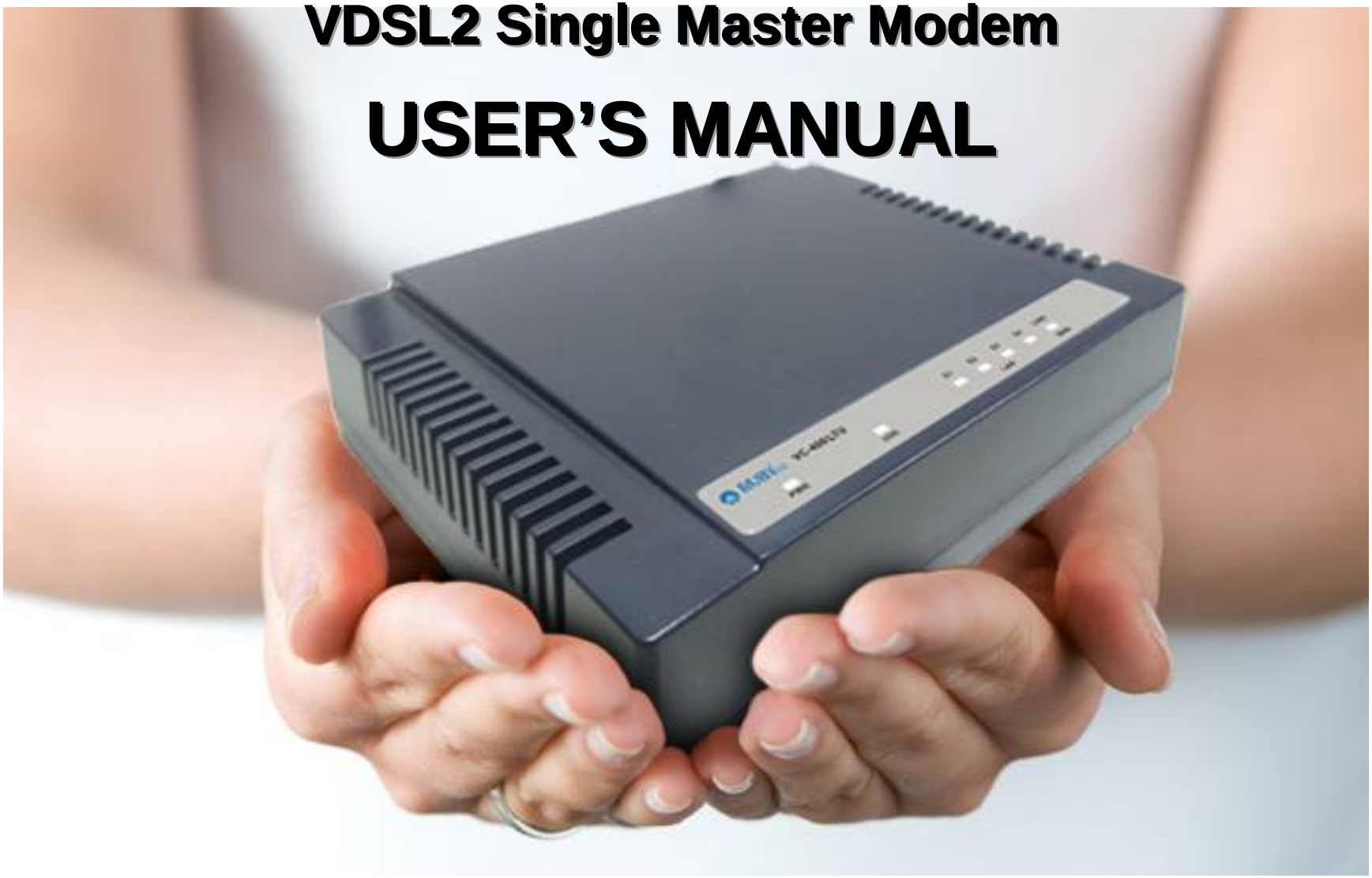
RUBYTECH
Deutschland GmbH
Networking & Communications

VC-400LTU

VDSL2 Single Master Modem

USER'S MANUAL



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Maximum signal rate derived from IEEE Standard specifications. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead, lower actual data throughput rate. RubyTech Germany GmbH does not warrant that the hardware will work properly in all environments and applications, and makes no warranty and representation, either implied or expressed, with respect to the quality, performance, merchantability, or fitness for a particular purpose. Make sure you follow in line with the environmental conditions to use this

product.

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-400LTU supports 12 VDC power input).
- **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-400LTU is a VDSL2 Master Modem that leverages the extraordinary bandwidth promise of VDSL2 (max. 100Mbps symmetric) technology, the next step in the delivery of new high-speed Internet applications in commercial environments. Quick, easy, economical to install and maintain, the VC-400LTU works over existing copper wire infrastructure. VC-400LTU is a CO(Central Office) device. And compitable with the VC-400RTU CPE(Customer-premises equipment).
VC-400LTU 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-400LTU 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-400LTU is for **indoor** applications only. This product does not have waterproof protection, please do not use in outdoor applications.

Table of Contents

Chapter 1. Unpacking Information

1.1 Check List

Thank you for choosing RubyTech Germany GmbH VC-400LTU Before installing the router, please verify the contents inside the package.

Package Contents:

			
1 x VDSL2 CO Modem	1 x QR code for user's manual hyperlink.	Accessory Kit : 1 x DC12V Power Adapter	

Notes:

1. 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.
2. Do not use sub-standard power supply. Before connecting the power supply to the device, be sure to check compliance with the specifications. The VC-400LTU uses a DC12V/1A or above Switching power supply.

Chapter 2. Installing the Modem

2.1 Hardware Installation

This chapter describes how to install the modem, and establish the network connections. The VC-400LTU 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. **The VC-400LTU has 2 pre-installed rubber feet.**

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 V / 1A**
- 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.
- Please note that the voice spectrum allowed by the VC-400LTU internal splitter is 0 KHz ~ 120 KHz.

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 Connecting the RJ-11 / RJ-45 Ports

- The line port have 1 connector: RJ-11 . It is used to connect with VC-400LTU (CO) over a single pair phone wire to VC-400RTU CPE(Slave) side (point to point application). (Figure 2.1)

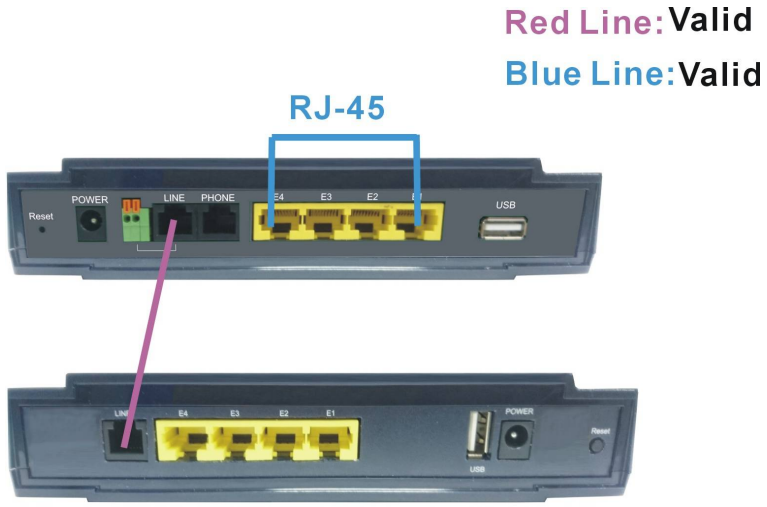


Figure 2.1 VC-400LTU line ports straight connection

- 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 modem. 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 Ethernet 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-400LTU boot.

5. Do not connect Line port with RJ-11 and Terminal block to two CPE modem.

2.5 VDSL2 Application

First a quick overview on a complete setup of VDSL2 CO/CPE Modem.
VC-400LTU/VC-400RTU is a modem leverages the extraordinary bandwidth promise of VDSL2(max 100Mbps Symmetric) technology (Figure 2.2)

