VC-450LR
Managed Industrial VDSL2 CO/CPE Modem.
USER'S MANUAL

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Safety Warnings

For your safety, be sure to read and follow all warning notices and instructions before using the device.

- **DO NOT** open the device or unit. Opening or removing the cover may expose you to dangerous high voltage points or other risks. ONLY qualified service personnel can service the device. Please contact your vendor for further information.

- **Use ONLY** the dedicated power supply for your device. Connect the power to the right supply voltage (110V AC used for North America and 230V AC used for Europe. VC-450 supports 12 to 48 VDC dual power input (Redundant power)).
- **Place** connecting cables carefully so that no one will step on them or stumble over them. DO NOT allow anything to rest on the power cord and do NOT locate the product where anyone can work on the power cord.
- **DO NOT** install nor use your device during a thunderstorm. There may be a remote risk of electric shock from lightning.
- **DO NOT** expose your device to dampness, dust or corrosive liquids.
- **DO NOT** use this product near water, for example, in a wet basement or near a swimming pool.
- **Connect ONLY** suitable accessories to the device.
- **Make sure** to connect the cables to the correct ports.
- **DO NOT** obstruct the device ventilation slots, as insufficient air flow may harm your device.
- **DO NOT** place items on the device.
- **DO NOT** use the device for outdoor applications directly, and make sure all the connections are indoors or have waterproof protection place.
- **Be careful** when unplugging the power, because it may produce sparks.
- **Keep** the device and all its parts and accessories out of the reach of children.
- **Clean** the device using a soft and dry cloth rather than liquid or atomizers. Power off the equipment before cleaning it.
- This product is **recyclable**. Dispose of it properly.

Attention:

Be sure to read this manual carefully before using this product. Especially Legal Disclaimer, Statement of Conditions and Safety Warnings.

VC-450LR is a Managed Single Master/Slave LAN Extender that leverages the extraordinary bandwidth promise of VDSL2 technology (max. 100Mbps symmetric), the next step in the delivery of new high-speed Internet applications in Industrial-grade environments. Quick, easy, economical to install and maintain, the VC-450LR works over existing copper wire infrastructure. VC-450LR is a Master(CO side) device. And also can switch as Slave(CPE side) by web config menu.
VC-450LR will allow operators worldwide to compete with cable andsatellite operators by offering services such as HDTV, VOD, videoconferencing, high speed Internet access and advanced voice services including VoIP, over a standard copper telephone cable. VC-450LR is seen by many operators as an ideal accompaniment to a FTTP rollout, where for instance fiber optic is supplied direct to an apartment block and from there copper cable is used to supply residents with high-speed VDSL2.

Caution:

The VC-450LR is industrial-grade applications. This product does not have waterproof protection.

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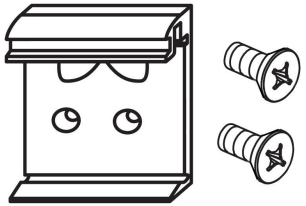
Chapter 1. Unpacking Information

1.1 Check List

Thank you for choosing RubyTech VC-450LR Before installing the modem, please verify the contents inside the package.

Package Contents:

Chapter 2. Installing the Modem

2.1 Hardware Installation

This chapter describes how to install the modem, and establish the network connections. The VC-450LR may be installed on any level surface (e.g. a table or shelf). However, please take note of the following minimum site requirements before you begin.

2.2 Pre-installation Requirements

Before you start the 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 requirements:

- Power requirements: **DC 12 to 48VDC redundant power.**
- The modem should be located in a cool dry place, with at least **10cm/4in** of space at the front and back for ventilation.
- Place the modem away from direct sunlight, heat sources, or areas with a high amount of electromagnetic interference.
- Check if the network cables and connectors needed for installation are available.
- Do not install phone lines strapped together with AC power lines, or telephone office line with voice signal.

- Avoid installing this device with radio amplifying stations nearby or transformer stations nearby.

2.3 General Rules

Before making any connections to the modem, please note the following rules:

- **Ethernet Port interface : RJ-45**

  All network connections to the modem Ethernet port must be made using Category 5 UTP/STP or above for 100 Mbps, Category 3, 4 UTP for 10Mbps.

  No more than 100 meters of cabling may be use between the MUX or HUB and an end node.

- **VDSL2 Port interface : RJ-11 & Terminal block combo**

  All network connections to the RJ-11/ terminal block(sharing port) must use **24~26** gauge with single **twisted pair** phone wire.

  We **do not recommend** the use of the 28 gauge phone wire or above.

  The RJ-11 is an 6P2C connector, two of which are wired. The modem uses the center two pins. The pin out assignment for these connectors is presented below.

  Please note that the line port is no polarity, therefore user can reverse the two wires of the phone cable when installed.

RJ-11 Pin out Assignments

Pin#	MNEMONIC	FUNCTION
1	NC	Unused
2	NC	Unused
3	**DSL**	**Used**
4	**DSL**	**Used**

5	NC	Unused
6	NC	Unused

2.4 Terminal Block and DIN-Rail mount installation

This section describes how to install the Terminal Block and DIN-Rail to the modem, if you do not install the DIN-Rail, please paste the 4 rubber feet at the bottom of the hulled to avoid scratches of metal housing.

- Take out the "2pin / 6pin terminal block" from inside the accessory kit, and install to the modem properly. (Figure 2.4.1)
- Please refer to install the DIN-RAIL as following step:

1. Install the DIN-Rail mounting plate to the VC-450LR. (Figure 2.4.2)
2. Please use the suitable DIN-Rail to install, please refer to the dimensions of the DIN-Rail.(Figure 2.4.3)
3. Insert the top of the DIN-Rail into the top slots on the DIN-Rail mounting plate and the DIN-Rail mounting plate will snap into place. (Figure 2.4.4)

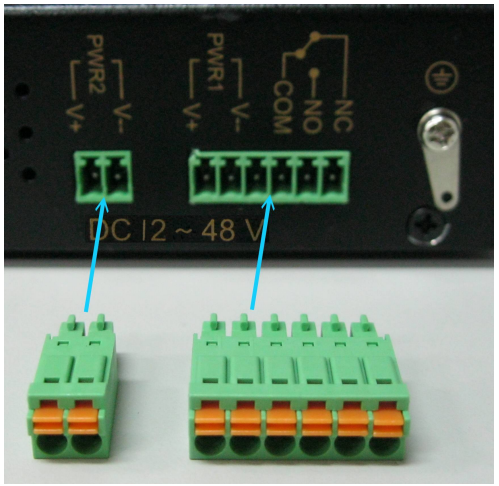


Figure 2.4.1

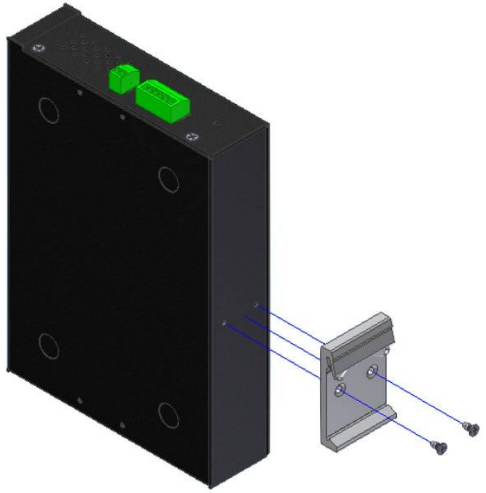


Figure 2.4.2

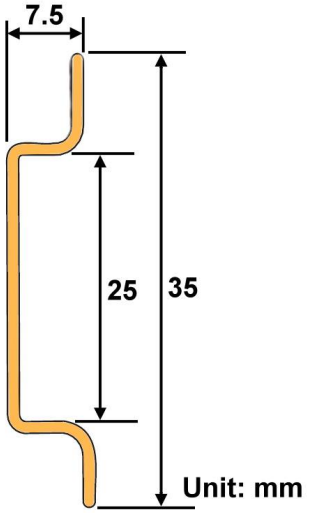


Figure 2.4.3

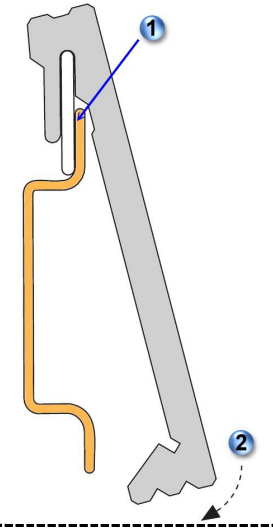


Figure 2.4.4

2.5 Connecting the RJ-11 / RJ-45 Ports

- The line port has 2 connectors: RJ-45 and terminal block. It is used to connect from VC-450(CO) using single pair phone cable to VC-450(CPE) bridge side (point to point solution). Take note that VC-450 line port cannot be used at the same time. Either RJ-11 port is connected or terminal block is connected using straight connection (Figure 2.4) or cross-over connection(Figure 2.5)
-

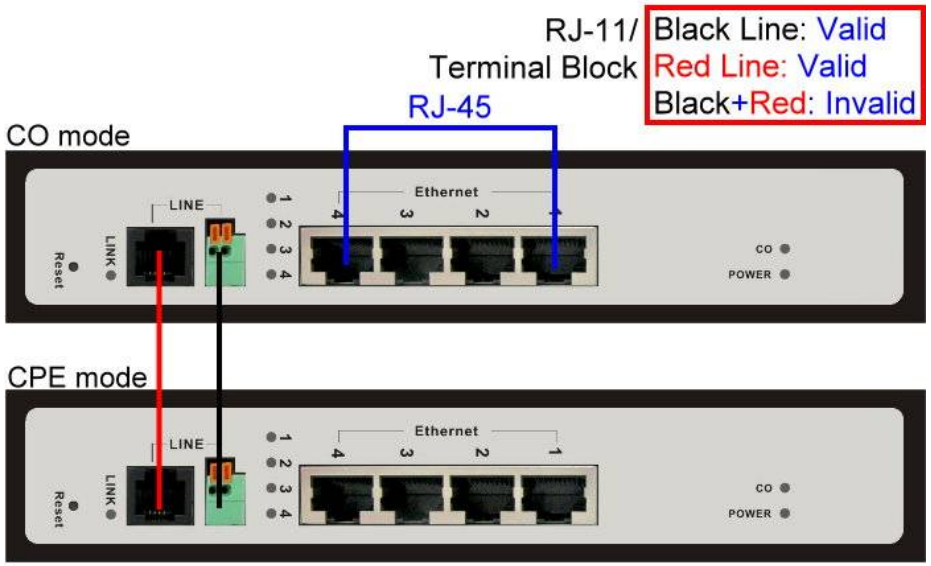


Figure 2.5.1 VC-450LR line ports straight connection

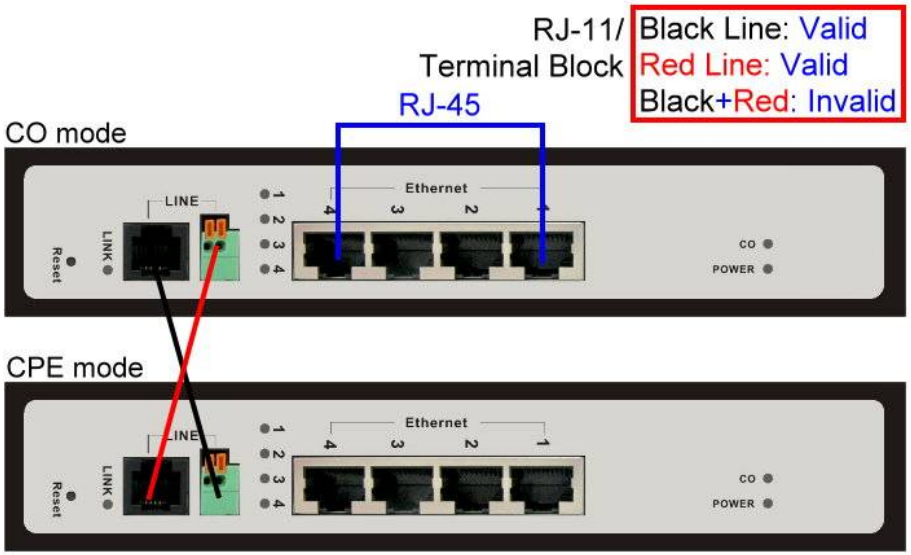


Figure 2.5.2 VC-450LR line ports straight connection

- When inserting a RJ-11 plug, make 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 bridge. Instead, use only twisted-pair cables with RJ-45 connectors that conform to Ethernet standard

Notes:

1. Be sure each twisted-pair cable (RJ-45 Ethernet cable) does not exceed 100 meters (333 feet).
2. We advise using Category 5~7 UTP/STP cables for making Bridge or Router connections to avoid any confusion or inconvenience in the future when you attach high bandwidth devices.
3. Use **24 ~ 26** gauge twisted pair phone wiring, we do not recommend 28 gauge or above.
4. Be sure phone wire has been installed before the VC-450LR boot.

2.6 Point to Point Application

First a quick overview on a complete setup of LAN extender Master/Slave LAN extender.
VC-450LR is a LAN extender leverages the extraordinary bandwidth promise of VDSL2 technology (max. 100Mbps Symmetric) (Figure 2.6)

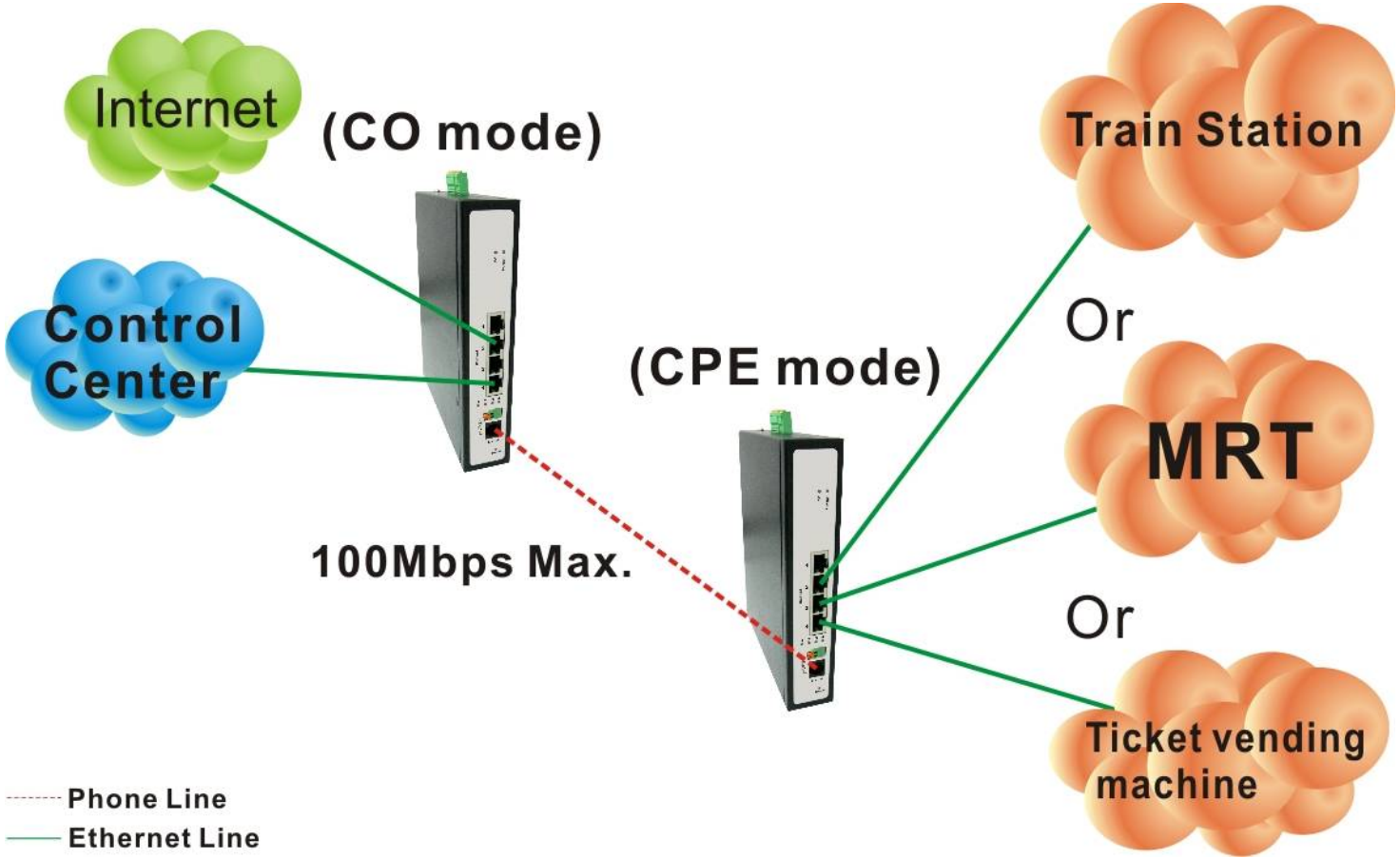


Figure 2.6 VC-450LR Point to Point application

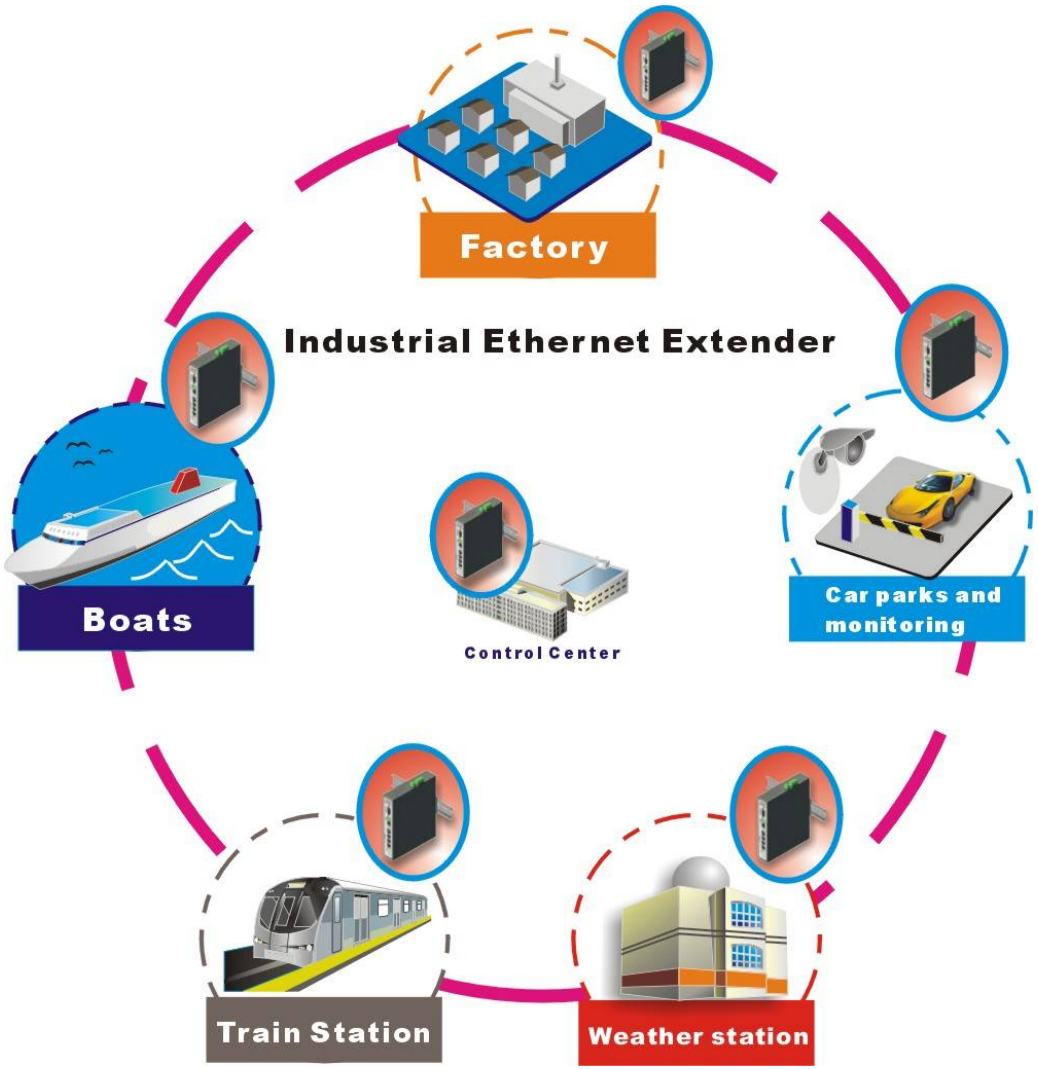


Figure 2.6 VC-450LR industrial-grade application

◆ 2.6.1 Connect the VC-450LR(Master) and the VC-450LR(Slave) to the Line

The objective for LAN extender is to pass high speed data over a twisted pair cable. In the setup, connect VC-450LR(Master) to VC-450LR (Slave) through phone wire(24~26 AWG) or line simulator or any other hardware representation of a cable network, with or without noise injection and crosstalk simulations.

