shutdown. If you still cannot isolate the problem, then the internal power supply may be defective. In this case, contact your supplier for assistance.

Installation

Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (e.g., the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

Transmission Mode

The selections of the transmission mode for the RJ-45 ports are auto-negotiation using the default method. Therefore, if the Link signal is disrupted (e.g., by unplugging the network cable and plugging it back in again, or by resetting the power), the port will try to reestablish communications with the attached device via auto-negotiation. If auto-negotiation fails, then communications are set to half duplex by default. Based on this type of industry-standard connection policy, if you are using a full-duplex device that does not support auto-negotiation, communications can be easily lost (i.e., reset to the wrong mode) whenever the attached device is reset or experiences a power fluctuation. The best way to resolve this problem is to upgrade these devices to version that will support auto-negotiation.

Cabling

1. Verify that the cable type is correct. Be sure RJ-45 cable connectors are securely seated in the required ports. Use 100Ω straight-through cables for all standard connections. Use Category 5 cable for

100Mbps Fast Ethernet connections, or Category 3, 4 or 5 cables for standard 10Mbps Ethernet connections. Be sure RJ-11 phone wiring, use 18~26 gauge.

2. Make sure all devices are connected to the network. Equipment any have been unintentionally disconnected from the network.
3. When cascading two devices using RJ-45 station ports at both ends of the cable (i.e., not an MDI port), make sure a crossover cable is used. Crossover cable should only be used if a MDI port is not available.

Physical Configuration

If problems occur after altering the network configuration, restore the original connections, and try to track the problem down by implementing the new changes, one step at a time. Ensure that cable distances and other physical aspects of the installation do not exceed recommendations

System Integrity

As a last resort verify the switch integrity with a power-on reset. Turn the power to the switch off and then on several times. If the problem still persists and you have completed all the preceding diagnoses, contact your dealer for assistance.

Appendix B: V-LAN Set up sample

Web management → Administrator → Switch settings → Advanced:
protocol setting → VLAN Operation Mode: Select “Port_Based”

The screenshot shows a configuration page with the following elements:

- WRR: High weight: weight:
- Enable Delay Bound: Max Delay Time: ms
- QoS Policy: High Priority Levels
- Level0 Level1 Level2 Level3 Level4 Level5 Level6 Level7
- Protocol Enable Setting:
 - Enable STP Protocol
 - Enable IGMP Protocol
- VLAN Operation Mode:
- Buttons: Apply, Default, Help

Web management → Administrator → Switch settings → Vlan Configuration:

VLAN Configuration

The screenshot shows a table titled "Port_based VLAN Information" with a single empty row. Below the table are navigation buttons: Add, Edit, Delete, PrePage, NextPage, and Help.

Add VLAN Group 1, member: port 1 and port 9

The screenshot shows a web-based configuration interface for VLANs. At the top, there are two input fields: "VLAN Name:" with the value "1" and "Grp ID:" with the value "1". Below these are two vertical lists of port numbers. The left list contains ports 2, 3, 4, 5, 6, 7, 8, and 10. The right list contains ports 1 and 9. Between the lists are two buttons: "Add >>" and "<< Remove". At the bottom of the interface are two buttons: "Apply" and "Help".

FCC Warning

This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning

This is a CE class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Warranty

The original owner that the product delivered in this package will be free from defects in material and workmanship for one year parts after purchase.

There will be a minimal charge to replace consumable components, such as fuses, power transformers, and mechanical cooling devices. The warranty will not apply to any products which have been subjected to any misuse, neglect or accidental damage, or which contain defects which are in any way attributable to improper installation or to alteration or repairs made or performed by any person not under control of the original owner.

THE ABOVE WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY WARRANTY ARISING OUT OF ANY PROPOSAL, SPECIFICATION, OR SAMPLE. SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. WE NEITHER ASSUMES NOR AUTHORIZES ANY PERSON TO ASSUME FOR IT ANY OTHER LIABILITY.

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