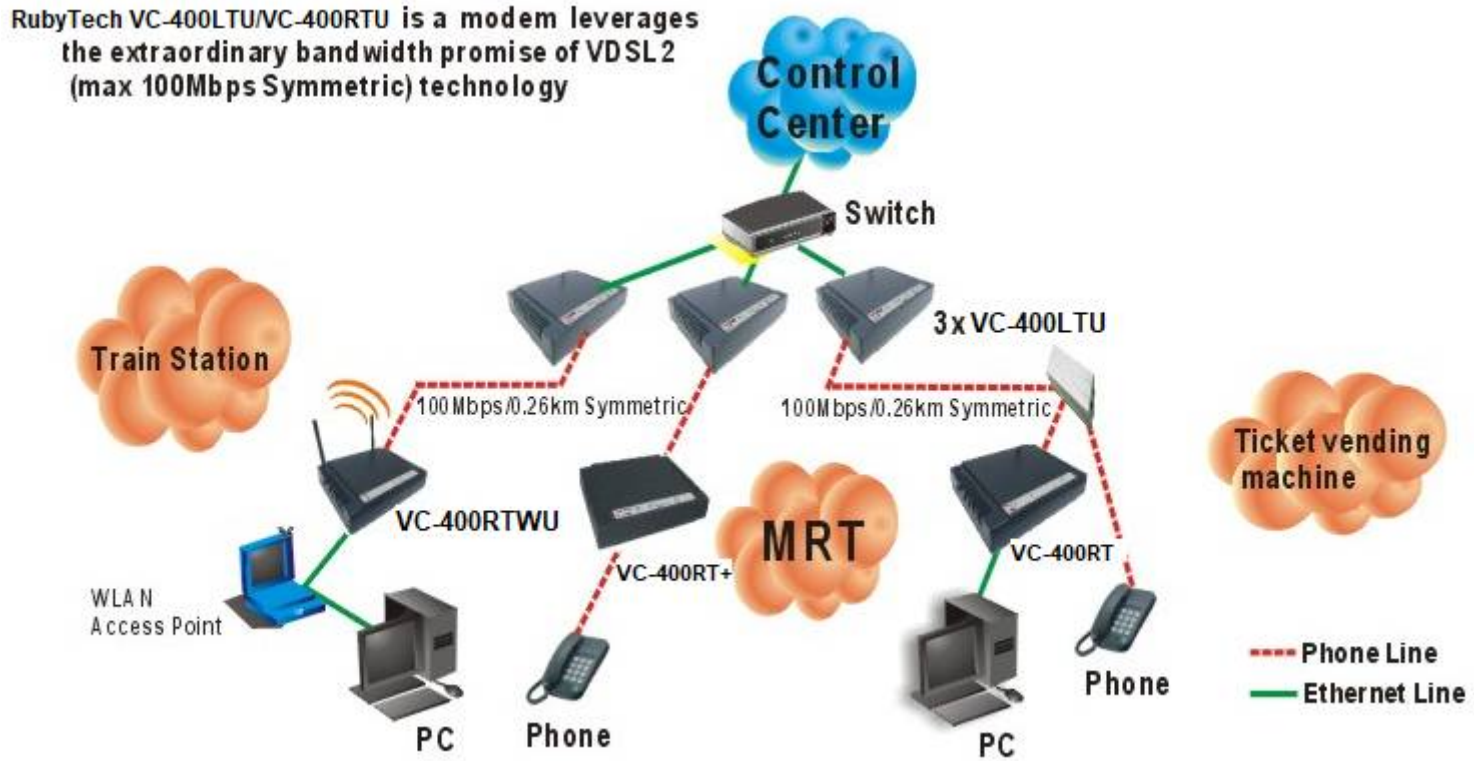


Figure 2.2 VC-400LTU application

◆ 2.5.1 Connect the VC-400LTU and the VC-400RTU to the Line

The objective for VDSL2 is to pass high speed data over a twisted pair cable. In the setup, connect VC-400LTU to VC-400RTU 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.

◆ 2.5.2 Connect the VC-400LTU and the VC-400RTU 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 side.

◆ 2.5.3 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 vdsl2 Modem It features the front panel and rear panel.

VC-400LTU Outward

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 the VDSL2 modem had power
		Off	The device is not ready or has malfunctioned.
LED	**Color**	**Status**	**Descriptions**
E1 ~ E4 (Ethernet LED)	Green	On(Steady)	The device has a good Ethernet connection.
		Blinking	The device is sending or receiving data.
		Off	The LAN is not connected or has malfunctioned.
LINK (VDSL2 LED)	Green	On(Steady)	The Internet or network connection is up.

		Fast Blinking	1. The CO device has detected a CPE device and ready to connect. 2. The device is sending or receiving data.
		Off	The Internet or network connection is down.
USB	Green	On (Steady)	The device has a good USB dongle connection.
		Off	The device is not ready or has malfunctioned.
CO	Green	On (Steady)	The device has a good Master connection.

Note:

It is normal for the connection between two Modems to take up to 3 minutes, due to VC-400LTU/VC-400RTU to establish a link mechanism in auto-negotiation, with detects and calculates CO and CPE both PBO and PSD level, noise levels and other arguments for getting a better connection.

3.3 Rear Panel

The following figure shows the rear panel. (Figure 3.2)

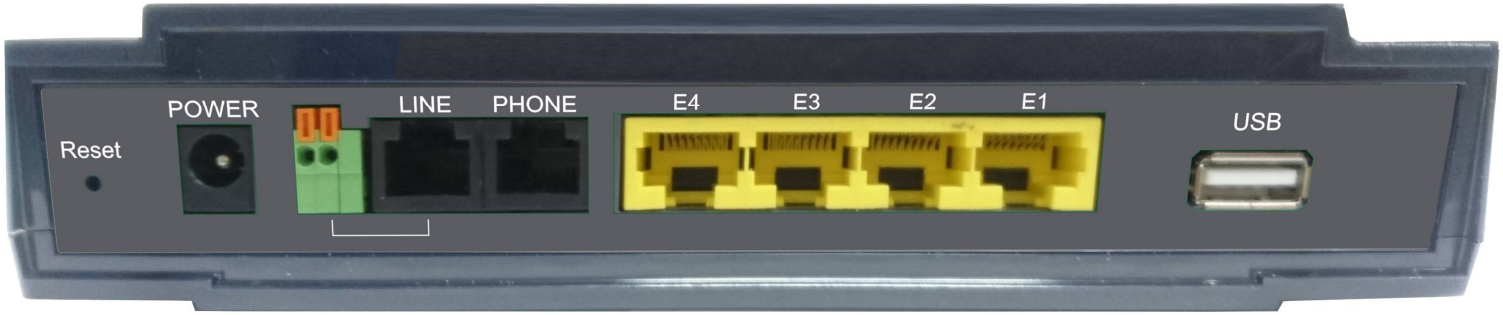


Figure 3.3 Rear Panel

And the table shows the description. (Table 3-2)

Table 3-2 Description of the modem rear connectors

Type	Connector	Description
Reset	Tact switch Button	The reset buttons allows users to reboot the VDSL2 or load the default settings. **Press and hold for 1-5 seconds: Reboot the VDSL2 Modem** **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 VDSL2 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.

USB	USB2.0 Type A	For connecting to the USB dongle.

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-400LTU Via Web Browser

The VC-400LTU provides a built-in HTML based management interface that allows configuration of the VC-400LTU 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 IP address 192.168.16.249 (VC-400LTU) in the Web page.
Following section user can find default username and password.

4.1 BASIC Setup

Login webpage

The IP address is 192.168.16.249 , username and password are admin.

Figure 4.1 Login Password

Display status

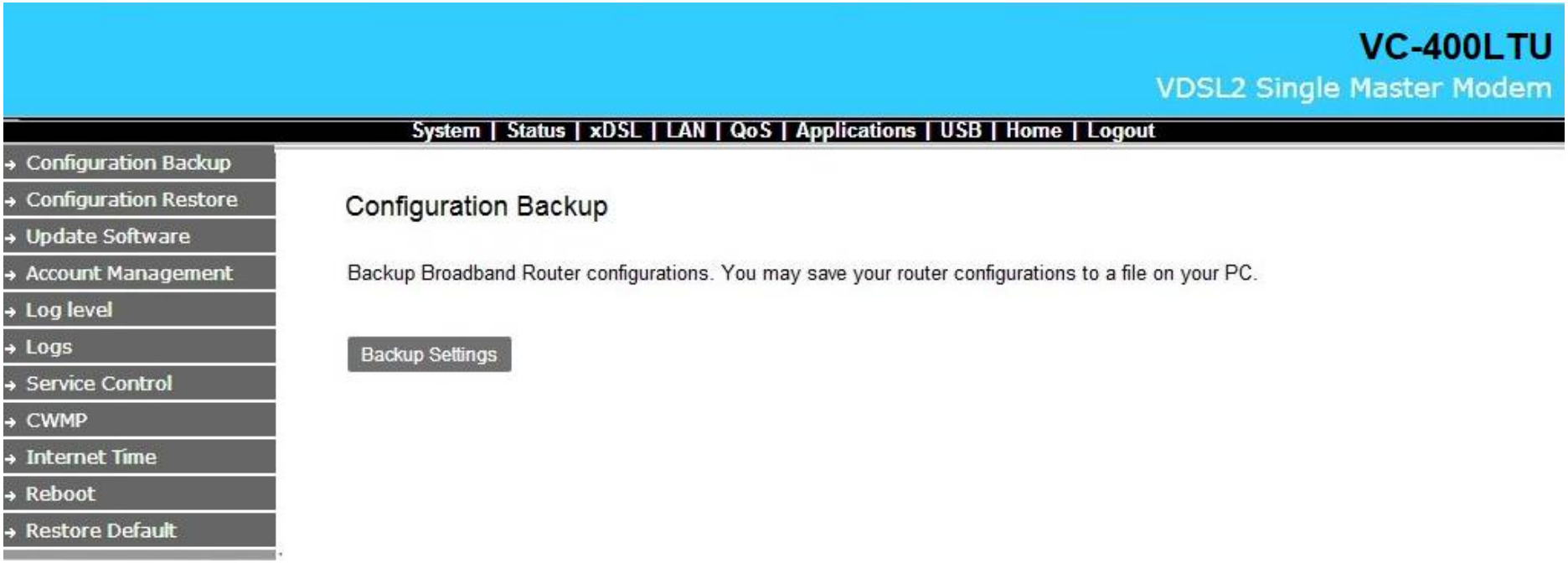
The status page displays some information. When the device is running.