◆ 2.6.2 Connect the VC-450LR(Master) and the VC-450LR(Slave) to LAN Devices

In the setup, usually an Ethernet tester serves as a representation of the LAN side as well as a representation of the WAN(Line) side.

◆ 2.6.3 Run Demos and Tests

The Ethernet tester may send data downstream as well as upstream. It also receives the data in order to check the integrity of the data transmission. Different data rates can be tested under different line conditions

Chapter 3. Hardware Description

This section describes the important parts of the VC-450LR. It features the front panel and rear panel.

VC-450LR Outward

3.1 Front Panel

The figure shows the front panel. (Figure 3.1)

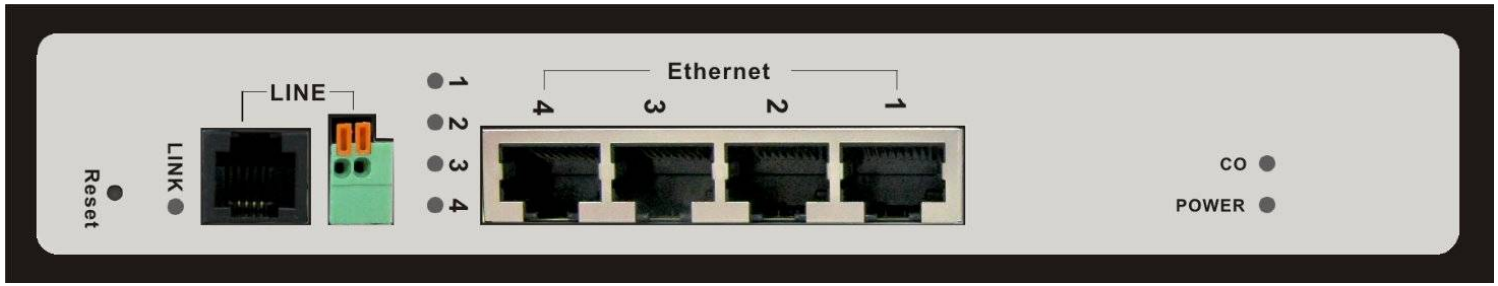


Figure 3.1 Front Panel(VC-450LR)

3.2 Front Indicators

The Modem has **Seven** LED indicators. The following Table shows the description. (Table 3-1)

Table 3-1 LED Indicators Description and Operation

LED	Color	Status	Descriptions
PWR (Power LED)	Green	On(Steady)	Lights to indicate that modem had power good
		Off	The device is not ready or has malfunctioned.
LED	**Color**	**Status**	**Descriptions**
E1 ~ E4	Green	On(Steady)	The device has a good Ethernet connection.

(Ethernet LED)		Blinking	The device is sending or receiving data.
		Off	The LAN is not connected or has malfunctioned.
LINK (Line LED)	Green	On(Steady)	The Internet or network connection is up.
		Fast Blinking	1. The Master device has detected a Slave device and ready to connect. 2. The device is sending or receiving data.
		Off	The Internet or network connection is down.
CO	Green	On (Steady)	VC-450LR config on Master mode.
		Off	VC-450LR config on Slave mode

Note:

It is normal for the connection between two VC-450LR to take up to 3 minutes, due to VC-450LR(Master) connect VC-450LR(Slave) to establish a link mechanism in auto-speed, with detects and calculates Master and Slave both PBO and PSD level, noise levels and other arguments for getting a better connection.

Table 3-2 Description of the modem rear connectors

Type	Connector	Description

Reset	Tact Switch Button	The reset buttons allows users to reboot the LAN VC-450LR or load the default settings. **Press and hold for 1-5 seconds: Reboot the VC-450LR** **Press over 5 seconds: Load the default settings**
Power	DC Jack	External switching Power Adapter: Input: AC 85~240Volts/50~60Hz. Output: DC 12V/1A.
Line	RJ-11	For connecting to a Master/Slave device.
Type	**Connector**	**Description**
phone	RJ-11	For connecting to the POTS equipment or ISDN.
Ethernet (E1-E4)	RJ-45	For connecting to an Ethernet equipped device.

3.3 Rear Panel

The following figure shows the rear panel. (Figure 3.3)

Figure 3.3 Rear Panel

Note:

Please refer to the section 2.6 to install DIN RAIL.

3.4 Side Panel

The following figure shows the side. (Figure 3.4)

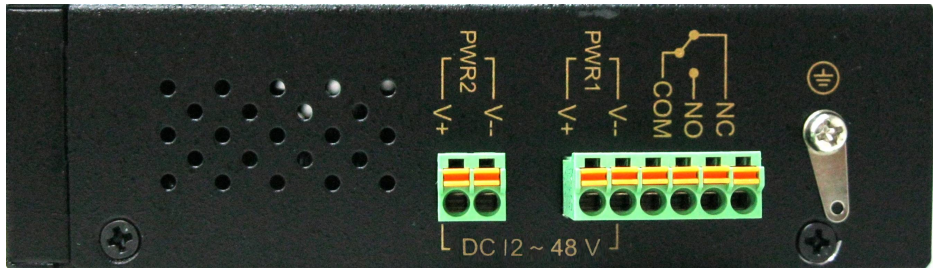


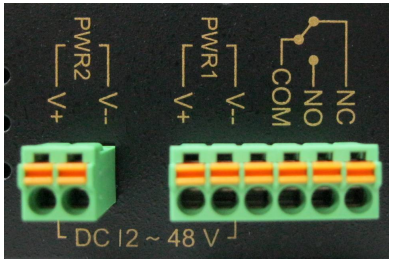
Figure 3.4 Rear connectors

The following description introduce Dual power and Relay Contact.

Wiring the dual Power Inputs

The VC-450LR has two sets of power inputs, power 1 and power 2, which are located on the VC-450LR's side panel. Power 1 pins are the bottom two contacts of the upper 6-contact terminal block and power 2 pins are the only two contacts on the lower 2-contact

terminal block.



STEP 1: Insert the negative/positive DC wires into the V-/V+ terminals, respectively.

STEP 2: Place the DC wires into terminal block connector: Push the orange switch of the terminal block with a small flat-blade screwdriver, then the DC wires insert the orange button below of the circle hole, and release the small flat-blade screwdriver.

STEP 3: Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on the VC-450LR's side panel.

Attention:

1. Please note that the negative DC wire must connect into the V- terminal, positive DC wire must connect V+terminal. If contrary to the location of the wiring, VC-450LR will enable Reverse Polarity Protection function automatically. DC power will not be able to directly through the machine.
2. Please note that if the DC power current exceeds 3A, VC-450LR will enable Overload Current Protection function automatically. DC power will not be able to directly through the machine.

Safety Caution!

1. **Be sure to disconnect the power when installing(uninstalling) the terminal block and power cable.**
2. **Please note that the user can use 12~48VDC dual power input(Redundant Power). Do not exceed DC 48V.**
3. **Be sure to disconnect the power before installing and/or wiring your VC-450LR modem.**
4. **Please calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size. If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.**

Power Input Status

The following Table shows the examples of the power input status. (Table 3-4)

Table 3-4

		Example 1				Example 2				Example 3			
Power Item	Default Polarity	Power Input1	Output State1	Power Input2	Output State2	Power Input1	Output State1	Power Input2	Output State2	Power Input1	Output State1	Power Input2	Output State2
Power 1	–	12V–	OFF	12V–	ON	12V+	Protection	12V+	Protection	48V–	ON	No Power	OFF
	+	12V+		12V+		12V–		12V–		48V+			
Power 2	–	24V–	ON	No Power	OFF	24V–	ON	No Power	OFF	48V–	ON	48V–	ON
	+	24V+				24V+				48V+		48V+	

		Example 4				Example 5				Example 6			
Power Item	Default Polarity	Power Input1	Output State1	Power Input2	Output State2	Power Input1	Output State1	Power Input2	Output State2	Power Input1	Output State1	Power Input2	Output State2
Power 1	–	12V–	Malfunction	12V–	Malfunction	12V–	ON	12V–	Malfunction	48V–	ON	No Power	OFF
	+	12V+		12V+		12V+		12V+		48V+			
Power 2	–	60V–	Malfunction	No Power	Malfunction	No Power	OFF	60V–	Malfunction	48V+	Protection	48V+	Protection
	+	60V+						60V+		48V–		48V–	

Notes:

1. State 1 always happens before State 2.
2. Protection means enable Reverse Polarity Protection function.
3. Please note that if use different DC voltage, higher voltage will feeding to VC-450LR.
4. Please note that the warranty is void if DC 48V power input is exceeded.

Wiring the Relay Contact

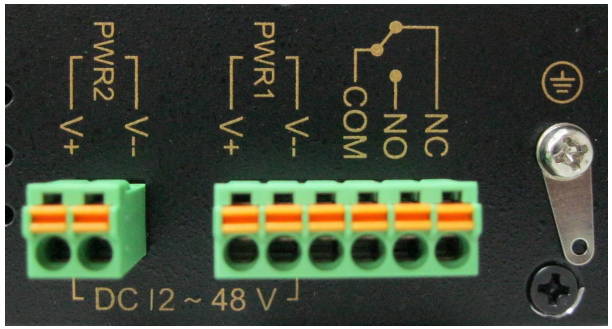
The VC-450LR has a set of relay outputs. The relay contact uses of the terminal block's contacts located on the VC-450LR's side panel. Refer to the following table shows how to connect the wires to the terminal block connector. In this section, we illustrate the meaning of the two contacts used to connect the relay contact.

Fault Tip:

The relay contacts of the 3-pins terminal block connector are used to detect a power failure warning event. Wires connected to Warning Device over normal open contact (COM & NO) for detecting power system. If power failure not occured, the fault circuit remains open. The current carrying capacity of relay contact is 1 A @ 24 VDC/ @ 125 VAC. This function triggered by built-in relay.

The following Table shows the Relay circuit and power status. (Table 3-5)

Table 3-5 Relay Circuit Status and Power good/failure Status.

	**Power good**	**COM & NC**	**Open Circuit**
		COM & NO	**Short Circuit**
	Power failure	**COM & NC**	**Short Circuit**
		COM & NO	**Open Circuit**

Grounding the VC-450LR

VC-450LR is designed to enhance EMS performance by grounding. VC-450LR come with metal DIN-Rail brackets for grounding the switches. For optimal EMS performance, connection of the right of the VC-450LR side panel ground lug to the grounding point.

Before user installed power and device, please read and follow these essentials:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

Note:

Do not run signal or communications wiring and power wiring through the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring sharing similar electrical characteristics can be bundled together.
- You should separate input wiring from output wiring.
- We recommend that you mark all equipment in the wiring system.

Chapter 4. Configure the VC-450LR via Web management menu

The VC-450LR provides a built-in HTML based management interface that allows configuration of the VC-450LR via Internet Browser. Best viewed using Chrome or Firefox browsers.

In order to use the web browser to configure the device, you may need to allow:

- Web browser pop-up windows from your device. Web pop-up blocking is enabled by default in windows XP SP2 or above.
- Java Scripts. (Enabled by default)
- Java permissions. (Enabled by default)

Launch your web browser and input the default IP address 192.168.16.249 (VC-450LR) in the Web page. Following section user can find default username and password.

4.1 BASIC Setup

4.1.1 Login Webpage

The default username and password are "admin".

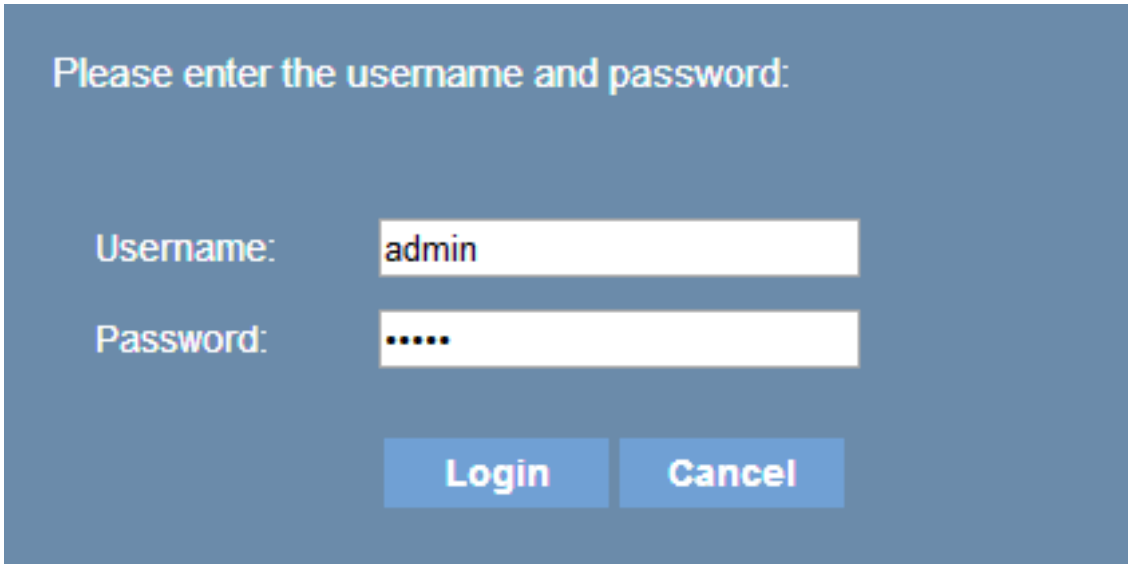


Figure 4.1.1 Login Webpage

4.1.2 Display status

When the device is running, the status page will display the device informations (Hardware/Software Version,

MAC Address, and System Up Time), as shown in Figure 4.1.2.

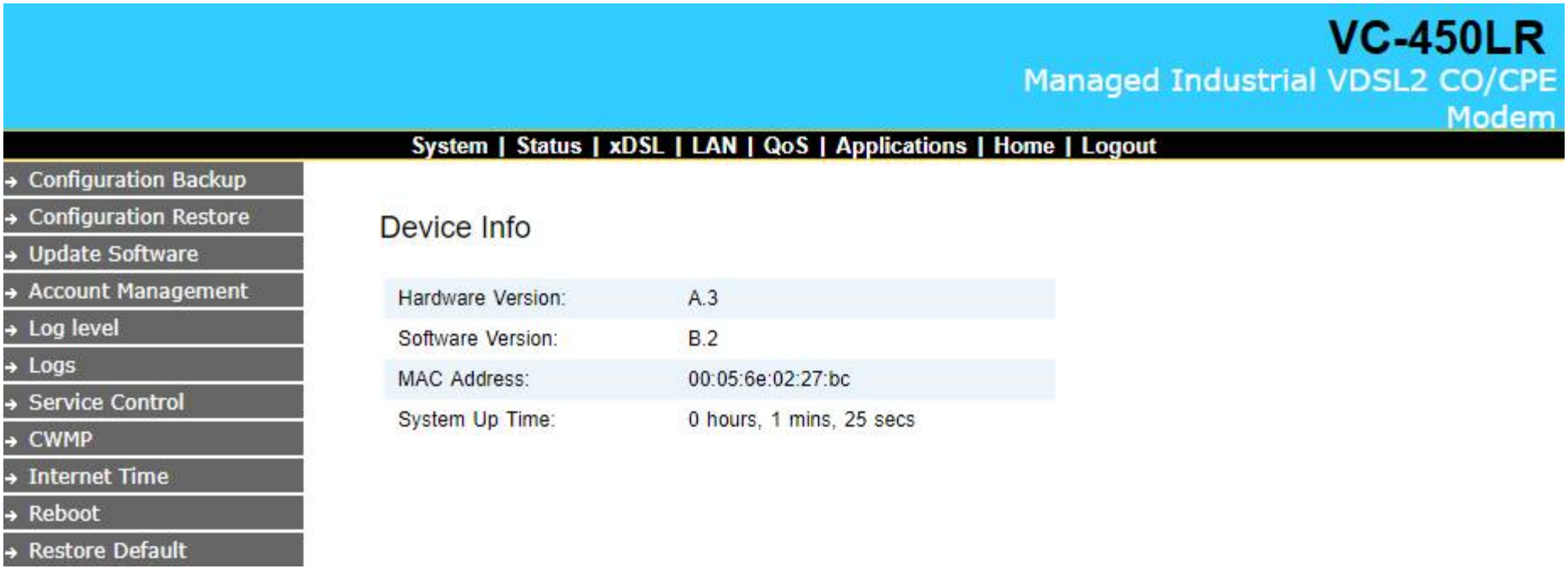


Figure 4.1.2 Device Info

4.2 Select the Menu Level

There is an easy Setup for end users at the setup of VC-450LR with **System, Status, xDSL, LAN, Qos, Applications,**

Home, Logout for more detail configurations.