For example:

Device Information:

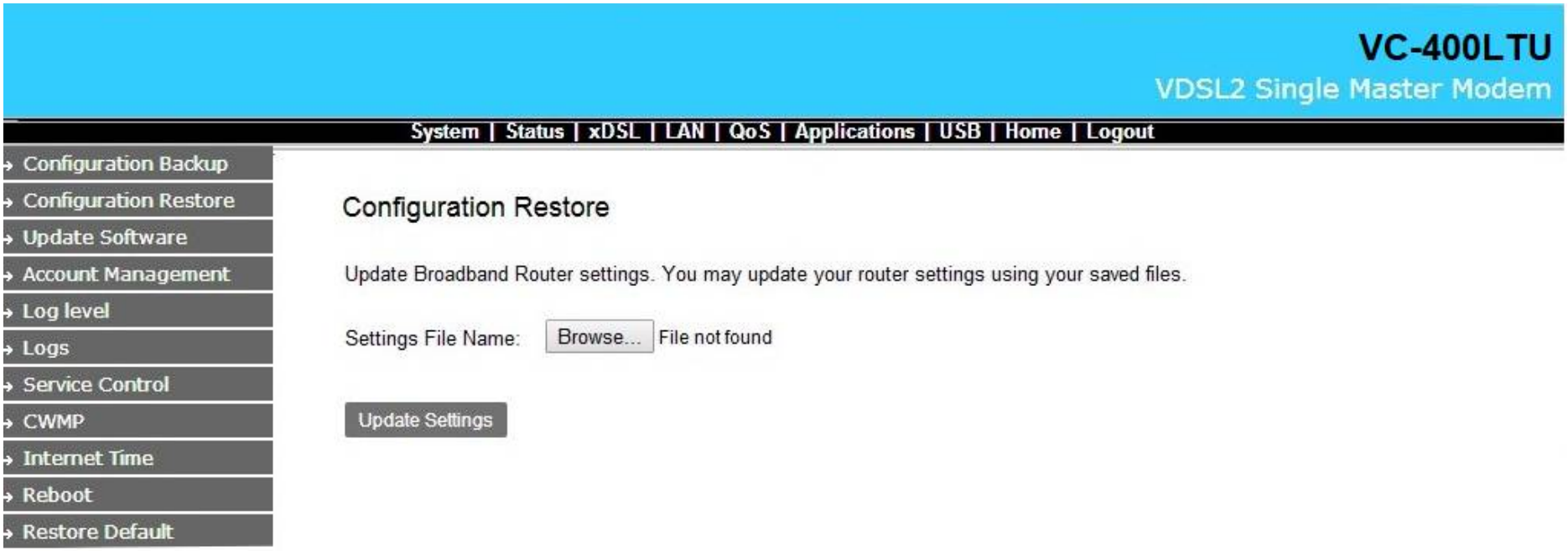
4.2 System Setup

System–> Configuration Backup



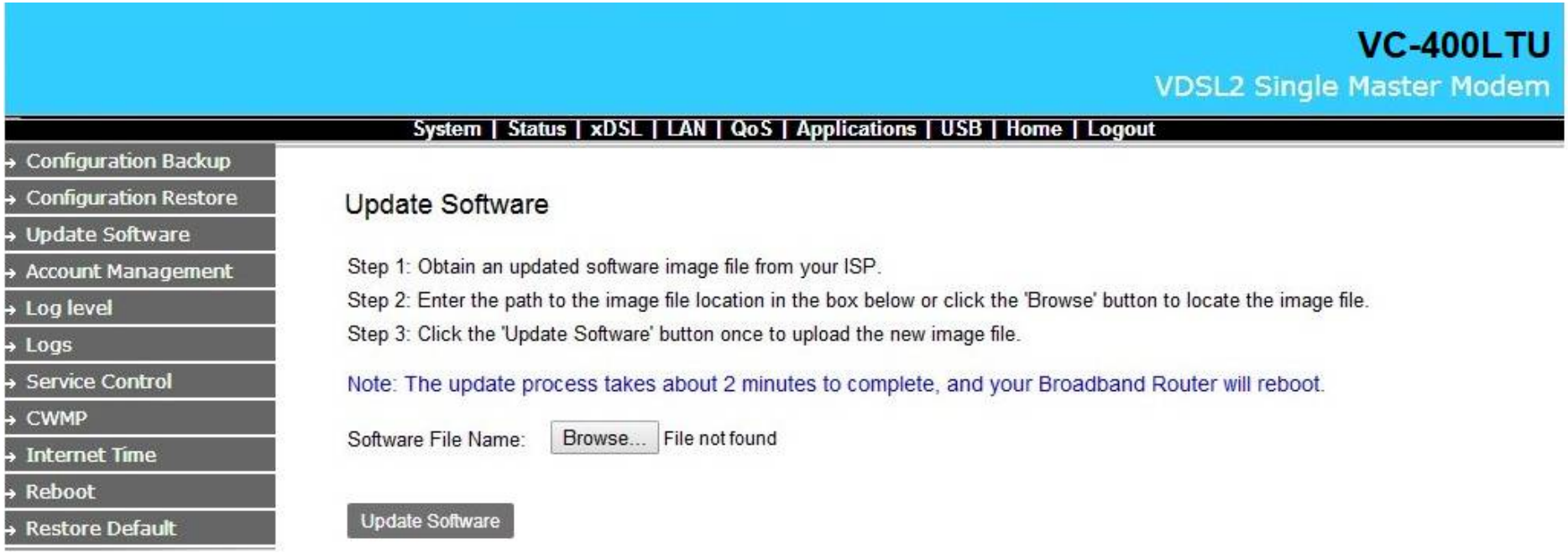
System-> Configuration Restore

Select "System" ->"Restore Default"
If Click "Restore Default Settings", the device will reboot in 10 seconds.