Figure 4.2 Select the Menu Level

4.3 System

Select "System". The menu below will be used frequently. It includes the sub-menus of **Configuration**

Backup、Configuration Restore、Update Software、Account Managemant、Log level、Logs、Service Control、CWMP、Internet Time、Reboot、Restore Default. A screen is displayed as shown in Figure 4.3

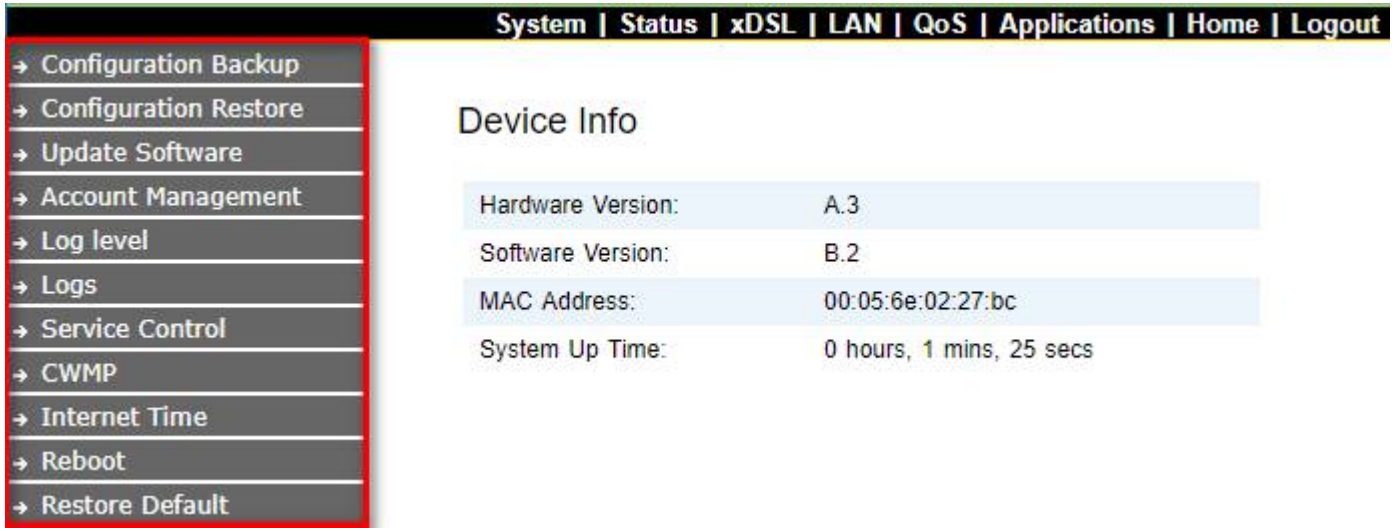


Figure 4.3 System

4.3.1 Configuration Backup

To backup the configuration setting value, click on the "Configuration Backup" link in the left navigation bar. A screen is displayed as shown in Figure 4.3.1.

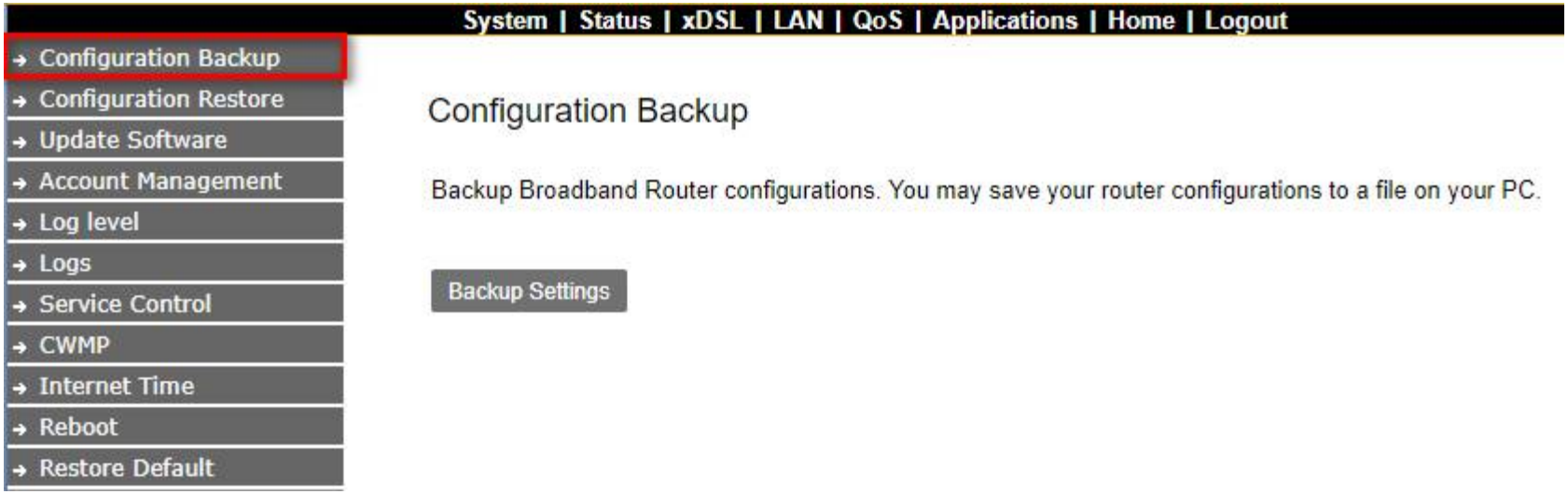


Figure 4.3.1 Configuration Backup

4.3.2 Configuration Restore

To restore your configuration setting value, click on the "Configuration Restore" link in the left navigation bar. A screen is displayed as shown in Figure 4.3.2.

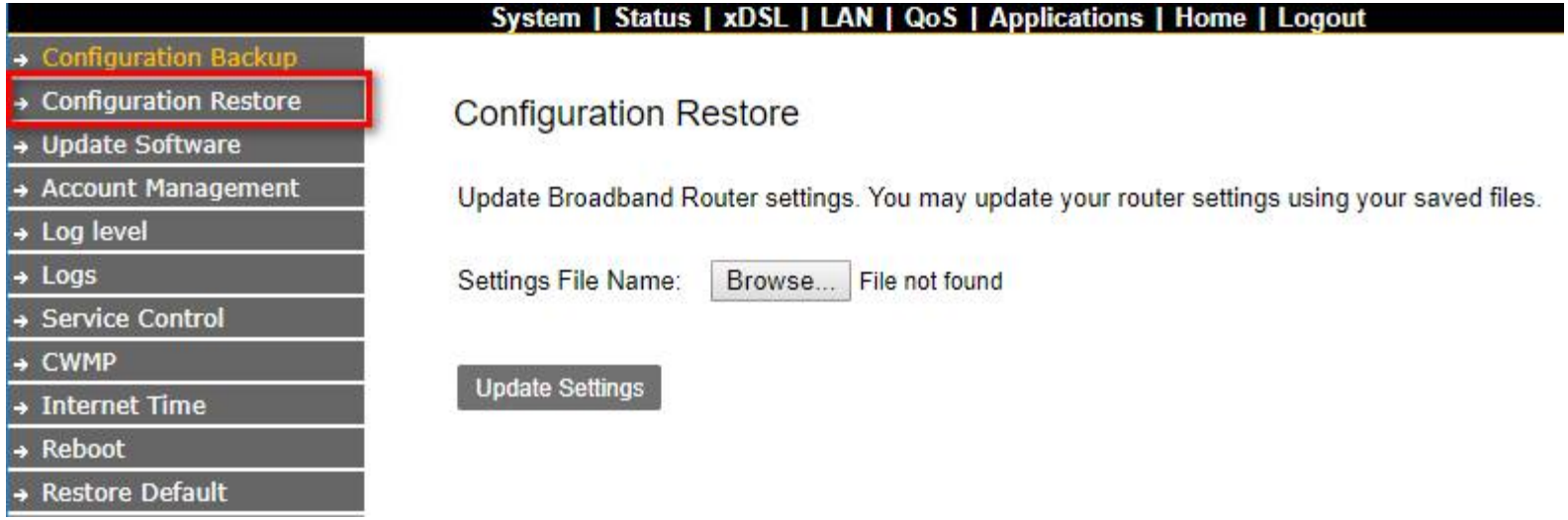


Figure 4.3.2 Configuration Restore

The screen contains the following detail:

- Click "Browse" to select a specific file name in preparation for modem settings.
- Click "Update Settings" to start updating.

4.3.3 Update Software

To update software, click on the "Update Software" link in the left navigation bar and follow the steps for updating. A screen is displayed as shown in Figure 4.3.3.

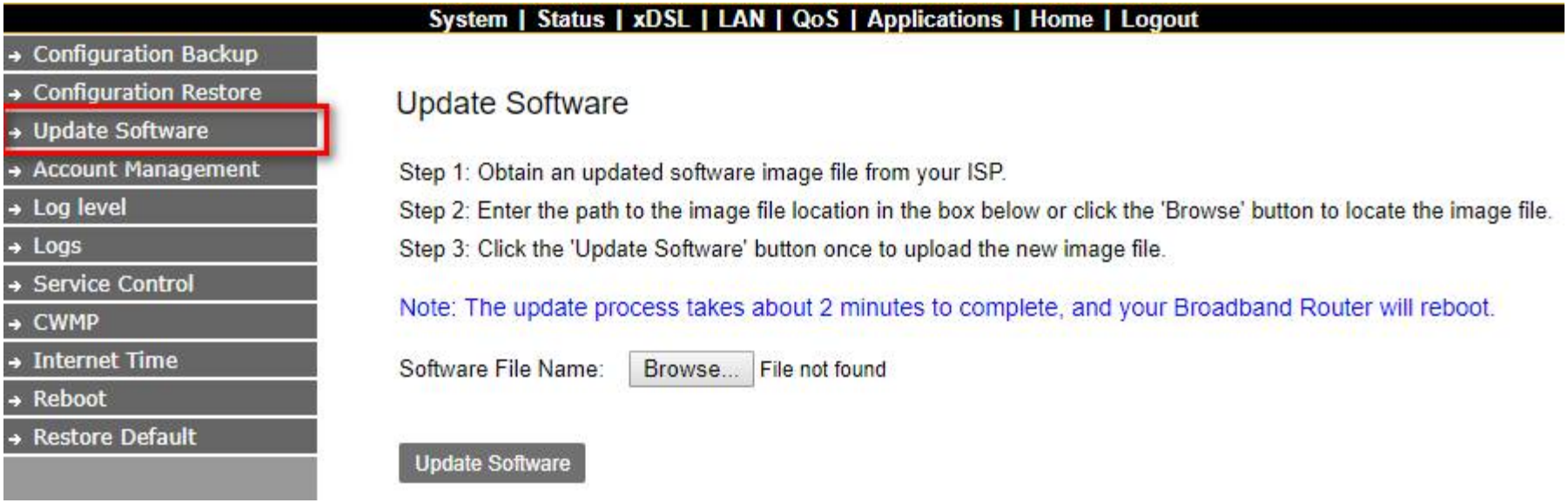


Figure 4.3.3 Update Software

Note:

The update process takes about 12 minutes to complete, and your Broadband Modem will reboot.

4.3.4 Account Management

To change or create passwords, click on the "Account Management" link in the left navigation bar. A screen is displayed as shown in Figure 4.3.4.

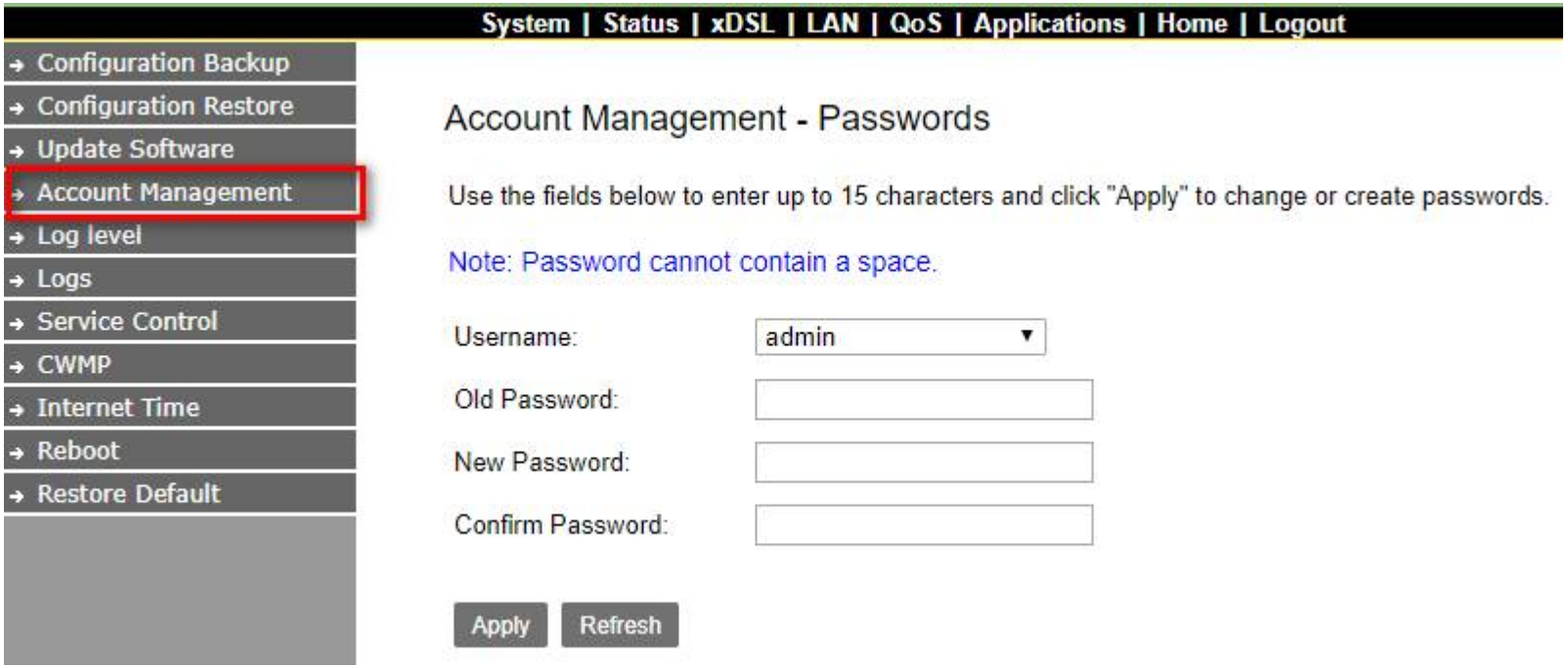


Figure 4.3.4 Account Management-Password

4.3.5 Log Level

Click on the "Log level" link in the left navigation bar, on the right page you will see how to enable Log or Log Server.

A screen is displayed as shown in Figure 4.3.5.

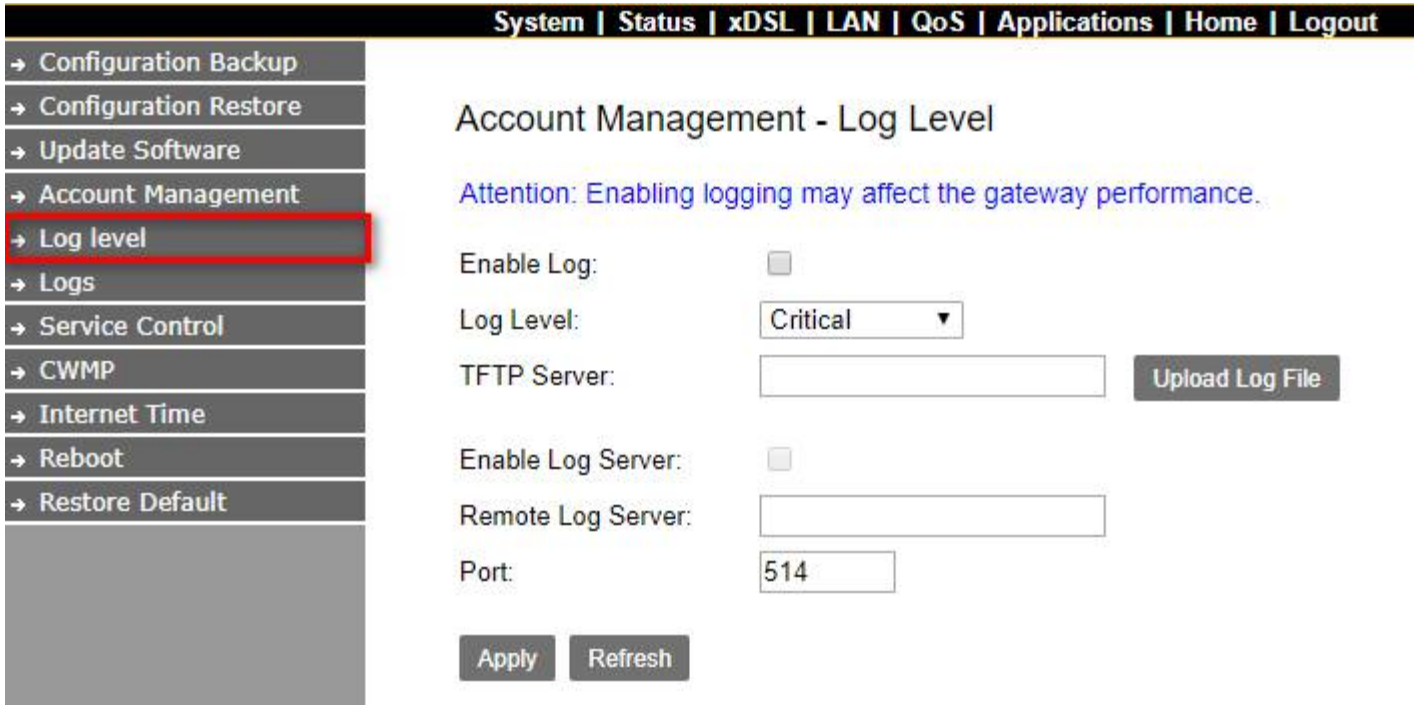
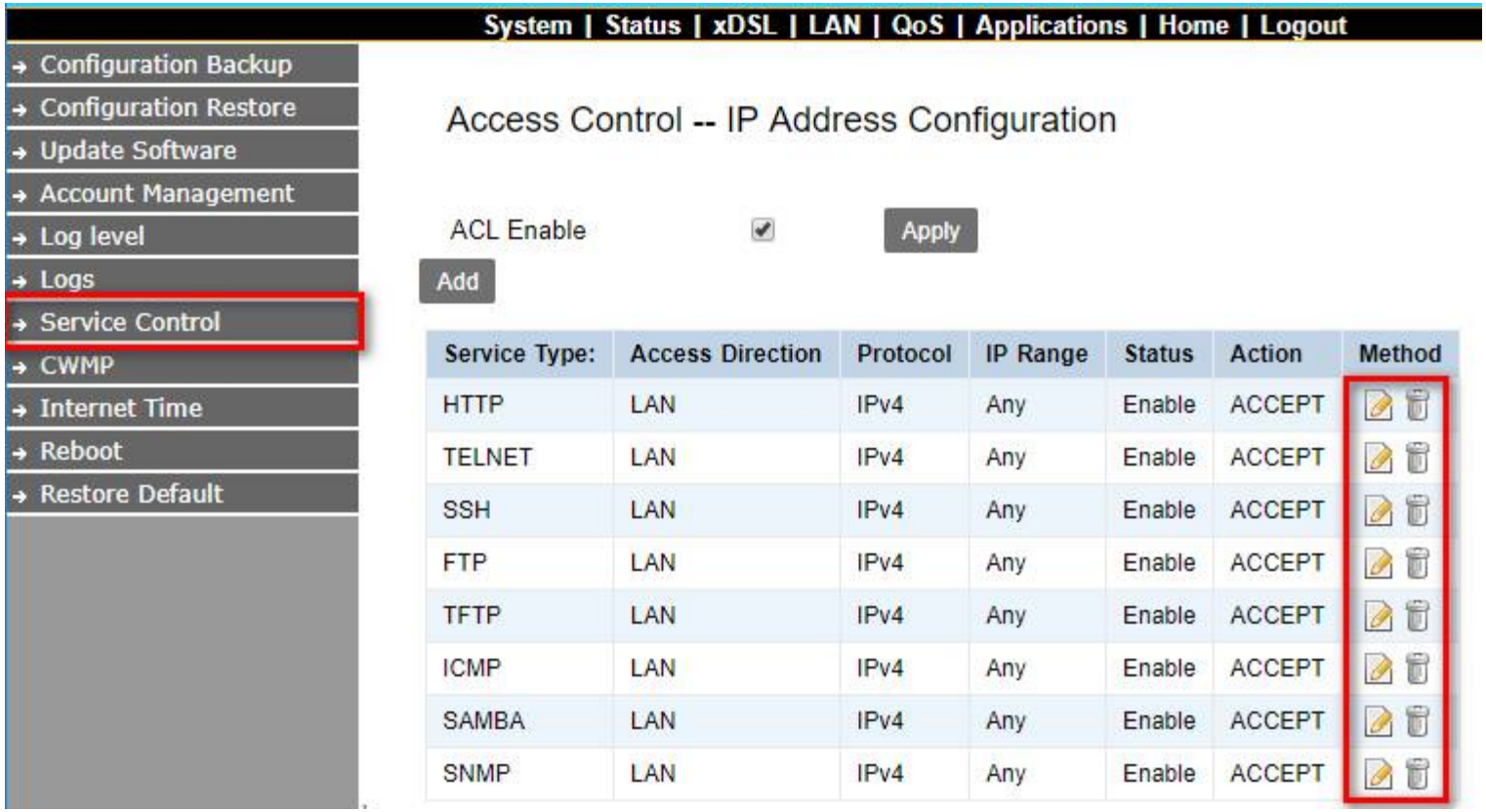


Figure 4.3.5 Account Management – Log Level

4.3.6 Service Control

Click on "Service Control" link in the left navigation bar, on the right page you will see how to enable ACL.

Click "add" to config Protocol / IP Protocol Type / Enable / Action and basic information. A screen is displayed as shown in Figure 4.3.6.


System | Status | xDSL | LAN | QoS | Applications | Home | Logout
Configuration Backup
Configuration Restore
Update Software
Account Management
Log level
Logs
Service Control
CWMP
Internet Time
Reboot
Restore Default
Access Control -- IP Address Configuration
ACL Enable
Apply
Add
Service Type: | Access Direction | Protocol | IP Range | Status | Action | Method
HTTP | LAN | IPv4 | Any | Enable | ACCEPT
TELNET | LAN | IPv4 | Any | Enable | ACCEPT
SSH | LAN | IPv4 | Any | Enable | ACCEPT
FTP | LAN | IPv4 | Any | Enable | ACCEPT
TFTP | LAN | IPv4 | Any | Enable | ACCEPT
ICMP | LAN | IPv4 | Any | Enable | ACCEPT
SAMBA | LAN | IPv4 | Any | Enable | ACCEPT
SNMP | LAN | IPv4 | Any | Enable | ACCEPT

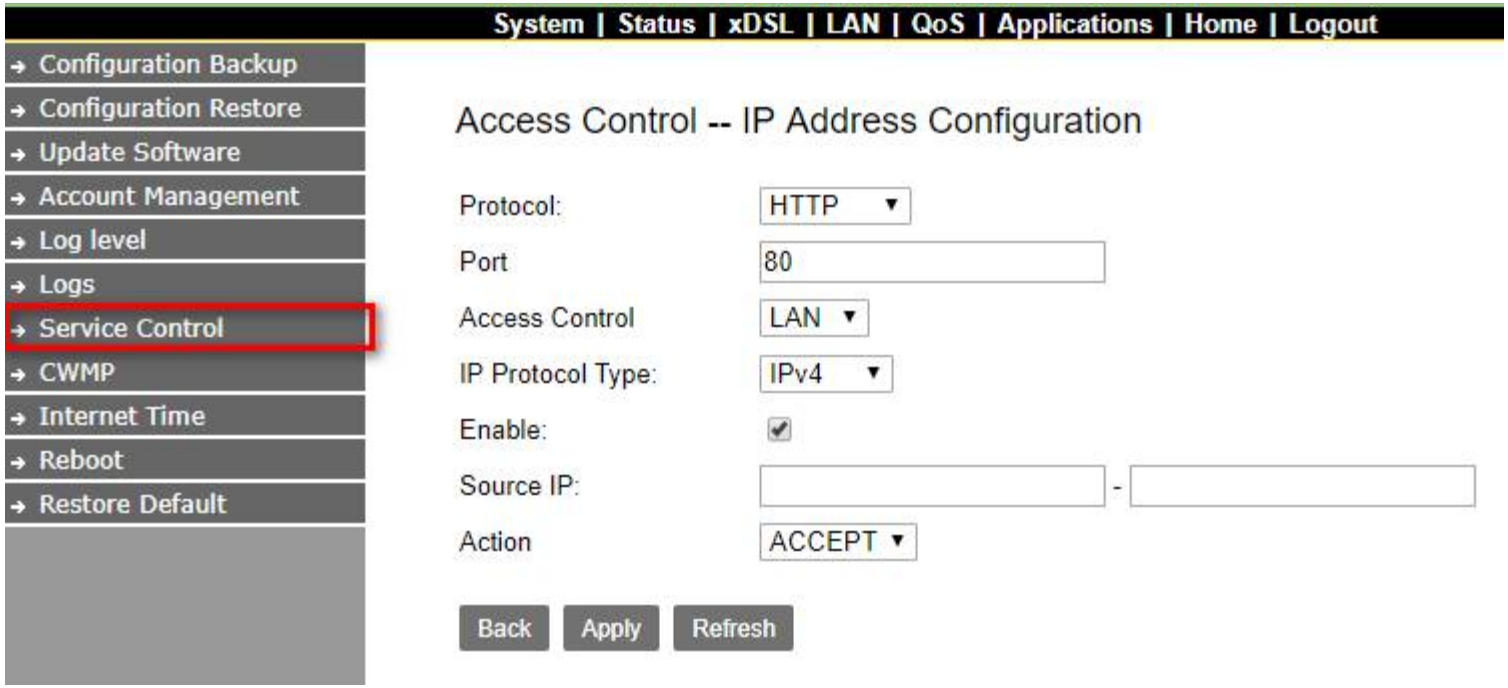


Figure 4.3.6 Service Control – IP Address Configuration

4.3.7 CWNP (TR-069 Settings)

Click on "CWMP" link in the left navigation bar to create TR-069 connection, and setup ACS URL/ ACS User Name/ACS Password and basic information. A screen is displayed as shown in Figure 4.3.7.

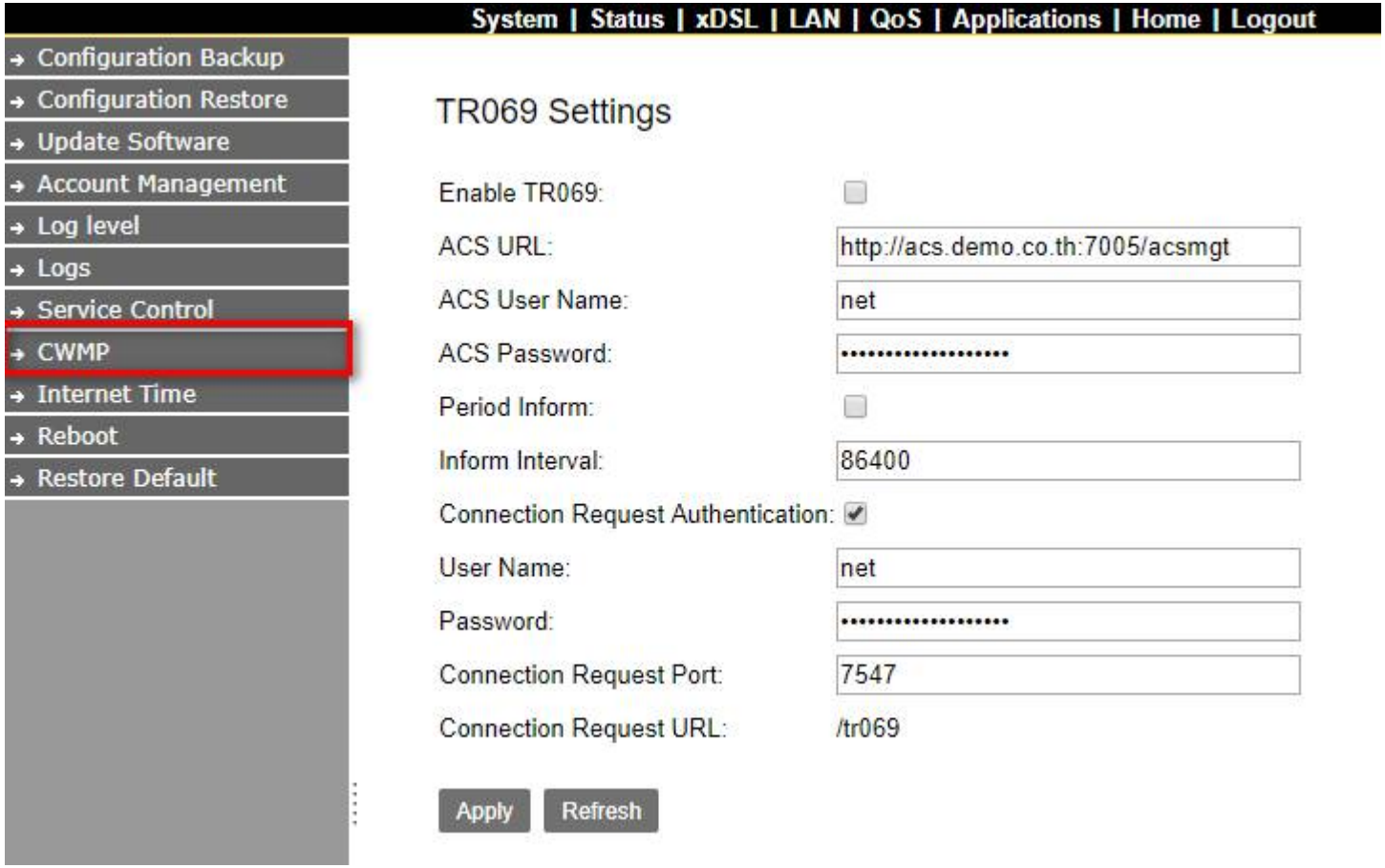


Figure 4.3.7 TR069 Settings

4.3.8 Internet Time

If SNTP server could not be connected to allow the device to synchronize the system clock to the global Internet. Please setup "Internet Time". A screen is displayed as shown in Figure 4.3.8.

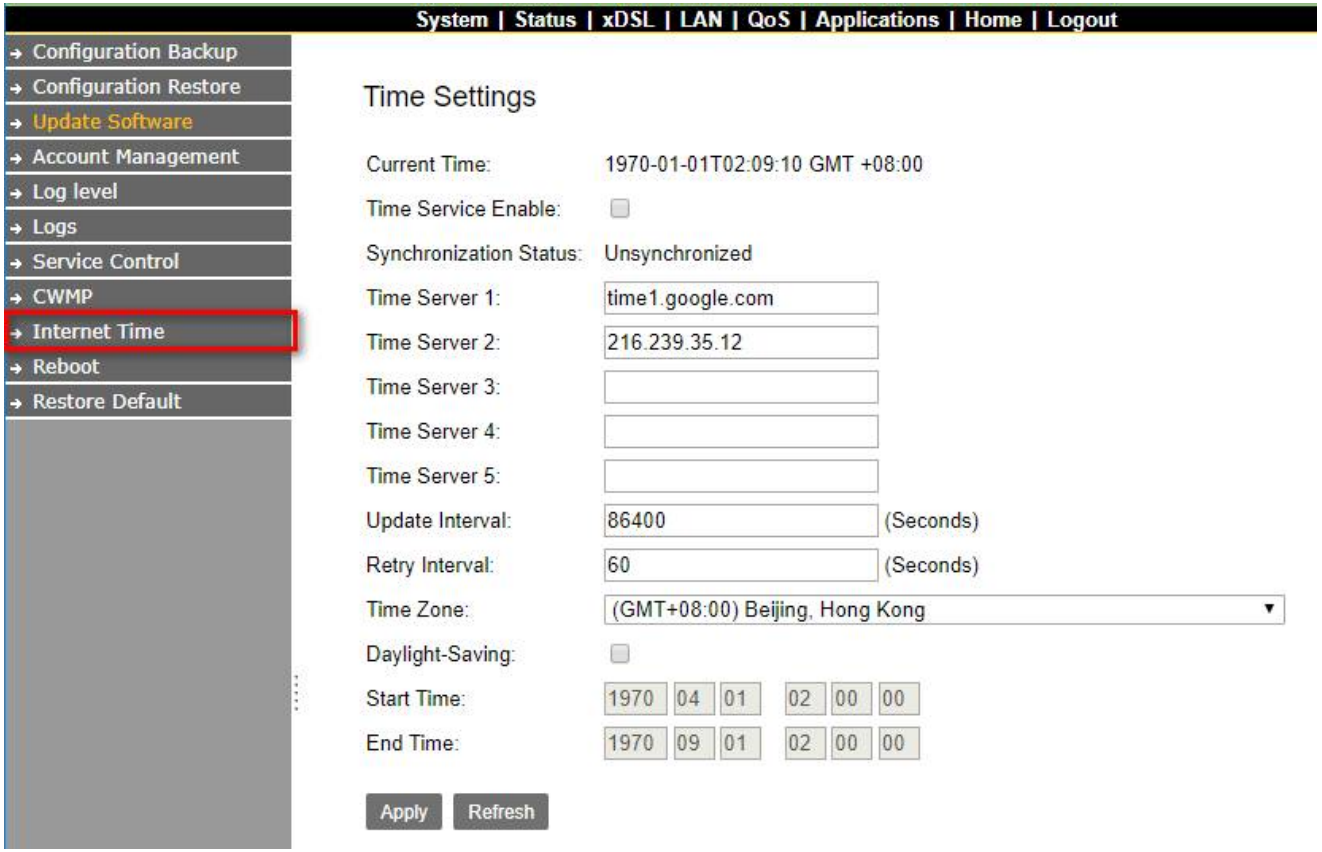


Figure 4.3.8 NTP Settings

4.3.9 Restore Default

Setting to the factory defaults, click on the "Restore Default" link in the left navigation bar, and press "Restore Default Settings", the device will reboot in 10 seconds. A screen is displayed as shown in Figure 4.3.9.

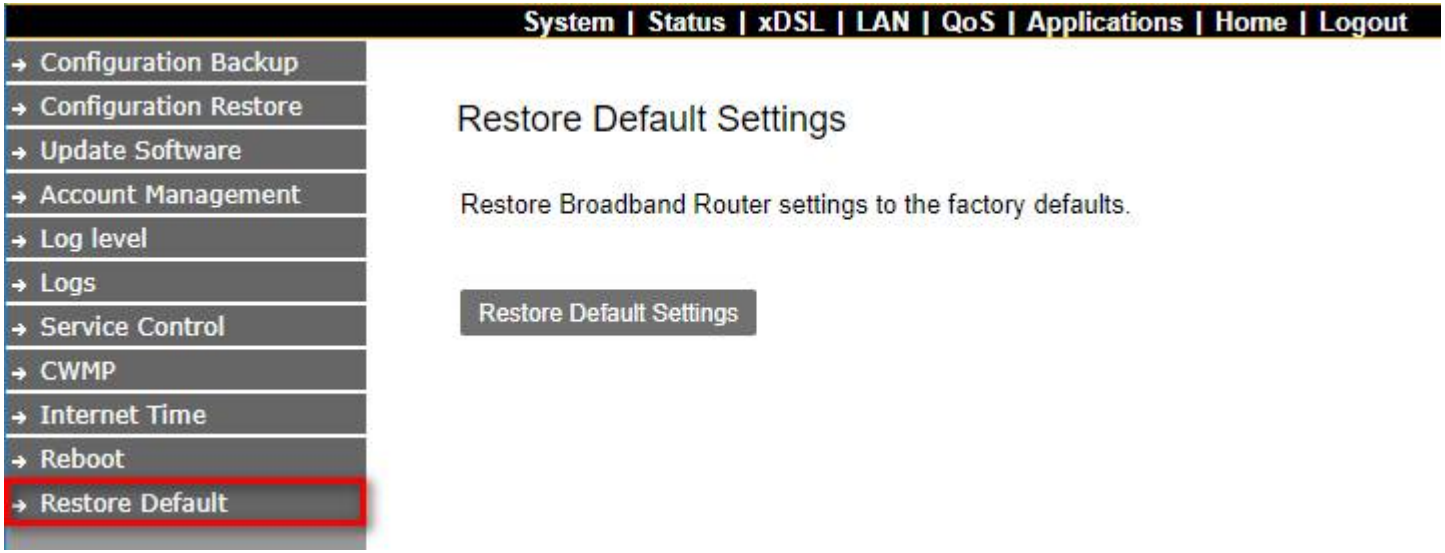


Figure 4.3.9 Restore Default Settings

4.4 Status Setup

Select "Status". It includes the sub-menus of **Device Infomation**、**LAN Network**、**Ethernet**、**WAN Statistics**、**LAN Statistics**、**ARP**. A screen is displayed as shown in Figure 4.4

Figure 4.4 Device informations

4.4.1 LAN Network

Click on the "LAN Network" link in the left navigation bar, you will see the status of IPv4/IPv6 Address for this device. A screen is displayed as shown in Figure 4.4.1.