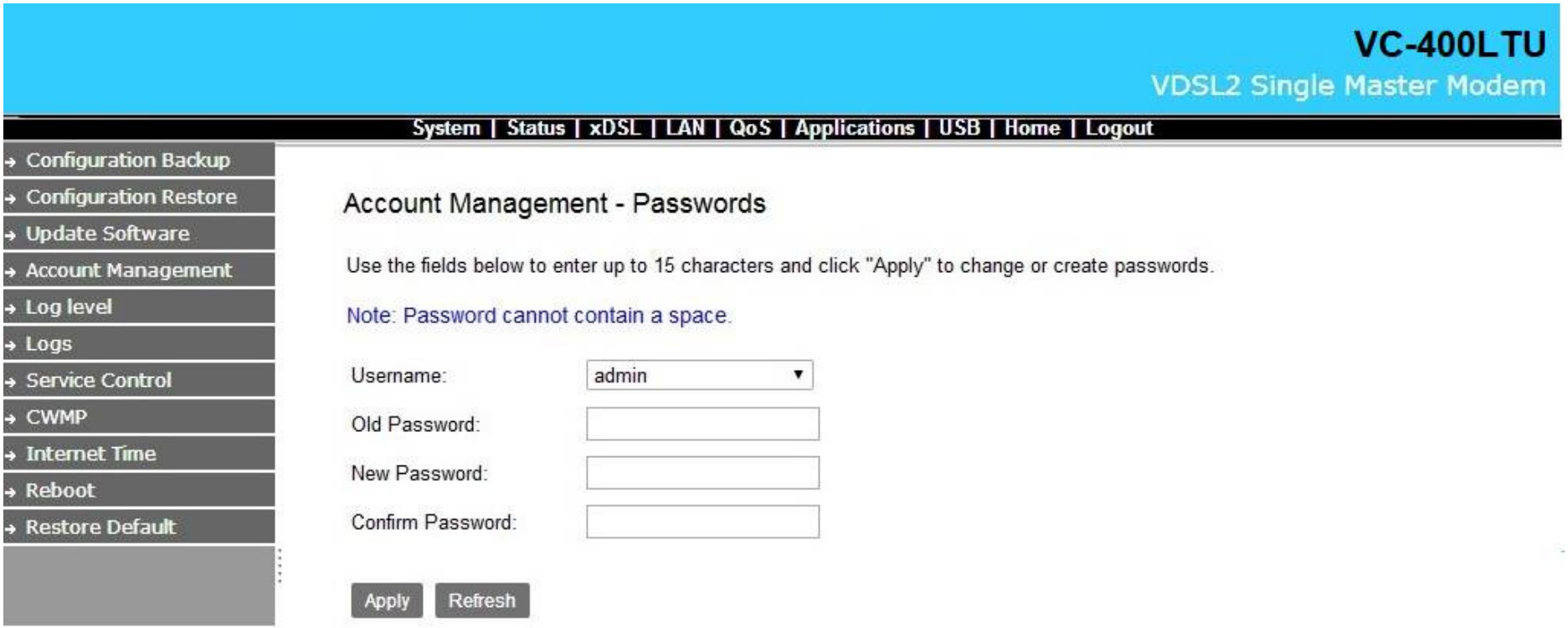


System->Update Software

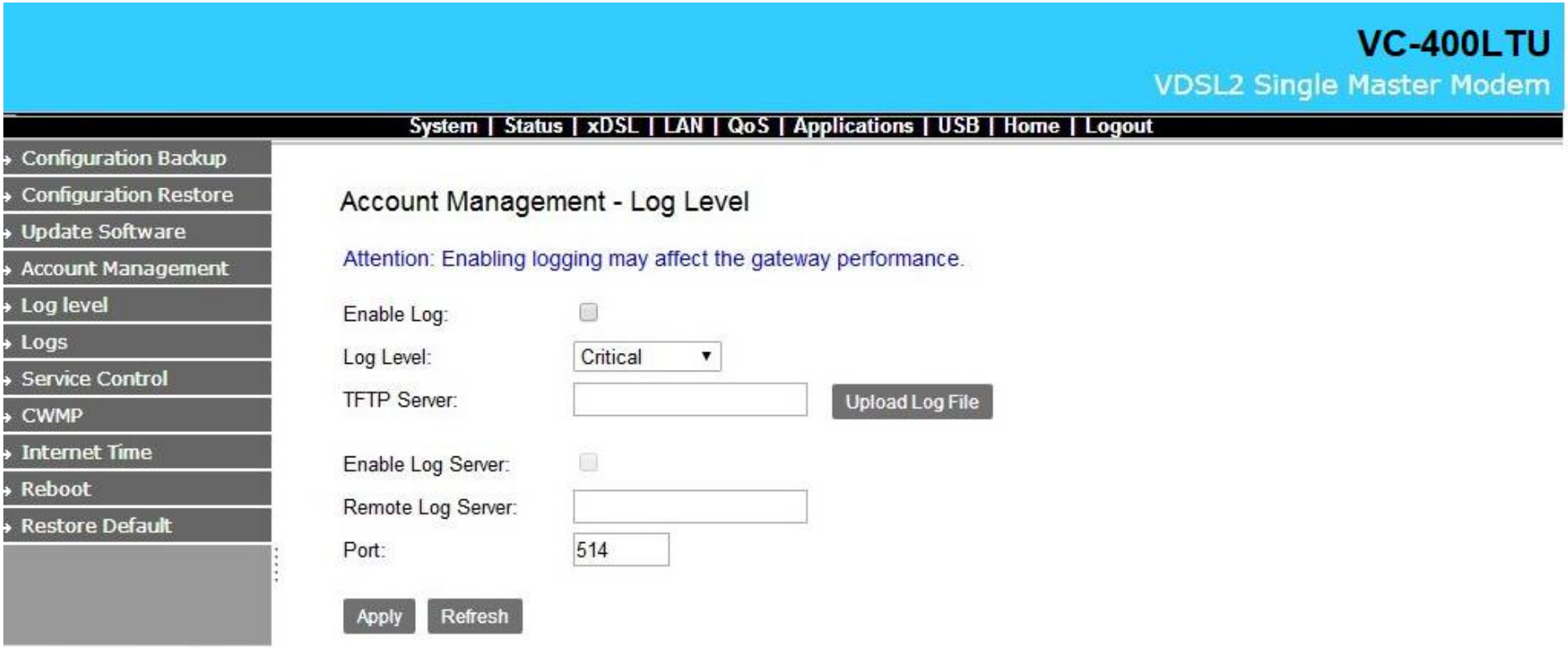
Select "System"->"update software"
Choose the newest Firmware file and do upgrading.