Figure 4.4.1 LAN Network information

4.4.2 Ethernet

Click on the "Ethernet" link in the left navigation bar, you will see the Ethernet Status, Speed, and Duplex of LAN1, LAN2, LAN3, LAN4 for this device. A screen is displayed as shown in Figure 4.4.2.

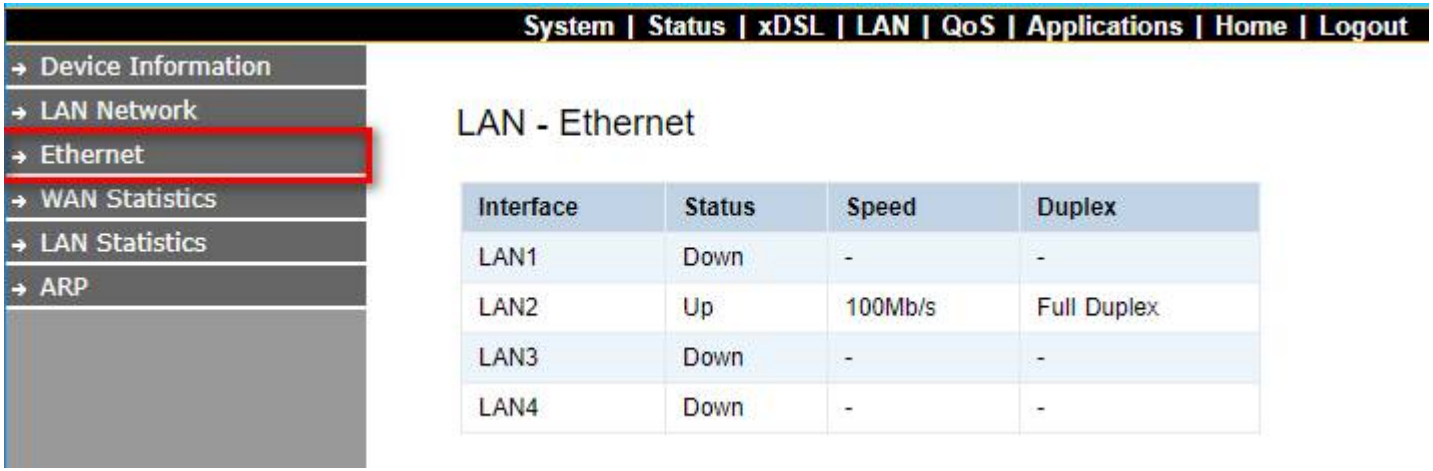


Figure 4.4.2 LAN-Ethernet information

4.4.3 WAN(Line) Statistics

Click on the "WAN Statistics" link in the left navigation bar, you will see the Received and Transmitted status for this device.

A screen is displayed as shown in Figure 4.4.3.

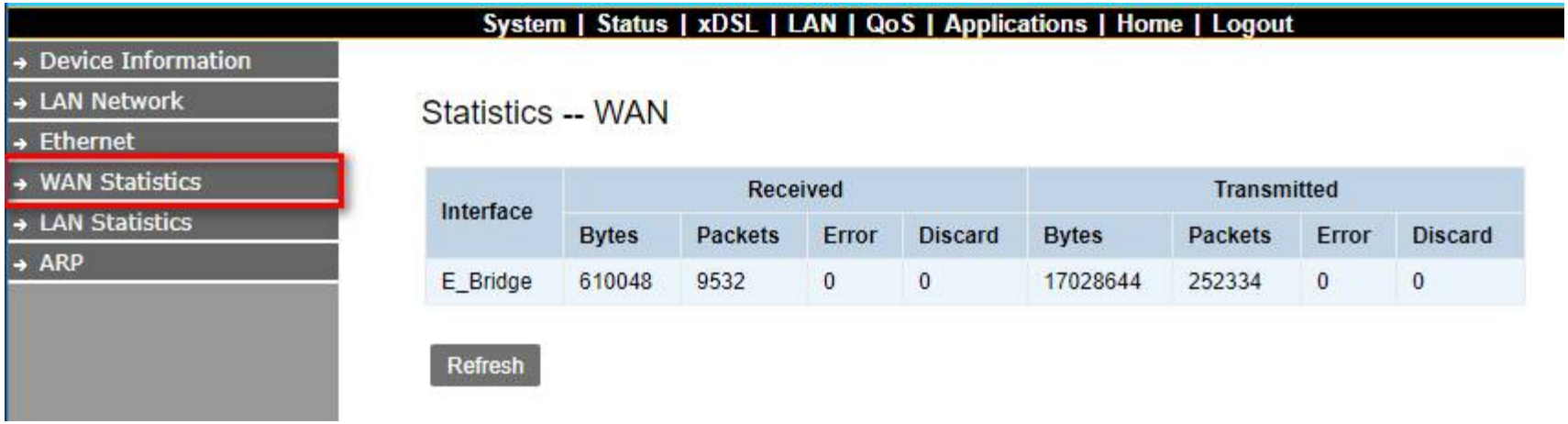


Figure 4.4.3 Statistics—WAN(Line)

4.4.4 LAN Statistics

Click on the "LAN Statistics" link in the left navigation bar, you will see the Received and Transmitted status for LAN1~4. A screen is displayed as shown in Figure 4.4.4.

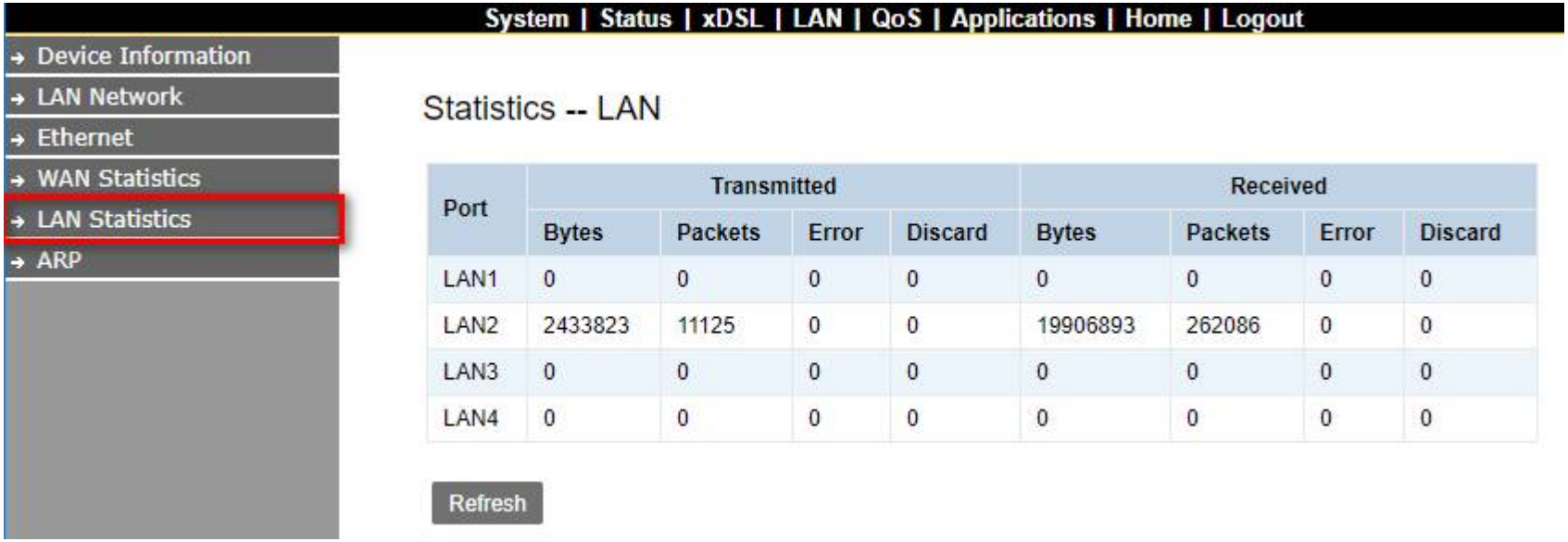


Figure 4.4.4 Statistics--LAN

4.4.5 ARP

Click on the "ARP" link in the left navigation bar, you will see the records of Flags, HW Address, and Device status for different IP addresses . A screen is displayed as shown in Figure 4.4.5.

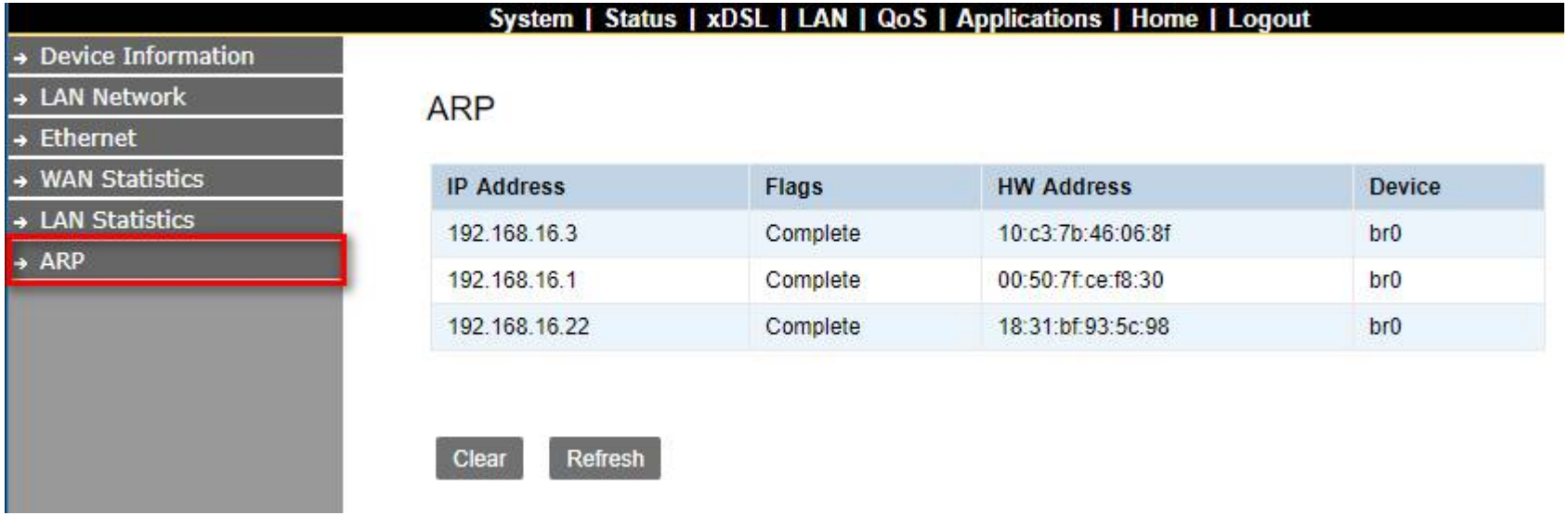


Figure 4.4.5 ARP setting

4.5 xDSL Setup

Select "xDSL". It includes the sub-menus of Dsl Status、Dsl Config.

Click on the "Dsl Status" link in the left navigation bar, you will see VDSL Information for this device. A screen is displayed as shown in Figure 4.5.

Figure 4.5. VDSL Information

4.5.1 Master/Slave mode & profile Config

Click on the "Dsl Config" link in the left navigation bar, there are 9 VDSL modes selectable, the default setting is "3. Master Mode, Sy-Auto 1_8/2 (SNRM 6/6)". A screen is displayed as shown in Figure 4.5.1.

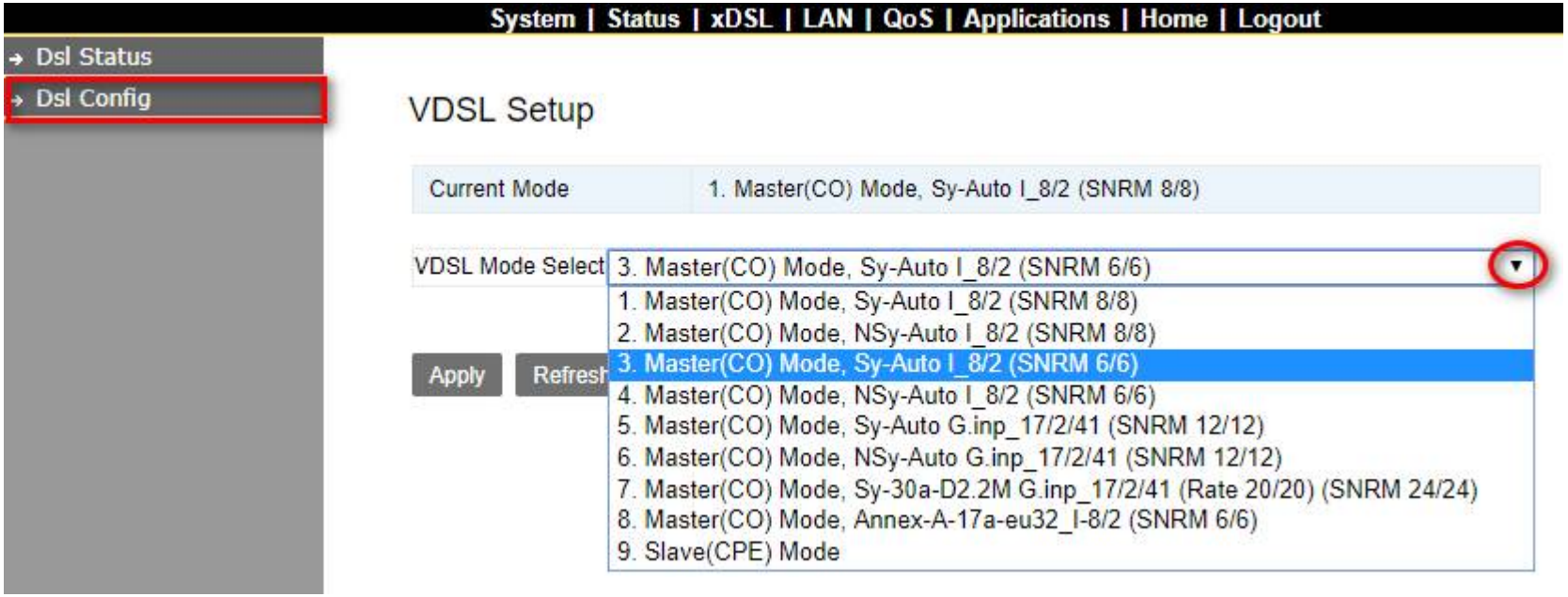


Figure 4.5.1 VDSL Setup

4.5.1.1 VDSL Config Overview

Below table clarify the settings of 9 different VDSL modes.

NO.	Config.	Note

1	Sy-Auto I_8/2 (SNRM 8/8)	Symmetric Auto, enable G. INP, enable re-transmition, SNRM=8
2	NSy-Auto I_8/2 (SNRM 8/8)	non symmetric Auto, enable G.INP, enable re-transmition, SNRM=8
3	Sy-Auto I_8/2 (SNRM 6/6)	Symmetric Auto, Max. Interleave=8, Min.Inp=2, SNRM=6 (Default)
4	NSy-Auto I_8/2 (SNRM 6/6)	Non symmetric Auto, Max. Interleave=8, Min.Inp=2, SNRM=6
5	Sy-Auto G.INP_17/2/41 (SNRM 12/12)	Symmetric Auto, enable G.INP, enable re-transmition, SNRM=12
6	NSy-Auto G.INP_17/2/41 (SNRM 12/12)	non symmetric Auto, enable G.INP, enable re-transmition, SNRM=12
7	Sy-30a-D2.2M G.INP_17/2/41 (Rate 20/20) (SNRM 24/24)	Symmetric 30a, disable 0~2.2MHz, enable G.INP, enable re-transmition, Max.Line rate=20Mbps, SNRM=24
8	Annex-A-17a-eu32_I-8/2 (SNRM 6/6)	17A Annex A Eu32, Max. Interleave=8, Min. Inp=2, SNRM=6
9	Slave Mode	Web config for Slave mode is available.

Note：This device is available to select Master (Config 1~8) / Slave (Config 9) mode through web config.

4.6 LAN Setup

Select "LAN". It includes the sub-menus of IPv4 Configuration、IPv6 Configuration、IPv6Static Route、Ethernet Mode.

A screen is displayed as shown in Figure 4.6.

Figure 4.6 LAN

4.6.1 IPv4 Configuration

Click on the "IPv4 Configuration" link in the left navigation bar. Click **"**Apply" at any time during configuration to save the information that you have entered. A screen is displayed as shown in Figure 4.6.1

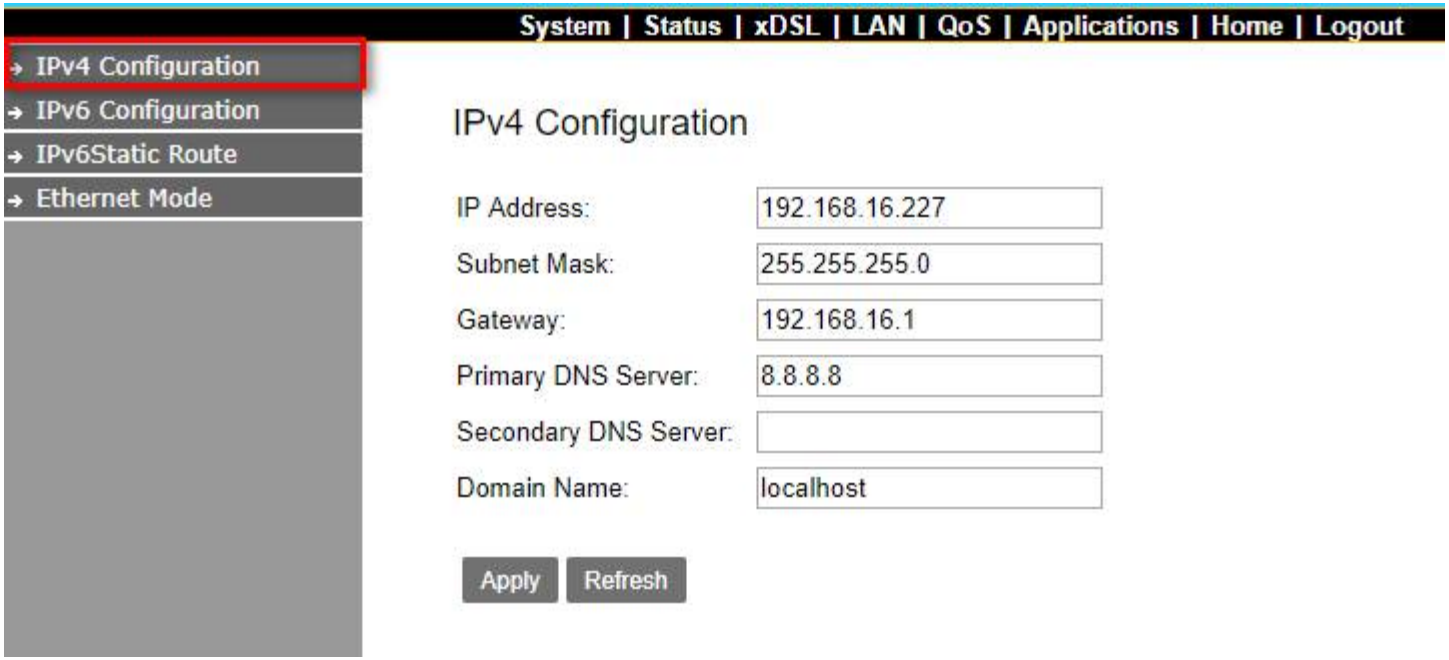


Figure 4.6.1 IPv4 Configuration

4.6.2 IPv6 Configuration:

Click on the "IPv6 Configuration" link in the left navigation bar. Click **"**Apply" at any time during configuration to save the information that you have entered. A screen is displayed as shown in Figure 4.6.2

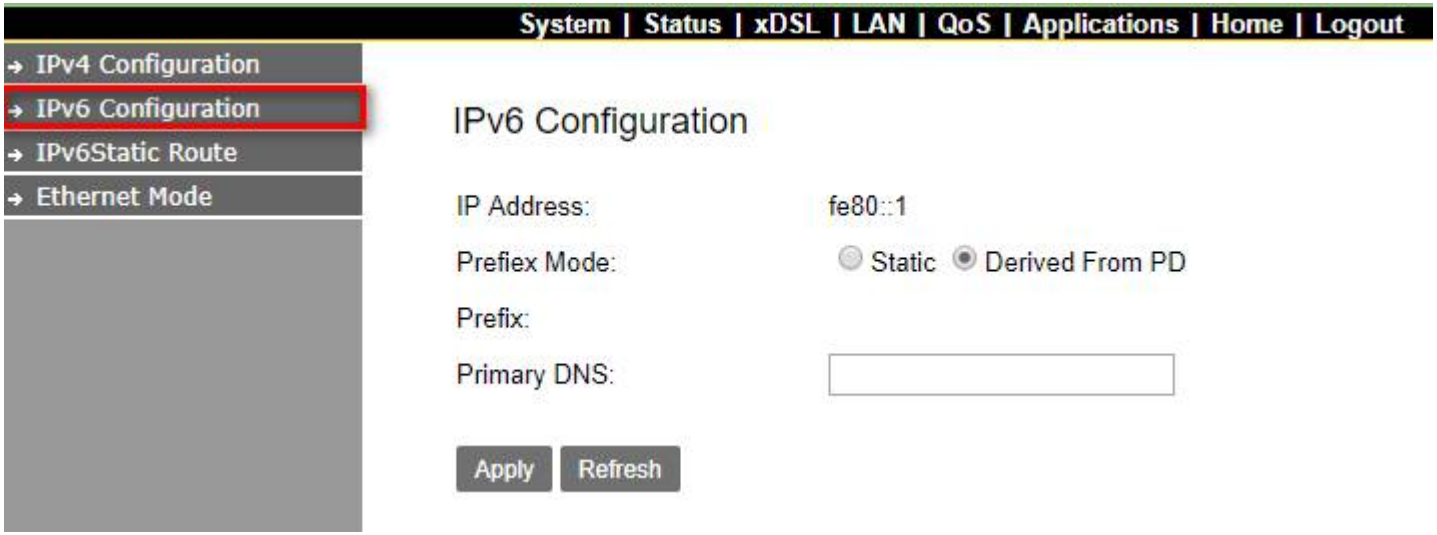


Figure 4.6.2 IPv6 Configuration

4.6.3 IPv6Static Route

Click on the "IPv6Static Route" link in the left navigation bar. Click **"**add" to a new page and setup Static Route. A screen is displayed as shown in Figure 4.6.3

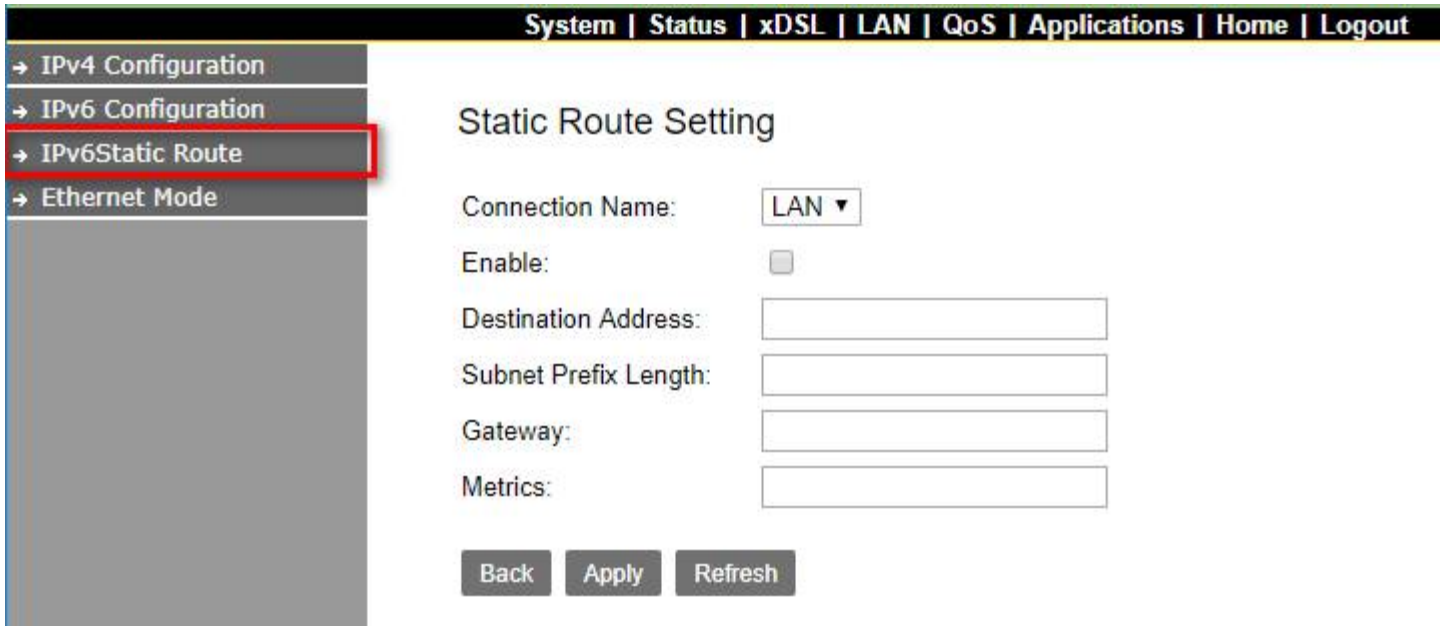


Figure 4.6.3 IPv6Static Route

4.6.4 Ethernet Mode

Click on the "Ethernet Mode" link in the left navigation bar. Choose the speed (Auto, 10Mb/s, 100Mb/s) of LAN1~4, and click "Apply" to setup.

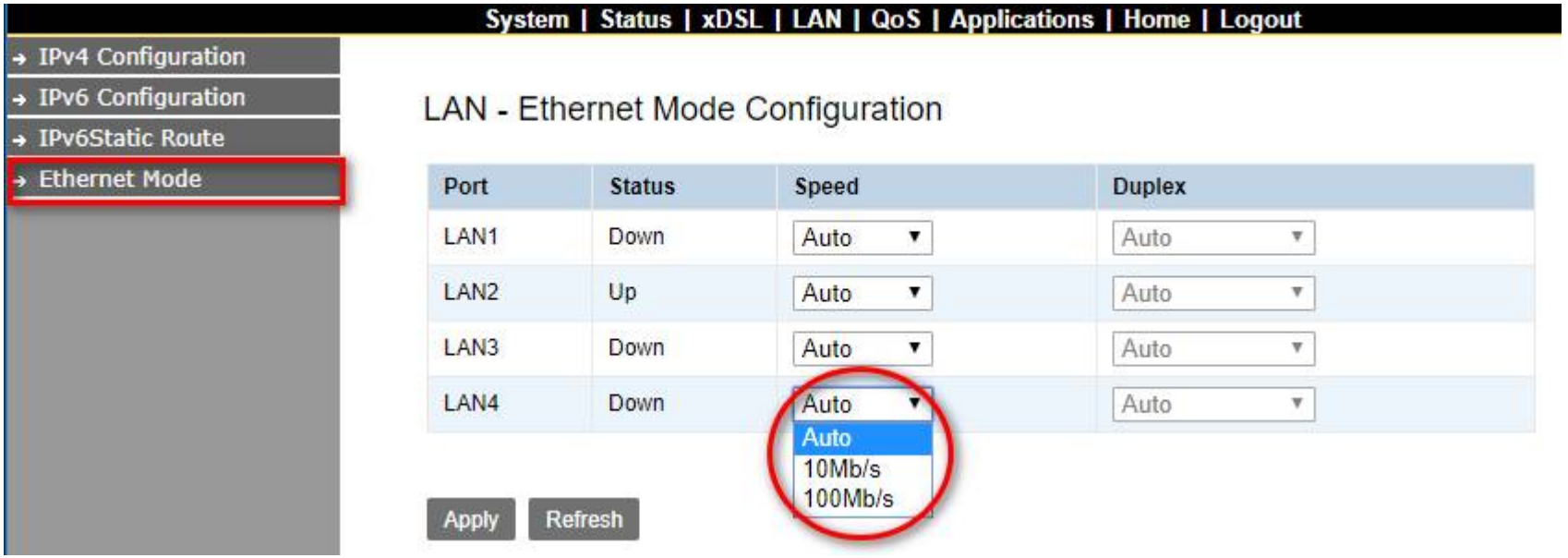


Figure 4.6.4 LAN-Ethernet Mode Configuration

4.7 Qos Setup

Select "Qos". It includes the sub-menus of Qos Queue、Qos Classification. A screen is displayed as shown in Figure 4.7.

Figure 4.7 Qos

4.7.1 Qos Queue

Click on "Qos Queue" link in the left navigation bar, on the right page you will see how to enable Qos, and Upstream Queue Settings. There are four modes of Qos profiles. A screen is displayed as shown in Figure 4.7.1.

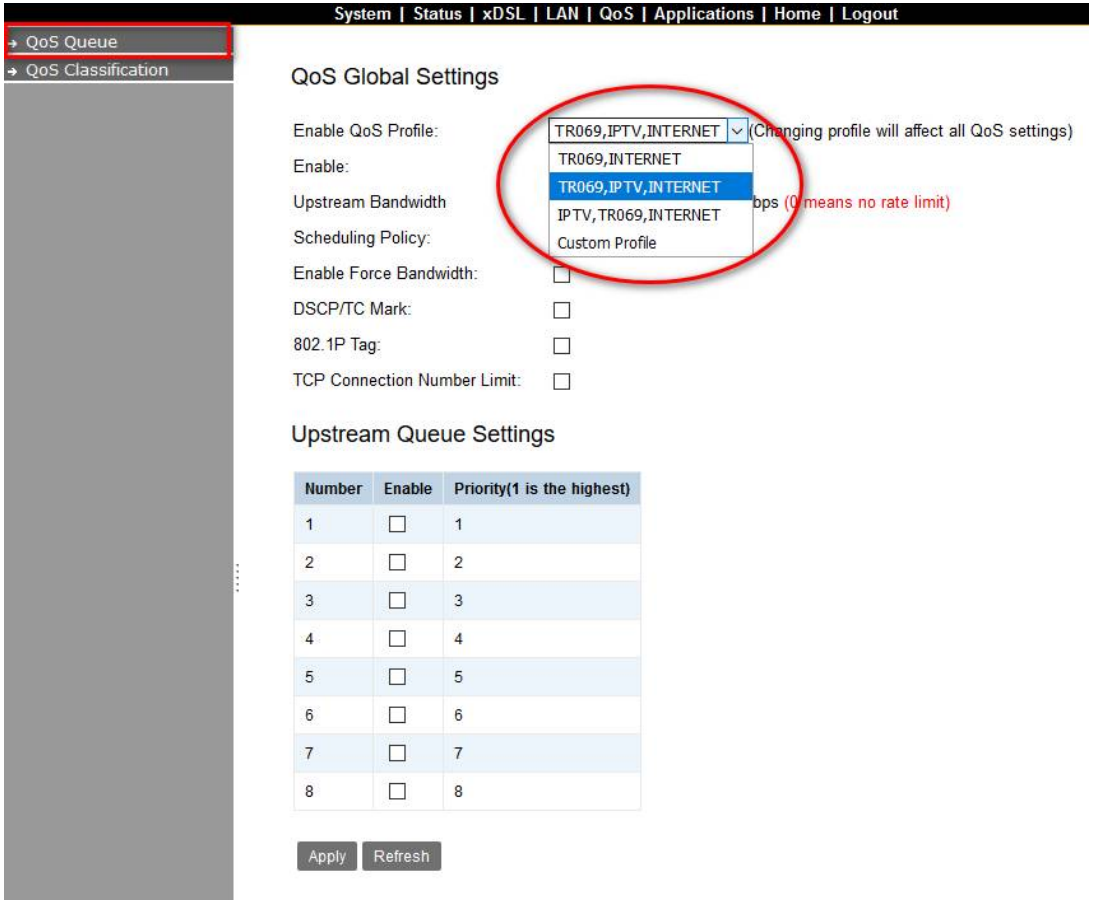


Figure 4.7.1 Qos Global Settings

4.8 Applications

Select "Applications". It includes the sub-menus of Telnet Service、SSH Service、Printer Share、Multimedia Share、UPnP、Multicast IGMP、Multicast MLD、SNMP. A screen is displayed as shown in Figure 4.8.

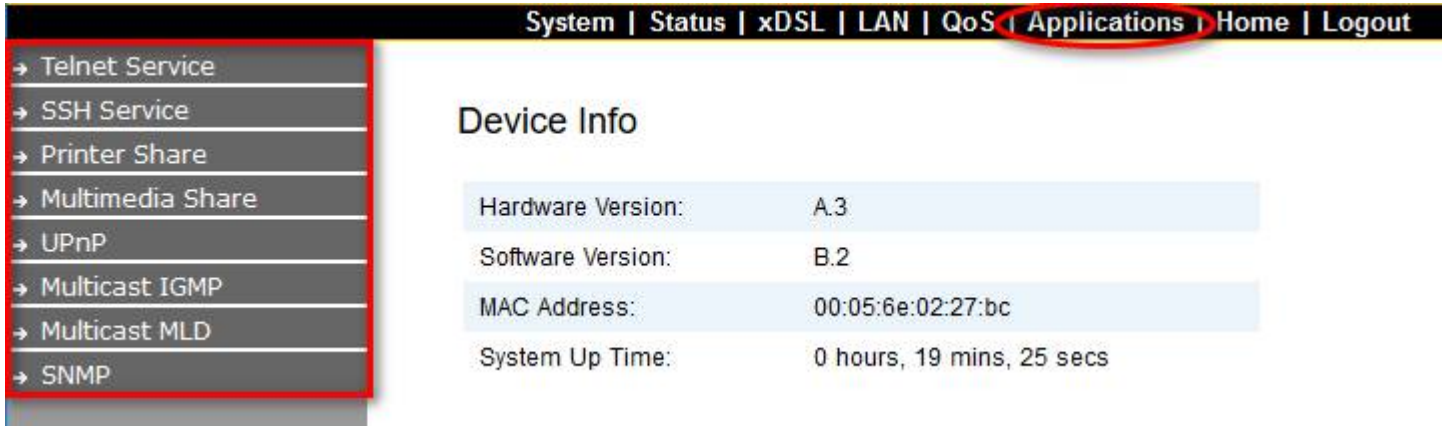


Figure 4.8 Applications

4.8.1 Telnet Service Setup(for Security)

Click on "Telnet Service" link in the left navigation bar, on the right page you will see how to enable Telnet Service. A

screen is displayed as shown in Figure 4.8.1

Figure 4.8.1 Service-Telnet Service Setup

4.8.2 SSH Service(Telnet Encryption)

Click on "SSH Service" link in the left navigation bar, on the right page you will see how to enable SSH Service.
A screen is displayed as shown in Figure 4.8.2

Figure 4.8.2 SSH Service Setup

4.8.3 Printer Sharing

Click on "Printer Share" link in the left navigation bar, on the right page you will see how to enable Printer Service, and type Queue Name. A screen is displayed as shown in Figure 4.8.3.

Figure 4.8.3 Printer Service Setup

4.8.4 Multimedia Sharing

Click on "Multimedia Share" link in the left navigation bar, on the right page you will see how to enable DMS, and select Share Folders. A screen is displayed as shown in Figure 4.8.4.