system->Account Management



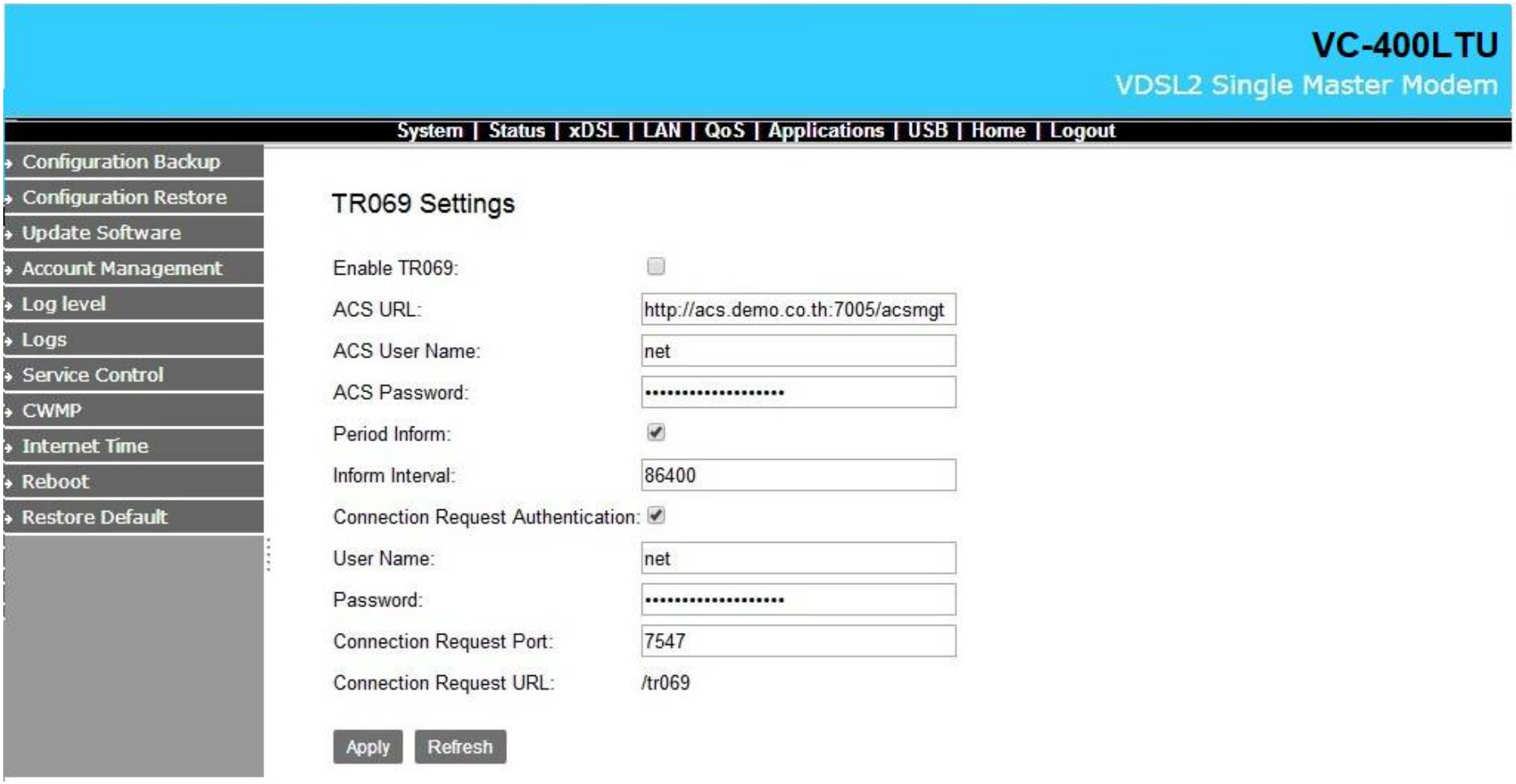
system->Account Management - Log Level



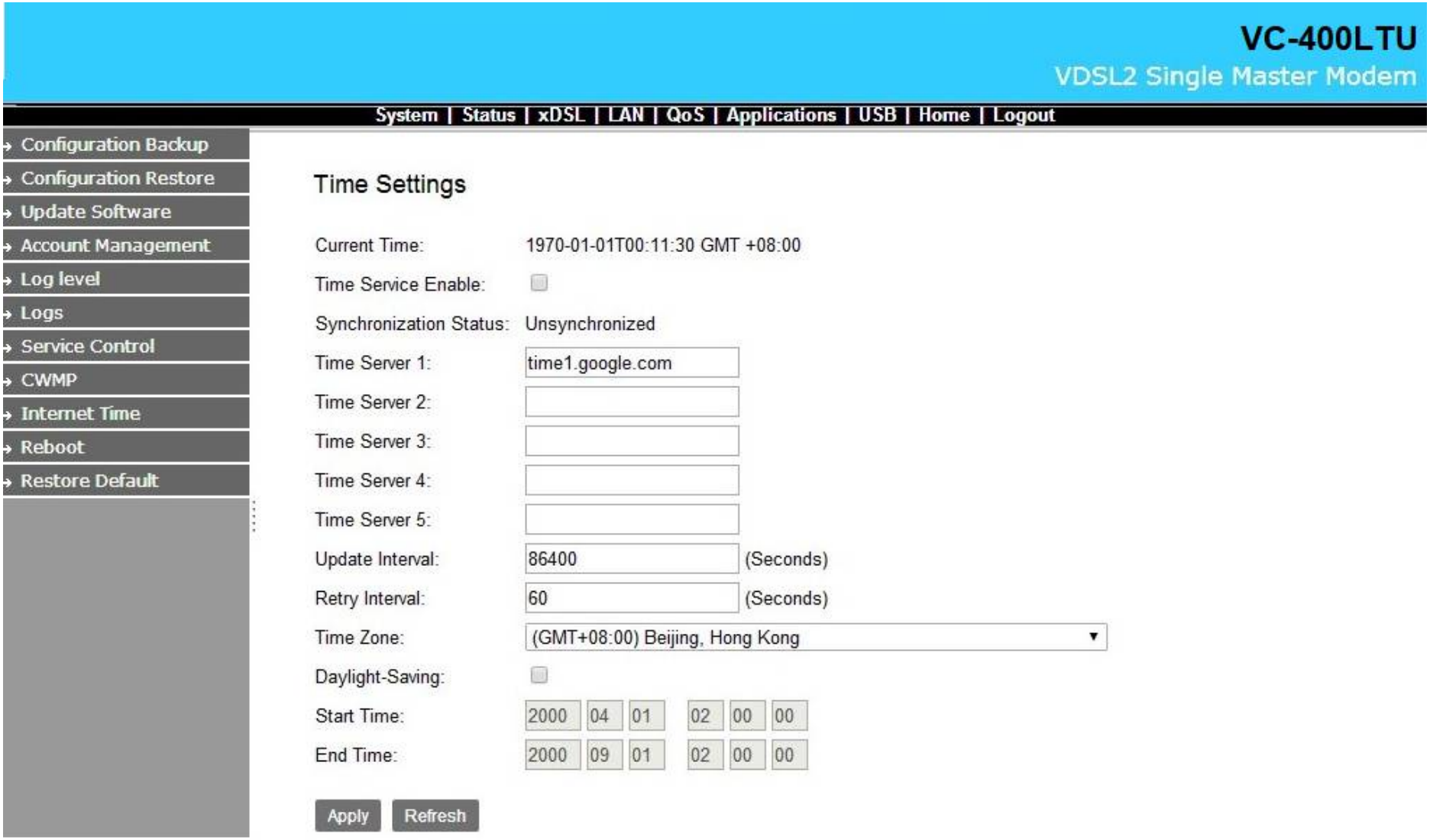
System->Service control

System->CWNP->TR-069 Settings

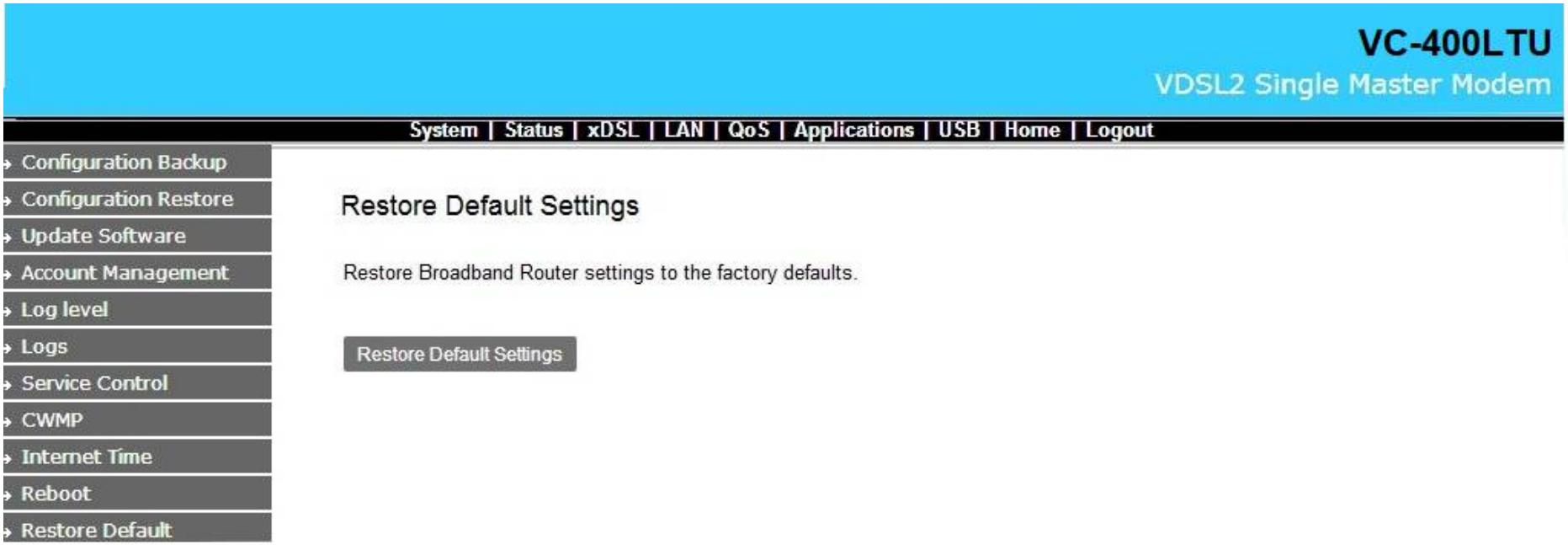
In System/CWMP page setup ACS URL/Username/Password TR069 and basic information.



System->Internet Time


VC-400LTU
VDSL2 Single Master Modem
System | Status | xDSL | LAN | QoS | Applications | USB | Home | Logout
Configuration Backup
Configuration Restore
Update Software
Account Management
Log level
Logs
Service Control
CWMP
Internet Time
Reboot
Restore Default
Time Settings
Current Time: 1970-01-01T00:11:30 GMT +08:00
Time Service Enable:
Synchronization Status: Unsynchronized
Time Server 1: time1.google.com
Time Server 2:
Time Server 3:
Time Server 4:
Time Server 5:
Update Interval: 86400 (Seconds)
Retry Interval: 60 (Seconds)
Time Zone: (GMT+08:00) Beijing, Hong Kong
Daylight-Saving:
Start Time: 2000 04 01 02 00 00
End Time: 2000 09 01 02 00 00
Apply
Refresh