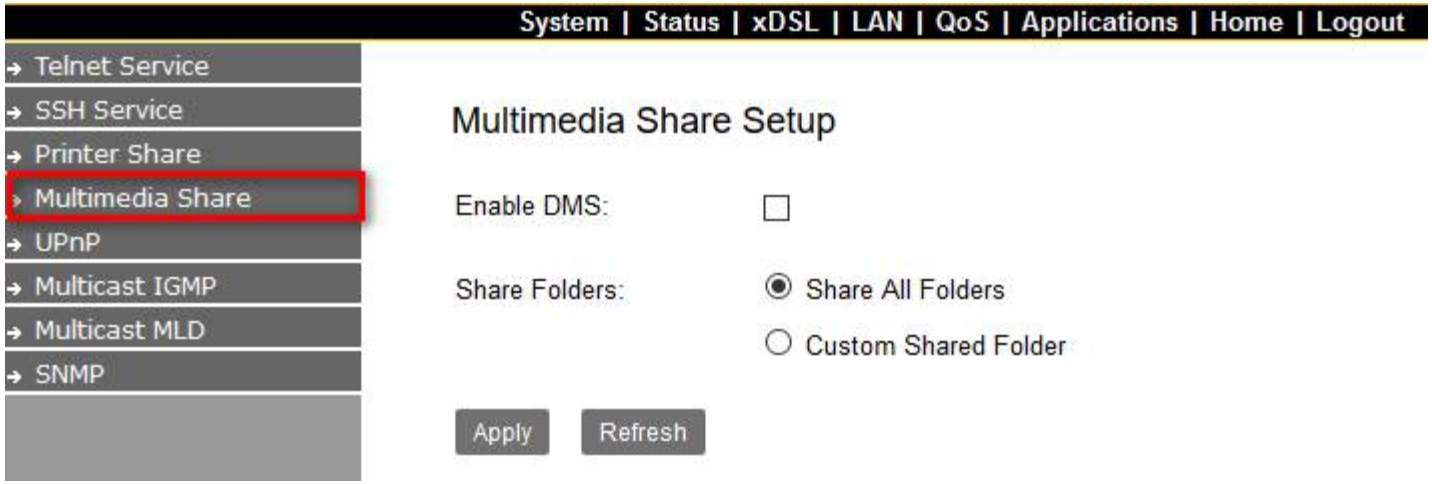


Figure 4.8.4 Multimedia Share Setup

4.8.5 UPnP

Click on "UPnP" link in the left navigation bar, on the right page you will see how to enable UPnP, and add Blacklist. A screen is displayed as shown in Figure 4.8.5.

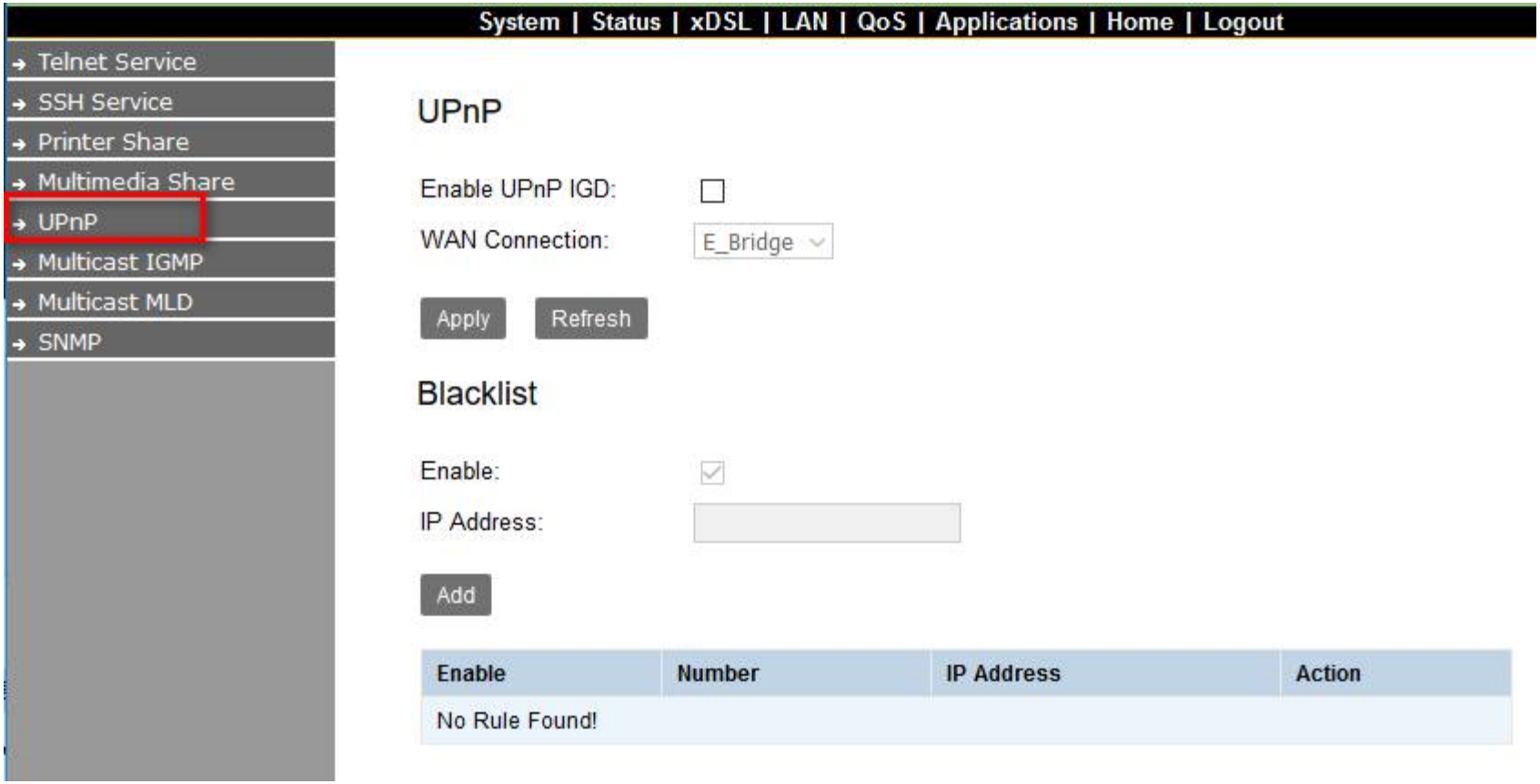


Figure 4.8.5 UPnP

4.8.6 Multicast IGMP

Click on "Multicast IGMP" link in the left navigation bar. According to the setting, if you want to test IGMP function, you only need to enable IGMP function basic on the Application setup.

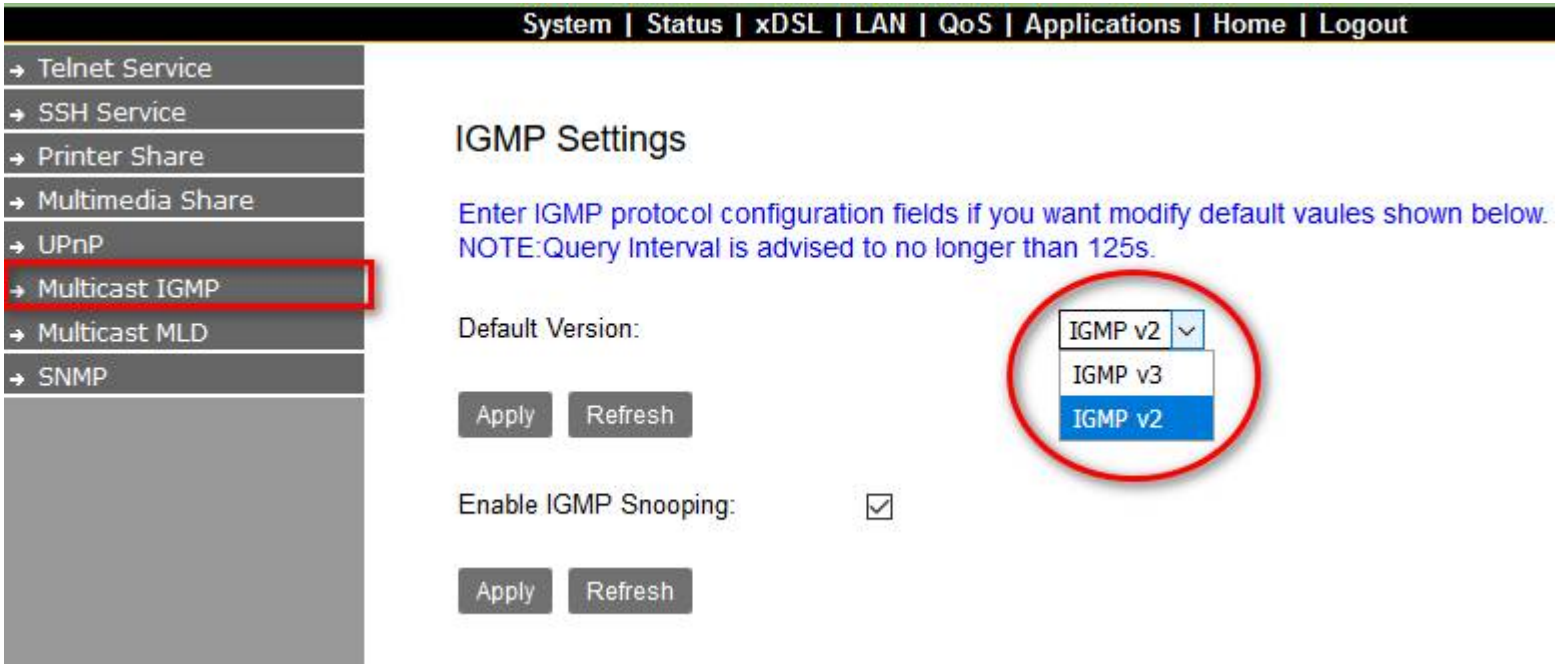


Figure 4.8.6 IGMP Settings

4.8.7 Multicast MLD (IPv6)

Click on "Multicast MLD" link in the left navigation bar. According to the setting, if you want to test MLD function, you only need to enable MLD function basic on the Application setup.

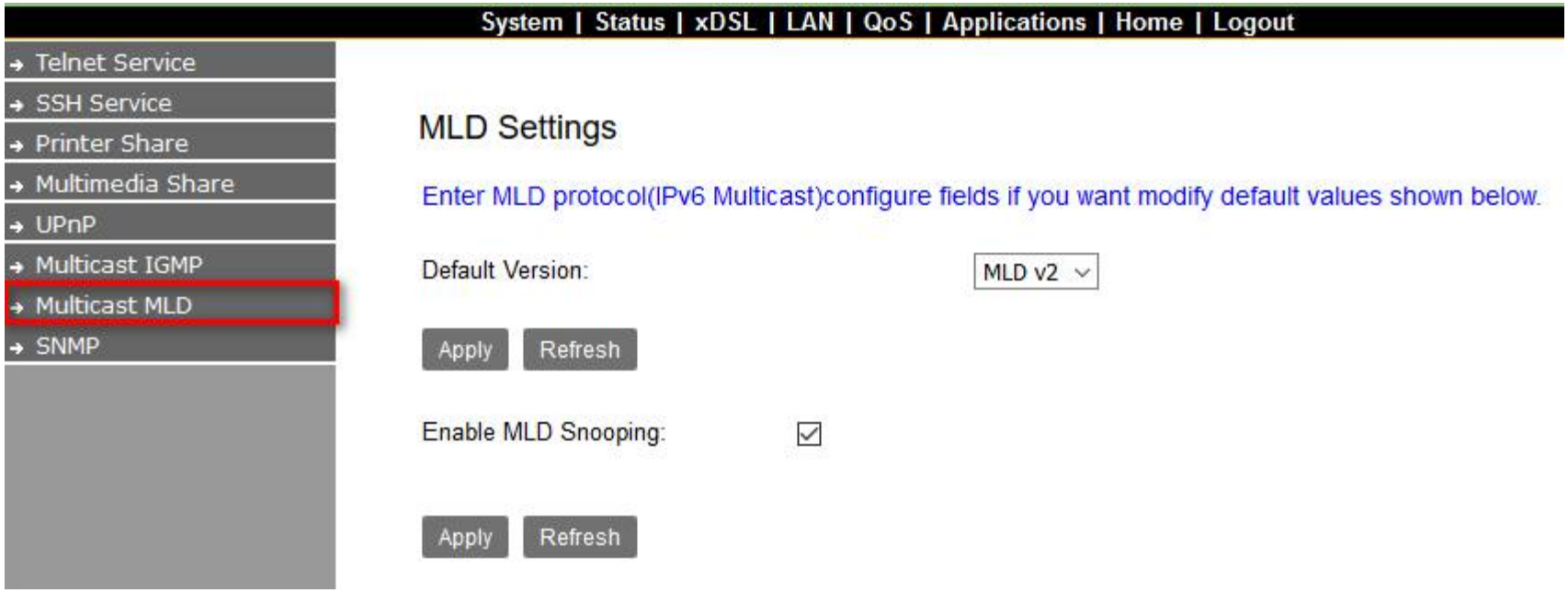


Figure 4.8.7 MLD Settings

4.8.8 SNMP

Click on "SNMP" link in the left navigation bar, on the right page you will see how to enable SNMP function. VC-450LR supports SNMP V1/V2.

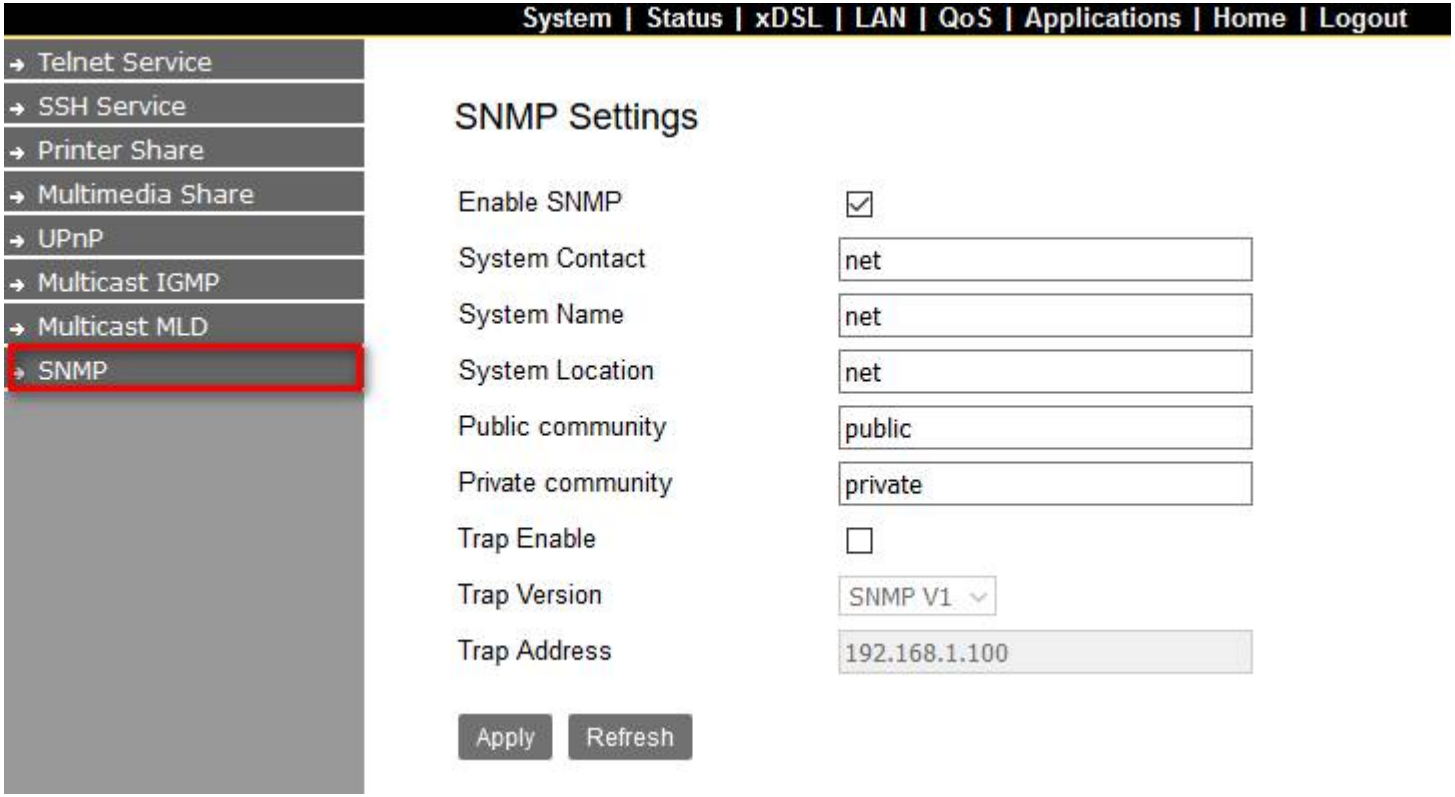
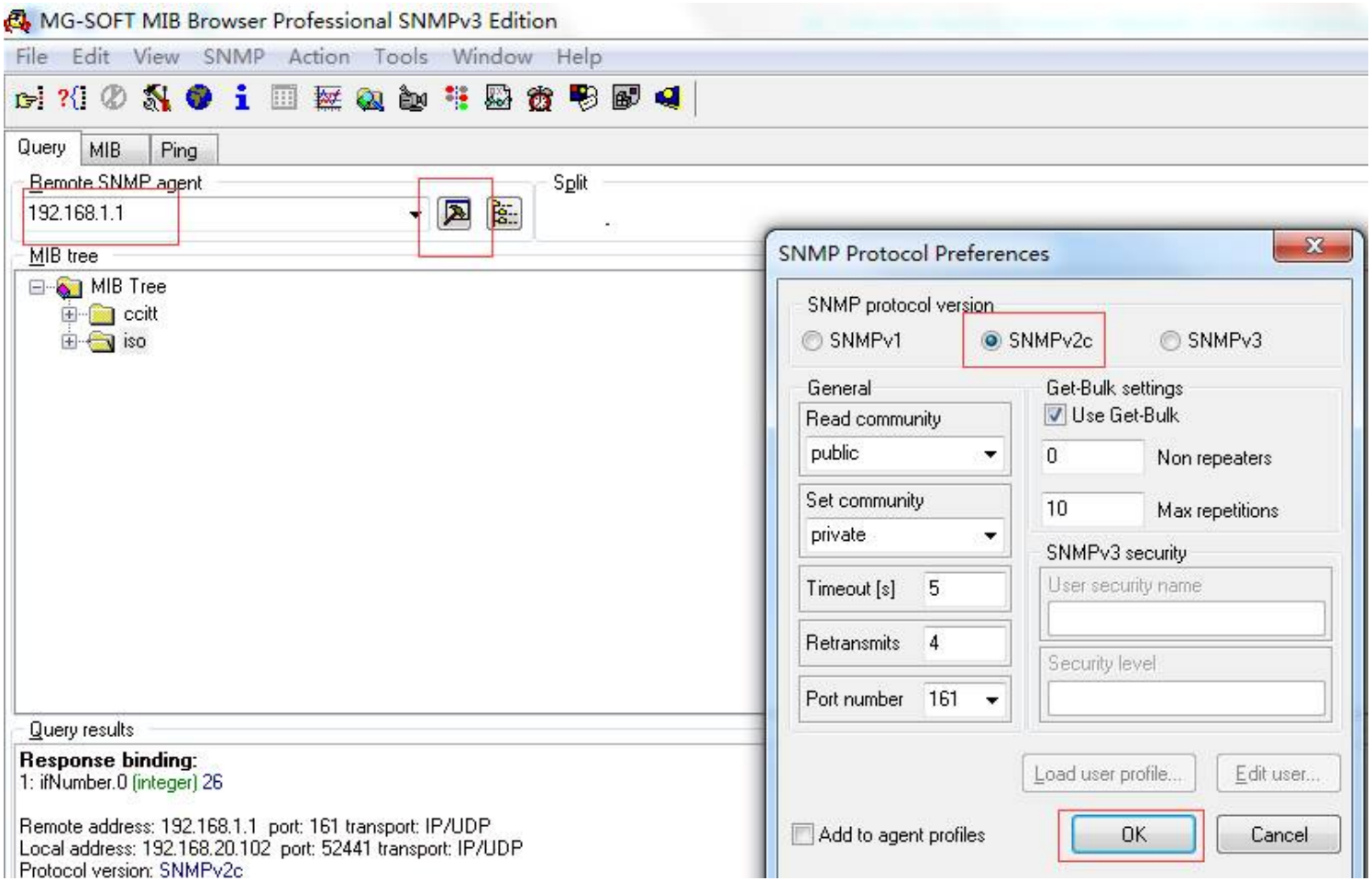
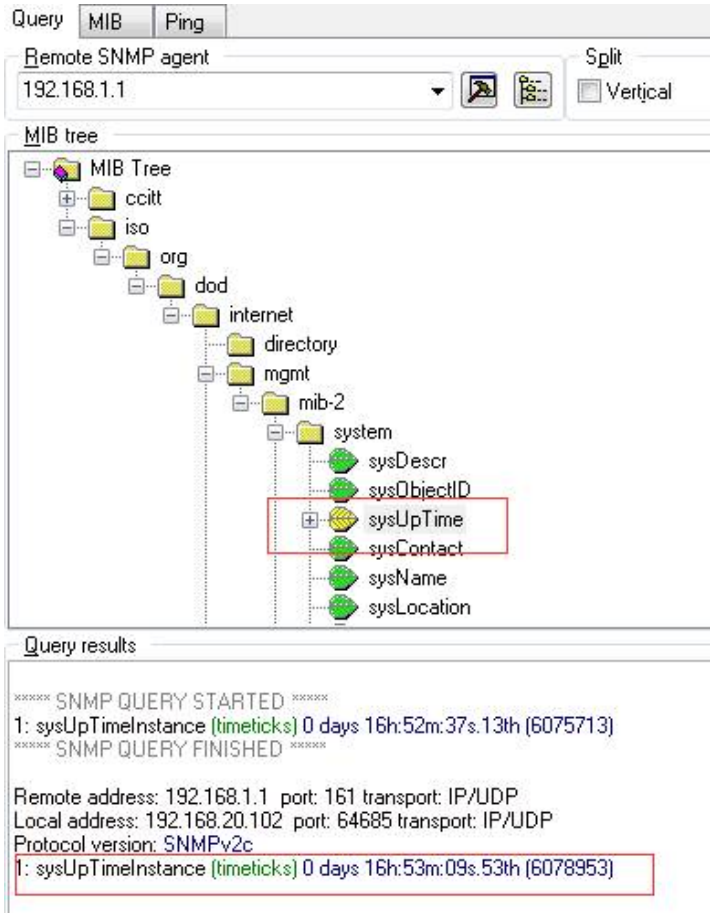