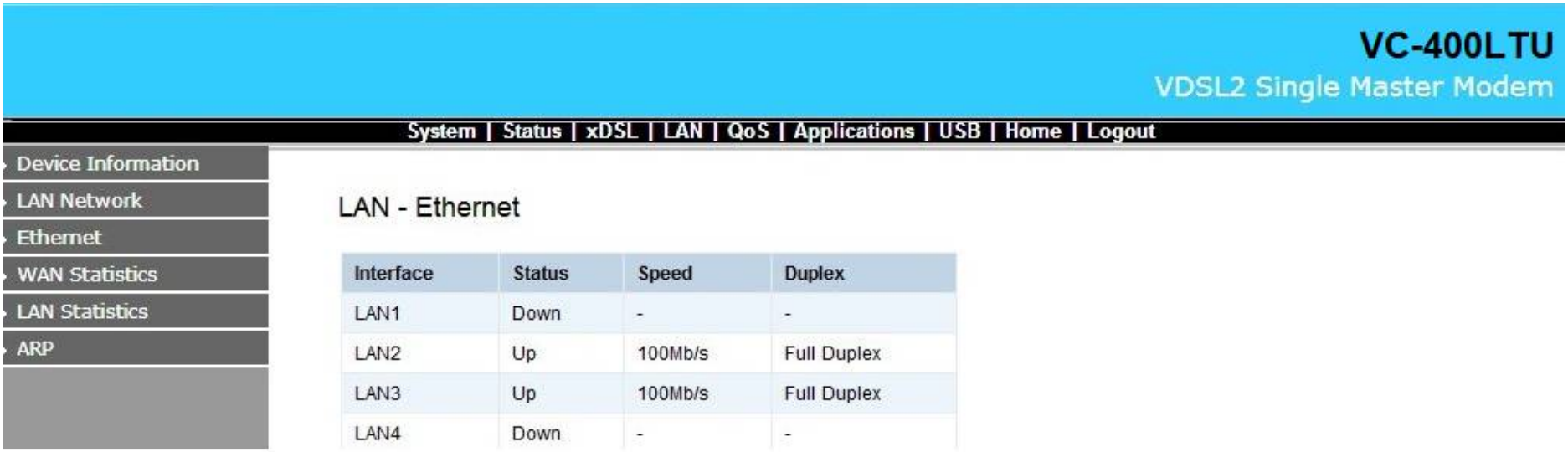
System->Restore Default Setting



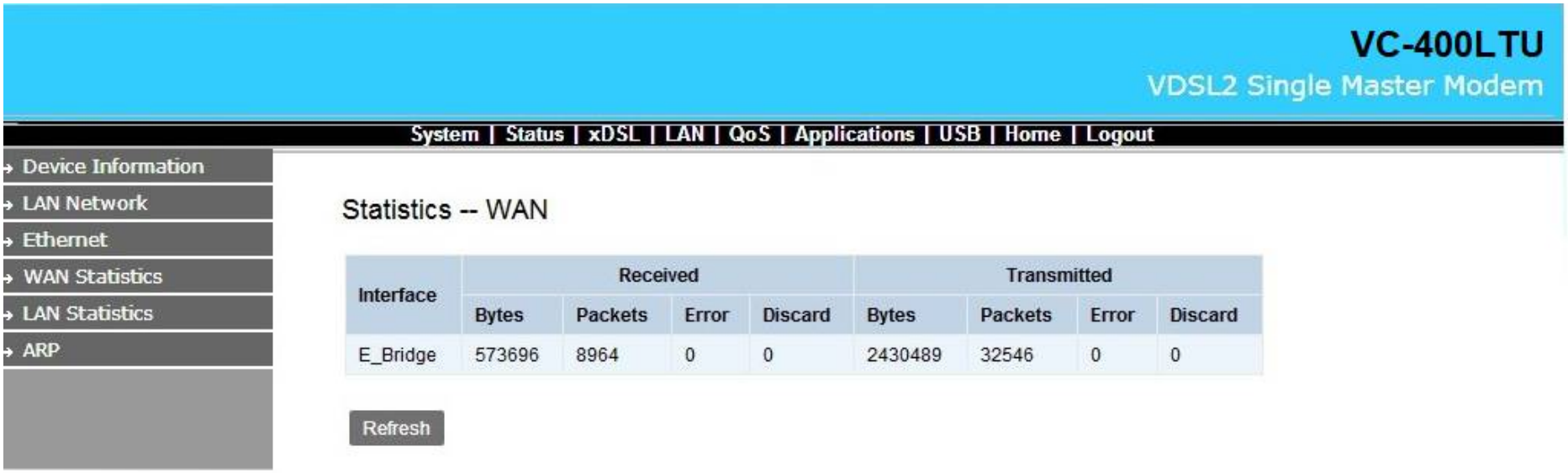
4.3 Status Setup

Status ->LAN Network

Status->LAN-> Ethernet



Status->WAN Statistics



Status->LAN Statistics

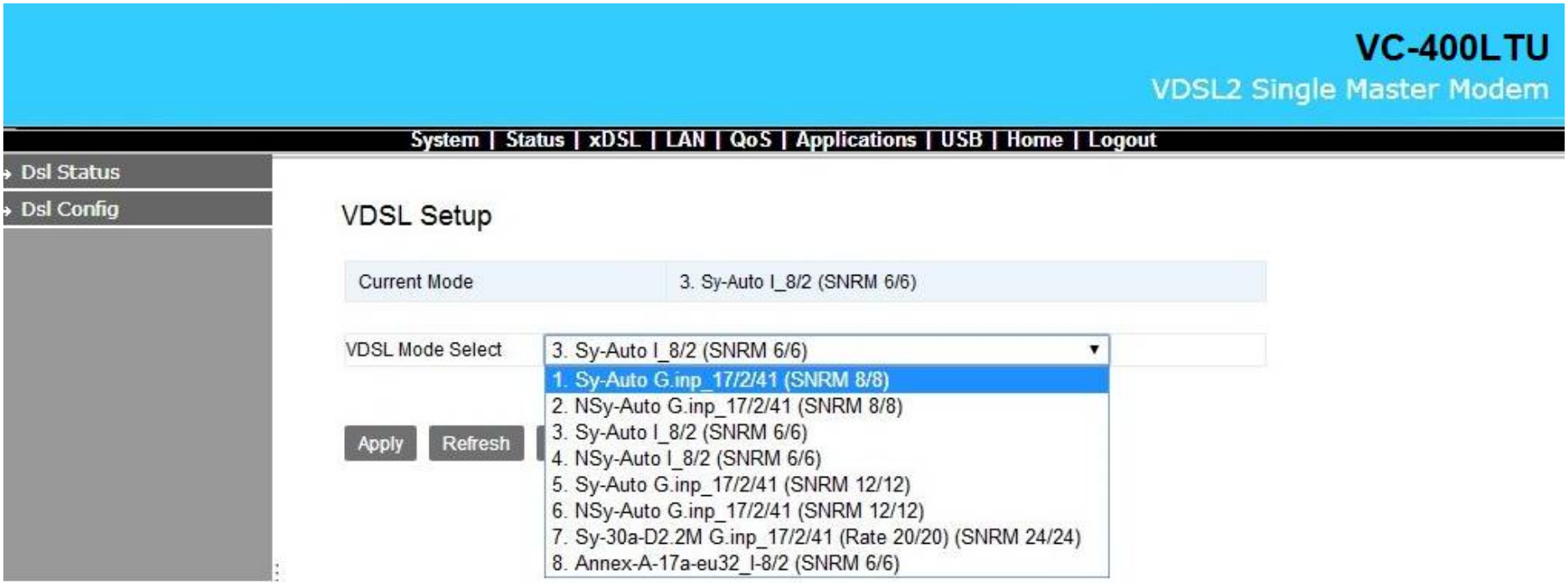
Status->ARP


VC-400LTU
VDSL2 Single Master Modem
System | Status | xDSL | LAN | QoS | Applications | USB | Home | Logout
Device Information
LAN Network
Ethernet
WAN Statistics
LAN Statistics
ARP
ARP
IP Address
Flags
HW Address
Device
192.168.16.26
Complete
ac:22:0b:8c:13:73
br0
192.168.16.3
Complete
10:c3:7b:46:06:8f
br0
192.168.16.15
Complete
88:d7:f6:54:fc:f6
br0
Clear
Refresh

4.4 Xdsl SETUP

Xdsl ->DSL STATUS

Xdsl-DSL Config



VDSL Config Overview

The page to configure VDSL Mode.

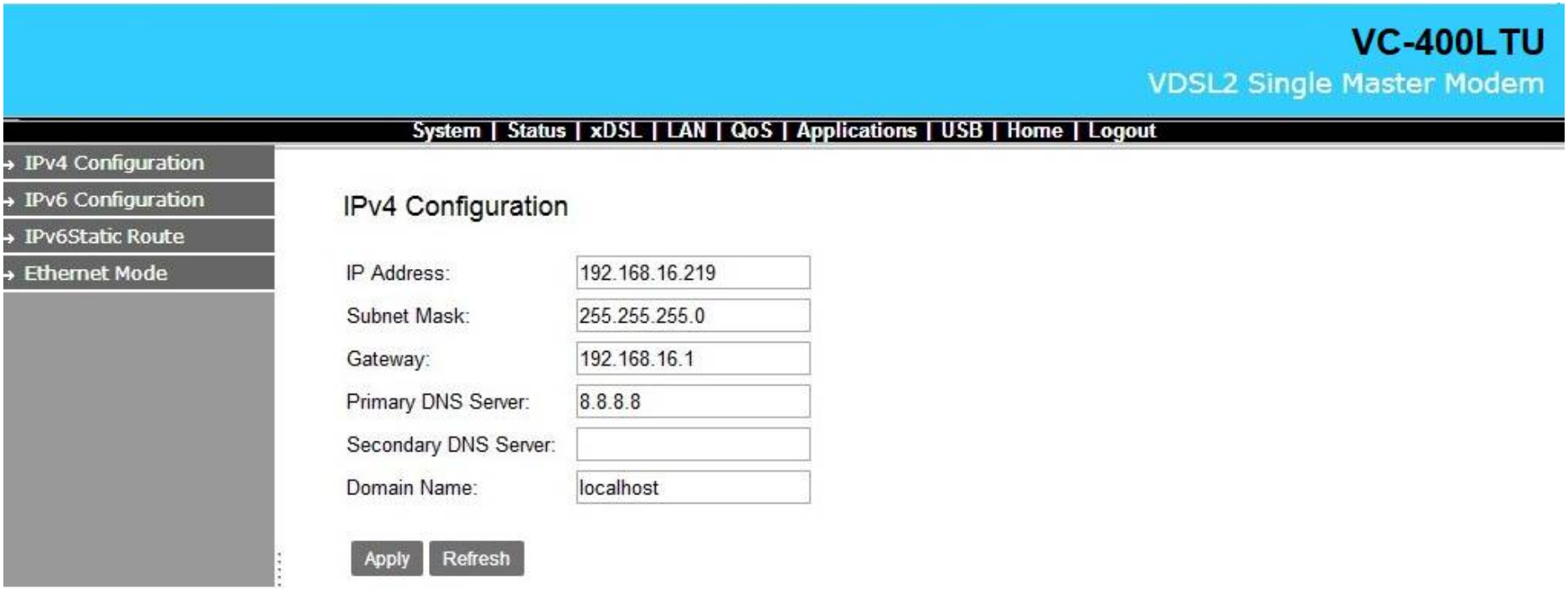
Support table:

NO.	Config.	Note
1	Sy-Auto G.INP_17/2/41 (SNRM 8/8)	Symmetric Auto, enable G. INP, enable re-transmition, SNRM=8
2	NSy-Auto G.INP_17/2/41 (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

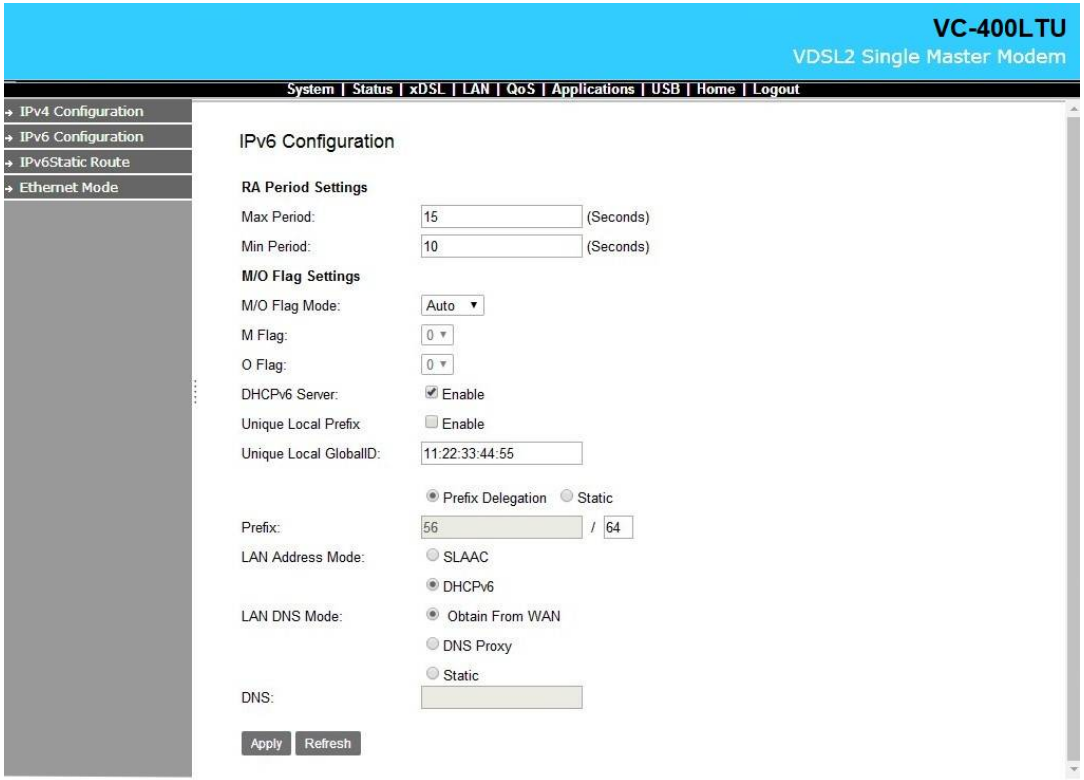
7	Sy-30a-D2.2M G.INP_17/2/41 (Rate 20/20) (SNRM 24/24)	Symmetric 30a, disable 0~2.2MHz, enable G.INP, enable re-transmition, Max.Line rate=20Mbps, SNRM=24
8	Annex-A-17a-eu32_I-8/2 (SNRM 6/6)	17A Annex A Eu32, Max. Interleave=8, Min. Inp=2, SNRM=6