Figure 4.8.8 SNMP Settings

Download "MG-SOFT MIB Browser". Below picture indicate how to use the software, and connect remote SNMP agent.



Select OID:1.3.6.1.2.1.1.3
SysUp Time



Appendix A: Cable Requirements

A.1 Ethernet Cable

A CAT 3~7 UTP (unshielded twisted pair) cable is typically used to connect the Ethernet device to the Modem. A 10Base-T

cable often consists of four pairs of wires, two of which are used for transmission. The connector at the end of the 10Base-T cable is referred to as an RJ-45 connector and it consists of eight pins. The Ethernet standard uses pins 1, 2, 3 and 6 for data transmission purposes. (Table A-1)

Table A-1 RJ-45 Ethernet Connector Pin Assignments

PIN #	MDI		MDI-X	
	Signal	Media Dependant interface	**Signal**	Media Dependant interface-cross
1	TX+	Transmit Data +	RX+	Receive Data +
2	TX-	Transmit Data -	RX-	Receive Data -
3	RX+	Receive Data +	TX+	Transmit Data +
4	--	Unused	--	Unused
5	--	Unused	--	Unused
6	RX-	Receive Data -	TX-	Transmit Data -
7	--	Unused	--	Unused
8	--	Unused	--	Unused

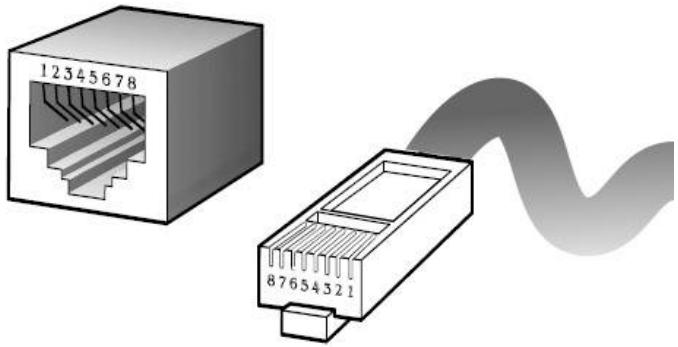


Figure A-1 Standard RJ-45 repectacle/connector

Note:

Please make sure your connected cables have the same pin assignment as the table above before deploying the cables into your network.

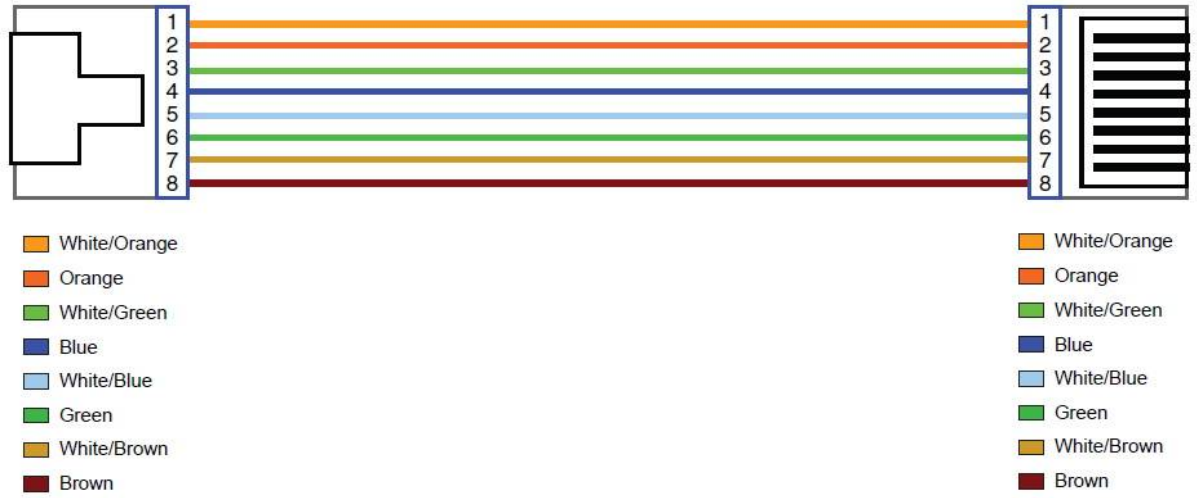


Figure A-2 Pin Assignments and Wiring for an RJ-45 Straight-Through Cable

Figure A-3 Pin Assignments and Wiring for an RJ-45 Crossover Cable

A.2 Telephone wire

Standard telephone wire of any gauge or type-flat, twisted or quad is used to connect the Modem to the telephone network. A telephone cable typically consists of three pairs of wires, one of which is used for transmission. The connector at the end of the telephone cable is called an RJ-11 connector and it consists of six pins. POTS (plain old telephone services) use pins 3 and 4 for voice transmission. A telephone cable is shown below. (Figure A-4)

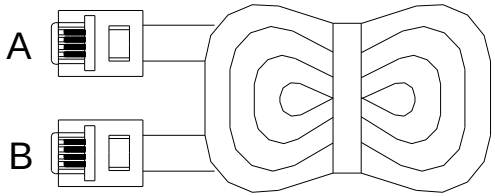


Figure A-4 Telephone cable

The A and B connectors on the rear of the Modem are RJ-11 connectors. These connectors are wired identically. The RJ-11 connectors have six positions, two of which are wired. The Modem uses the center two pins. The pin out assignment for these connectors is presented below. (Table A-2)

Table A-2 RJ-11 Pin out Assignments

Pin#	MNEMONIC	FUNCTION
1	NC	Unused
2	NC	Unused
3	**TIP**	**POTS**
4	**RING**	**POTS**
5	NC	Unused
6	NC	Unused

Appendix B: Product Specification

Key Features & Benefits

- Dual DC input power Redundant 12~48VDC
- Wide operating temperature -20 ~70 C
- Adopts ARM Cortex A9 dual-core processor
- IP30 metal housing and DIN rail support
- Supports SNMP V1/ V2
- Supports RJ11 & Terminal Block combo port
- Supports Master/ Slave Mode selectable by Web config
- Supports Jumbo frame up to 2k
- Supports up to VDSL2 profile 30a
- Supports G.998.4 G.INP
- Supports IPV4/ IPV6 address
- Supports Dual Firmware Image Backup
- Supports on board surge protection
- Supports IGMP snooping V2/ V3
- Support SSL/ SSH/ TR-069

Note:

1. Features and specifications in this manual are subject to change without prior notice.
2. (*) Firmware upgradeable for future enhancement.

Product Specification

Standard:	IEEE802.3 10Base-T IEEE 802.3u 100Base-TX Complies with ITU-T G993.2
Regulatory Compliance:	FCC CEs RoHS Compliance
Physical Interface:	4x RJ-45 10/100Mbps 1x RJ-11 Line port 1x Terminal Block
LED Indicators:	1 x Power LED 4 x Link/Active Status for Ethernet port 1 x Link LED for VDSL2 port 1 x CO(Master) LED
Switch method:	Store and forward
Flow control:	Full duplex: IEEE 802.3x Half duplex: Back pressure
Typical Power Consumption:	4.4W (Full load, without port)
Power Supply:	Dual DC input power Redundant 12~48V (Removable Terminal Block)
Operating Temperature:	-20°C ~ 70°C (-4°F ~ 158°F)

	Fanless, free air cooling
Storage Temperature:	-40°C ~ 70°C (-40°F ~158°F)
Humidity:	5 - 95% non-condensing
Dimensions:	182x142x35.5 mm (7.16"x5.59"x1.39")
Weight:	About 0.8 kg
EMC Certification:	EMI Compliant: FCC EMS Compliant: CE mark

Appendix C: Troubleshooting

Diagnosing the Modem's Indicators

The modem can be easily monitored through its comprehensive panel indicators. These indicators assist the network manager in identifying problems the hub 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 External power supply
Solution:	Check the power plug by plugging in another that is functioning properly. Check the power cord with another device. Check the terminal block make sure to fasten the power cord. If these measures fail to resolve the problem, have the unit power supply replaced by a qualified distributor.
Note:	Please refer to power status table to check power input status. Section 3.3

2. Symptom:	Link indicator does not light up (green) after making a connection.
Cause:	Network interface (ex. a network adapter card on the attached device), network cable, or switch port is defective.
Solution:	2.1 Verify that the switch and attached device are power on. 2.2 Be sure the cable is plugged 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 modem on the attached device and cable connections for possible defects. 2.5 Make sure that the phone wire must be connecting VC-450LR first, when powered on. 2.6 Replace the defective modem or cable if necessary.

	2.7 Or try to change band profile as 17a for getting long reach

3. Symptom:	Line Link cannot be established.
Cause:	VC-450LR Master/Slave setting failure or phone cable length is over the specification limit.
Solution:	3.1 Please make sure that the phone wire must be connected between VC-450LR(Master) side and VC-450LR(Slave) side when both are power on. VC-450LR Master side will do link speed function depending on phone wire length, therefore if VC-450LR Master side can't detect Slave Side over phone wire while both power on, this will cause the Link to fail. 3.2 Please check phone wire, we recommend use 24-26 gauge with twisted pair and without rust. 3.3 Please reinsert power when change cable length or link time over 3 minutes. 3.4 Or try to change band profile as 17a for getting long reach.
Note:	Phone wire must meet CAT 3 standard or above and twisted pair, otherwise will cause more cross talk issue to reduce Line power driver.

4. Question:	What is VDSL2 technology? (Only reference)
Answer:	Very-high-speed digital subscriber line 2 (VDSL2) is an access technology that exploits the existing infrastructure of copper wires that were originally deployed for traditional telephone service. It can be deployed from central offices, from fiber-optic connected cabinets located near the customer premises, or within buildings. It was defined in standard ITU-T G.993.2 finalized in 2005. VDSL2 was the newest and most advanced standard of digital subscriber line (DSL) broadband wireline communications. Designed to support the wide deployment of triple play services such as voice, video, data, high definition television (HDTV) and interactive gaming, VDSL2 was intended to

	enable operators and carriers to gradually, flexibly, and cost-efficiently upgrade existing xDSL infrastructure. The protocol was standardized in the International Telecommunication Union telecommunications sector (ITU-T) as Recommendation G.993.2. It was announced as finalized on 27 May 2005,[1] and first published on 17 February 2006. Several corrections and amendments were published in 2007 through 2011. VDSL2 is an enhancement to very-high-bitrate digital subscriber line (VDSL), Recommendation G.993.1. It permits the transmission of asymmetric and symmetric aggregate data rates up to 200 Mbit/s downstream and upstream on twisted pairs using a bandwidth up to 30 MHz. VDSL2 deteriorates quickly from a theoretical maximum of 250 Mbit/s at source to 100 Mbit/s at 0.5 km (1,600 ft) and 50 Mbit/s at 1 km (3,300 ft), but degrades at a much slower rate from there, and still outperforms VDSL. Starting from 1.6 km (1 mi) its performance is equal to ADSL2+. ADSL-like long reach performance is one of the key advantages of VDSL2. LR-VDSL2 enabled systems are capable of supporting speeds of around 1–4 Mbit/s (downstream) over distances of 4–5 km (2.5–3 miles), gradually increasing the bit rate up to symmetric 100 Mbit/s as loop-length shortens. This means that VDSL2-based systems, unlike VDSL1 systems, are not limited to short local loops or MTU/MDUs only, but can also be used for medium range applications.

5. Symptom:	Connected the VC-450LR Master side with Slave side within 300 meters RJ-11 phone cable got only less than 10 Mbit/s.
Cause:	Some testing program which is base on TCP/IP protocol such as FTP, Iperf, NetIQ, the bandwidth of testing outcome will be limited by TCP window size.
Solution:	We recommend to test VC-450LR bandwidth best by Smartbit equipment, if you don't have Smartbit, we recommend test that by IPERF program, and TCP window size must be settled max. 64k, the parameter as iperf –c server IP address –i 1 –t 50 –w 65535 for client side.

6. Question:	I just bought a VC-450LR to replace my Quest DSL modem for my home. I was told any VDSL2 modem would replace and give me higher communication speeds. It doesn't get me internet when hooked up. All lights come on but no Link light. Is this the complete wrong application for this unit?
Answer:	Re: Please note VC-450LR is a Master (CO side), it must be connected to the VC-450LR Slave(CPE side) to work. Band profile and band plan setting must be compatible to each other .

7. Question:	We need to set up a default gateway on a VC-450LR pair which are in Bridge mode, as they want to manage the units from a different network.
Answer:	When the application is used within the LAN, the switch(bridged) mode is not necessary to set up a gateway .However, if the application crosses various network segments (LAN to WAN(Line) or WAN(Line) to LAN), you must set up a gateway to connect different network segment. Regarding how to configure a default gateway at switch(bridged) mode for crossing various network segments . Configuration gateway example from static routing: Destination LAN IP: 0-0-0-0 Subnet Mask: 0-0-0-0 Gateway: 255-255-255-0 **Note:** Static Routing functionality is used to define the connected Gateway between the LAN and WAN.

8. Question:	What can I do if I forgot my password.
Answer:	If you forgot your password, you must reset your modem. Unfortunately this process will change all your settings back to the factory defaults. To reset the modem, locate the reset on the rear panel of the unit. With the modem powered on, use a paperclip to hold the button down for over 5 seconds.

	Release the button and the modem will go through its reboot process. The default ip is 192.168.16.249. When logging in, the default username and password both are "admin".

9. Question:	What is the maximum Ethernet frame MTU for these modems?
Answer:	VC-450LR maximum Ethernet frame MTU is 2K bytes.

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 power is off after running for a while, check for loose power connections, power losses or surges at the power outlet. If you still cannot isolate the problem, then the internal power supply may be defective. In this case, please contact your local dealer.

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 default method of selecting the transmission mode for RJ-45 ports is 10/100 Mbps ETHERNET, for RJ-11 line port are auto-speed VDSL2 PTM transmission. 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 commercial-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 a version that support Ethernet and VDSL.

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, then contact your dealer.

Appendix E: Compliance Information

FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a computing device, pursuant to Part 15 of 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 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 try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. The equipment and the receiver should be connected to outlets on separate circuits.
4. Consult the dealer or an experienced radio/television technician for help.

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

If this telephone equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make 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 in order for you to make necessary modifications to maintain uninterrupted service.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

FCC Warning

This equipment has been tested 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 when the equipment is operated in a commercial environment. This equipment can generate, use, and 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 owner's expense.

CE Mark Warning

This is a 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.

RoHS Mark Warning

RoHS stands for Restriction of Hazardous Substances, and impacts the entire electronics industry and many electrical products as well. The original RoHS, also known as Directive 2002/95/EC, originated in the European Union in 2002 and restricts the use of six hazardous materials found in electrical and electronic products. All applicable products in the EU market since July 1, 2006 must pass RoHS compliance. Directive 2011/65/EU was published in 2011 by the EU, which is known as RoHS-Recast or RoHS 2. RoHS 2 includes a **CE-marking directive**, with RoHS compliance now being required for CE marking of products. RoHS 2 also added Categories 8 and 9, and has additional compliance recordkeeping requirements. Directive 2015/863 was published in 2015 by the EU, which is known as RoHS 3. RoHS 3 adds four additional restricted substances (phthalates) to the list of six.

WEEE Warning

To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

Warranty

The original product that the owner 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. We shall not be liable for incidental or consequential damages. We neither assume nor authorize any person to assume for it any other liability.

WARNING:

1.DO NOT TEAR OFF OR REMOVE THE WARRANTY STICKER AS SHOWN, OR THE WARRANTY IS VOID.

2.WARRANTY VOID IF USE COMMERCIAL-GRADE POWER ADAPTER IS USED AT HARSH ENVIRONMENTS.