4.5 LAN Setup

LAN >IPV4 Configuration

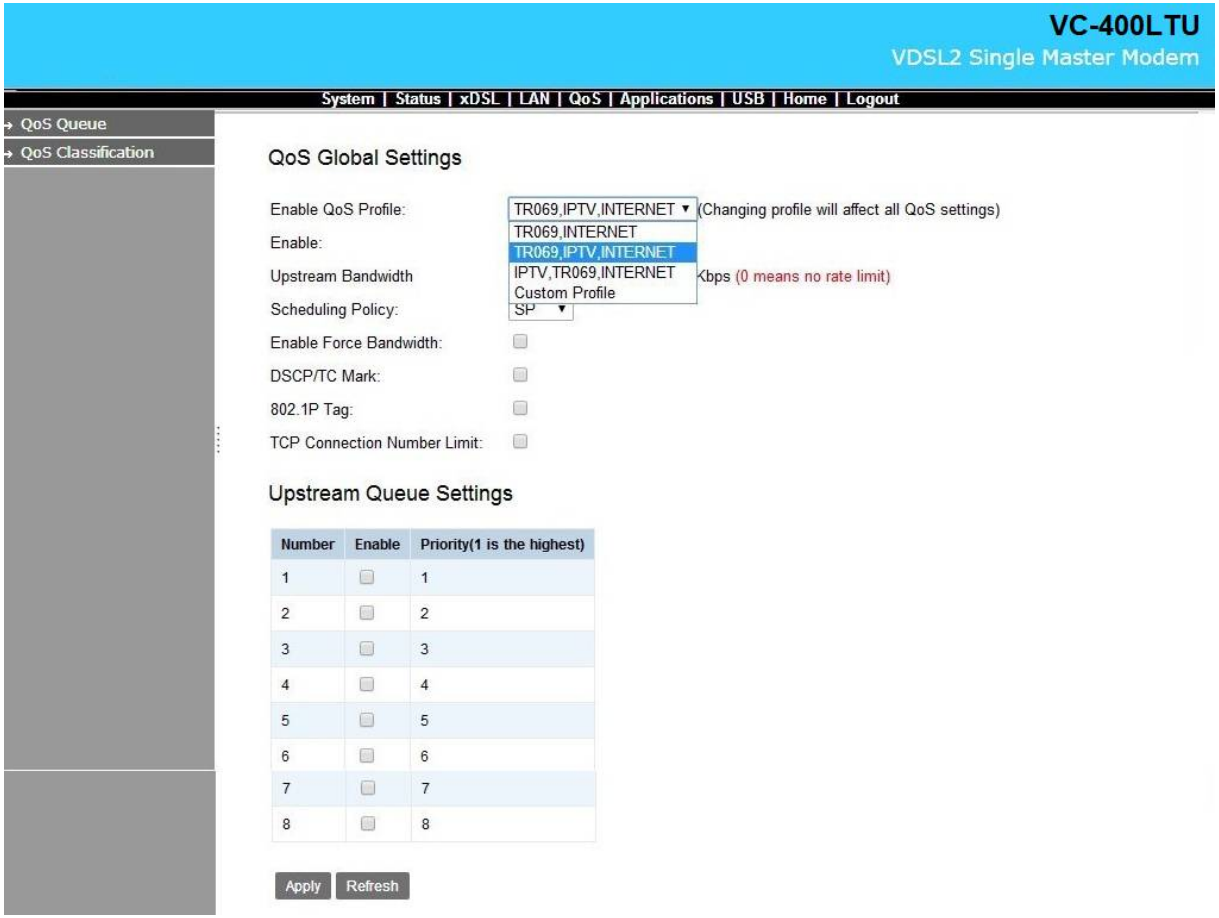


LAN->IPv6 Configuration:



4.6 Qos SETUP

Qos ->Qos Queue

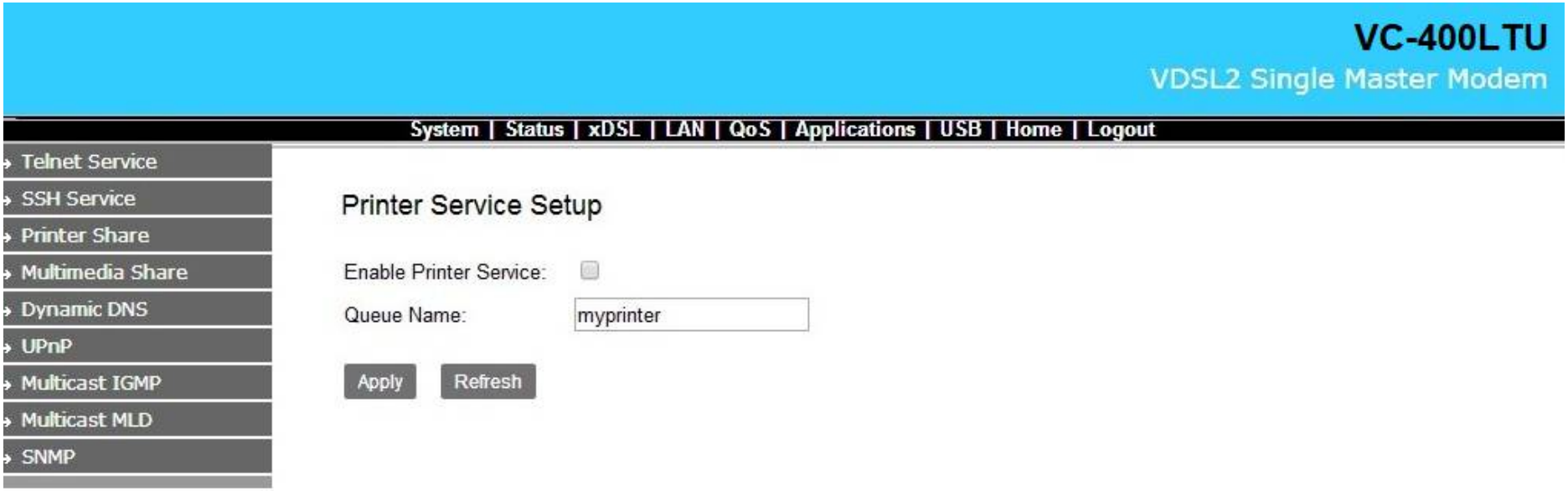


4.7 Application Setup

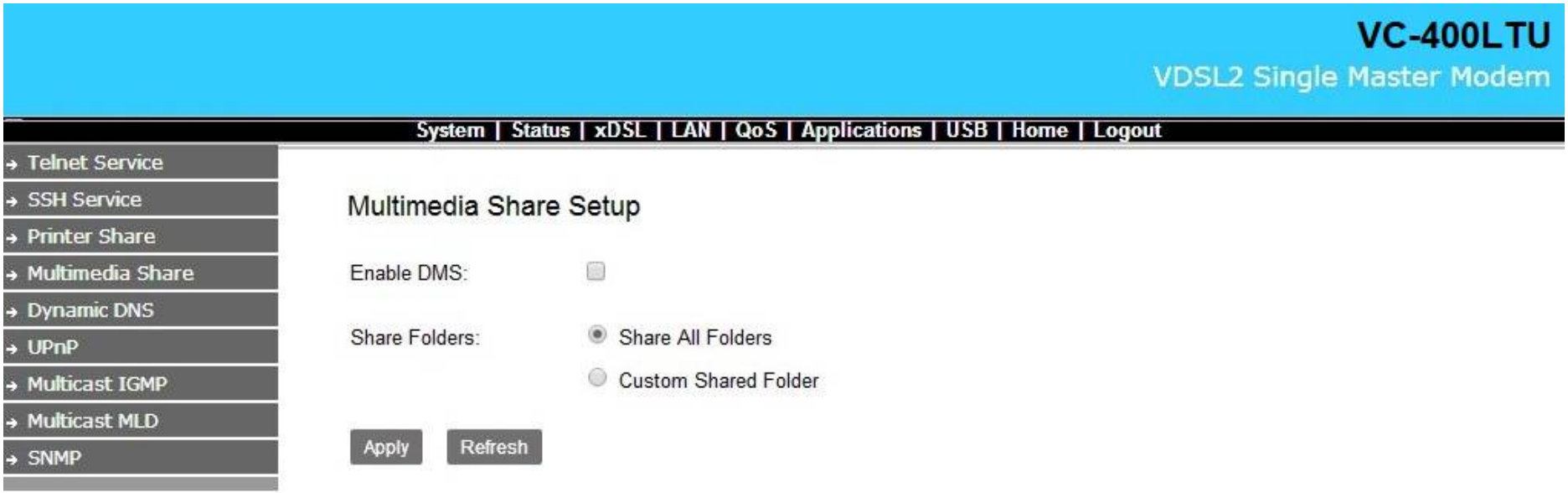
Application->Telnet Service Setup

Application-> SSH Service

Application->Printer Share



Application->Multimedia Share

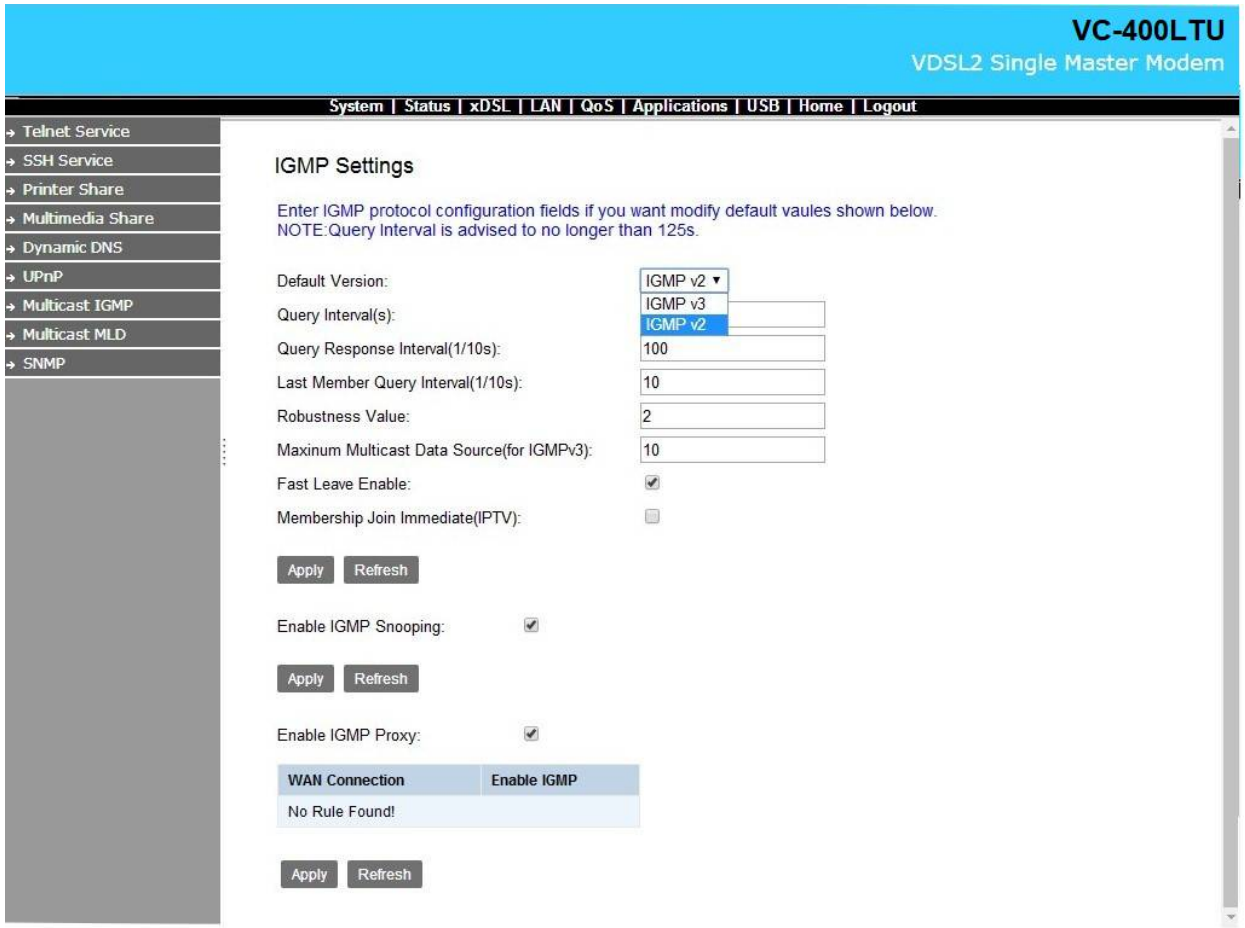


Application->Dynamic DNS

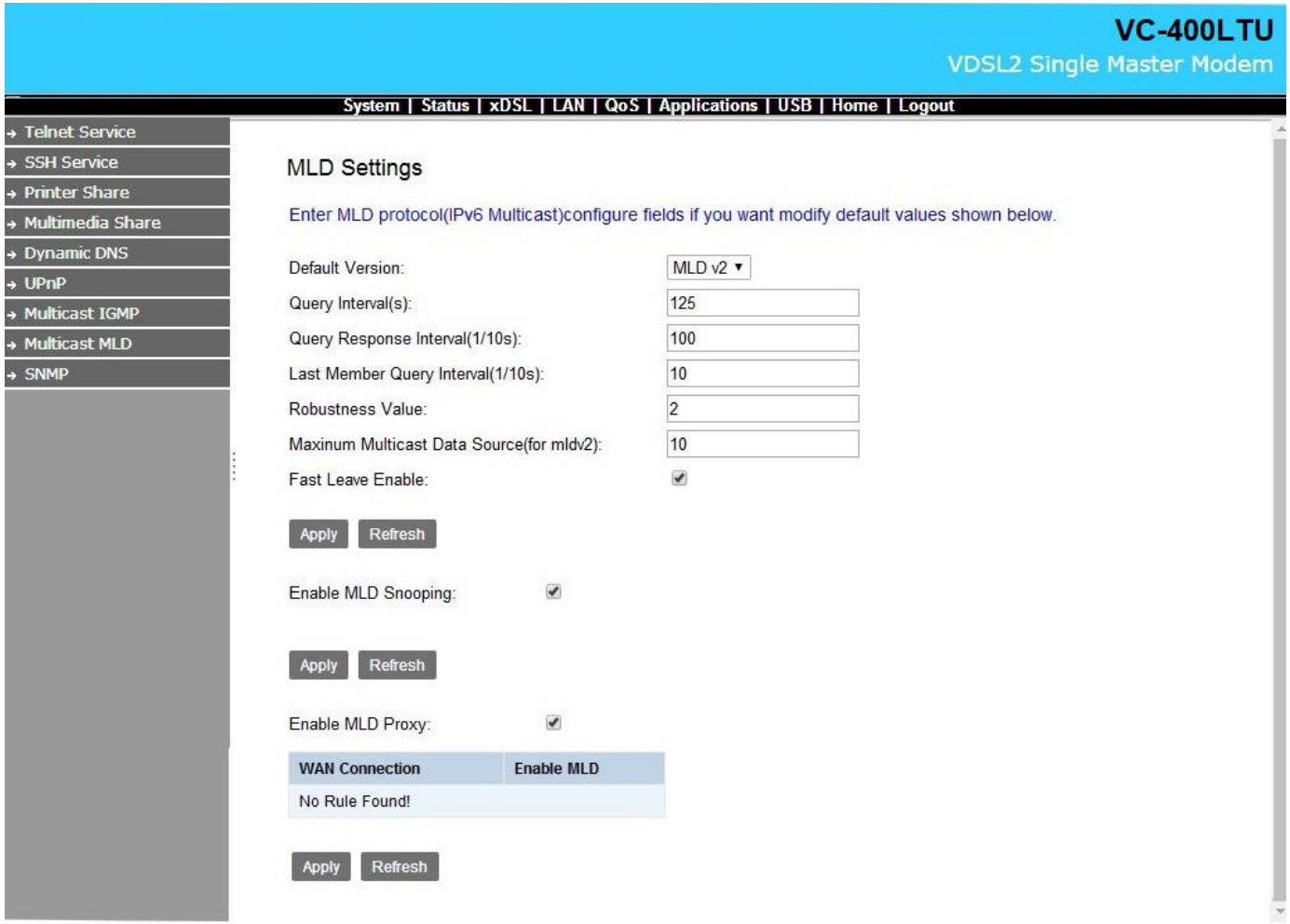
Application->UPnP

Application->multicast IGMP setting

According to the setting, if you want to test IGMP function, you only need to enable IGMP function basic on the Application SETUP

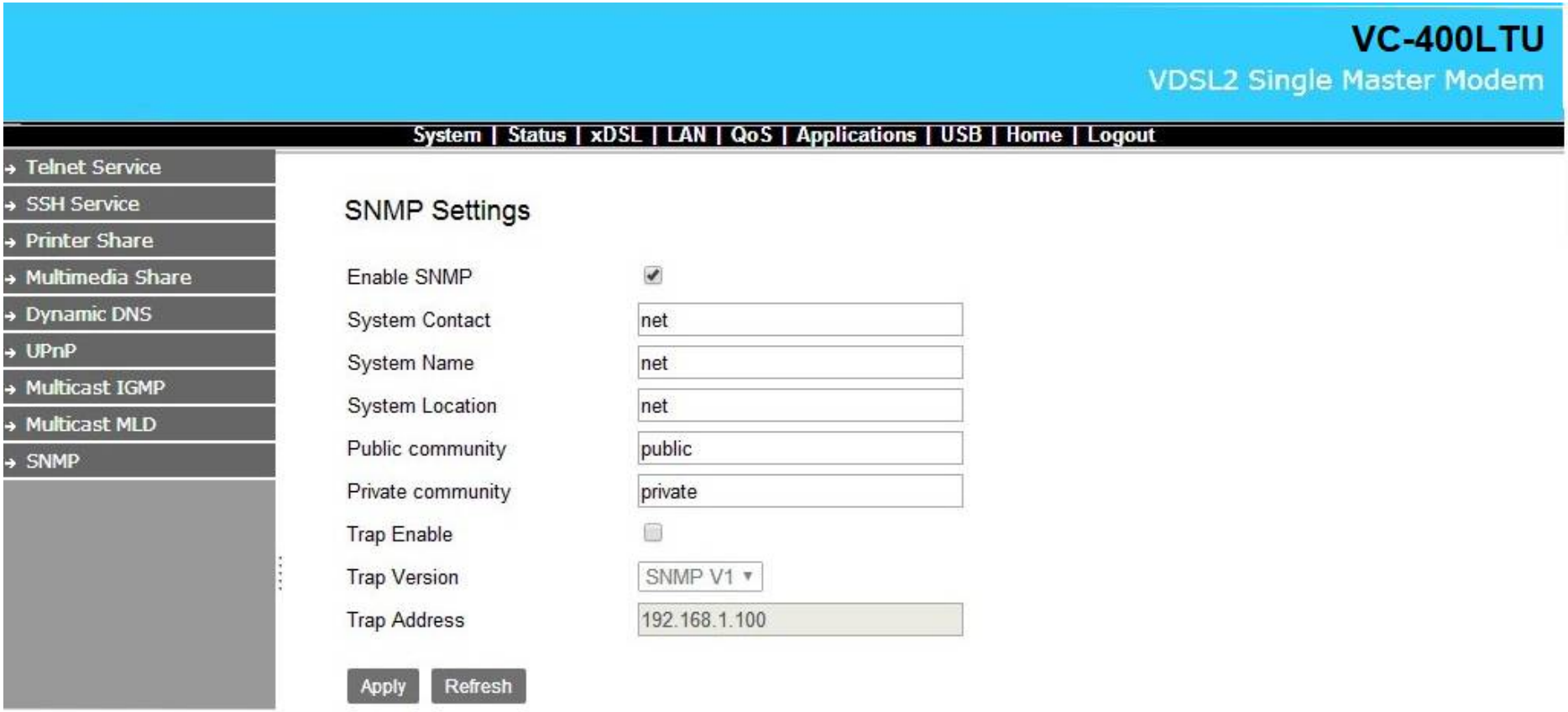


Application->Multicast MLD

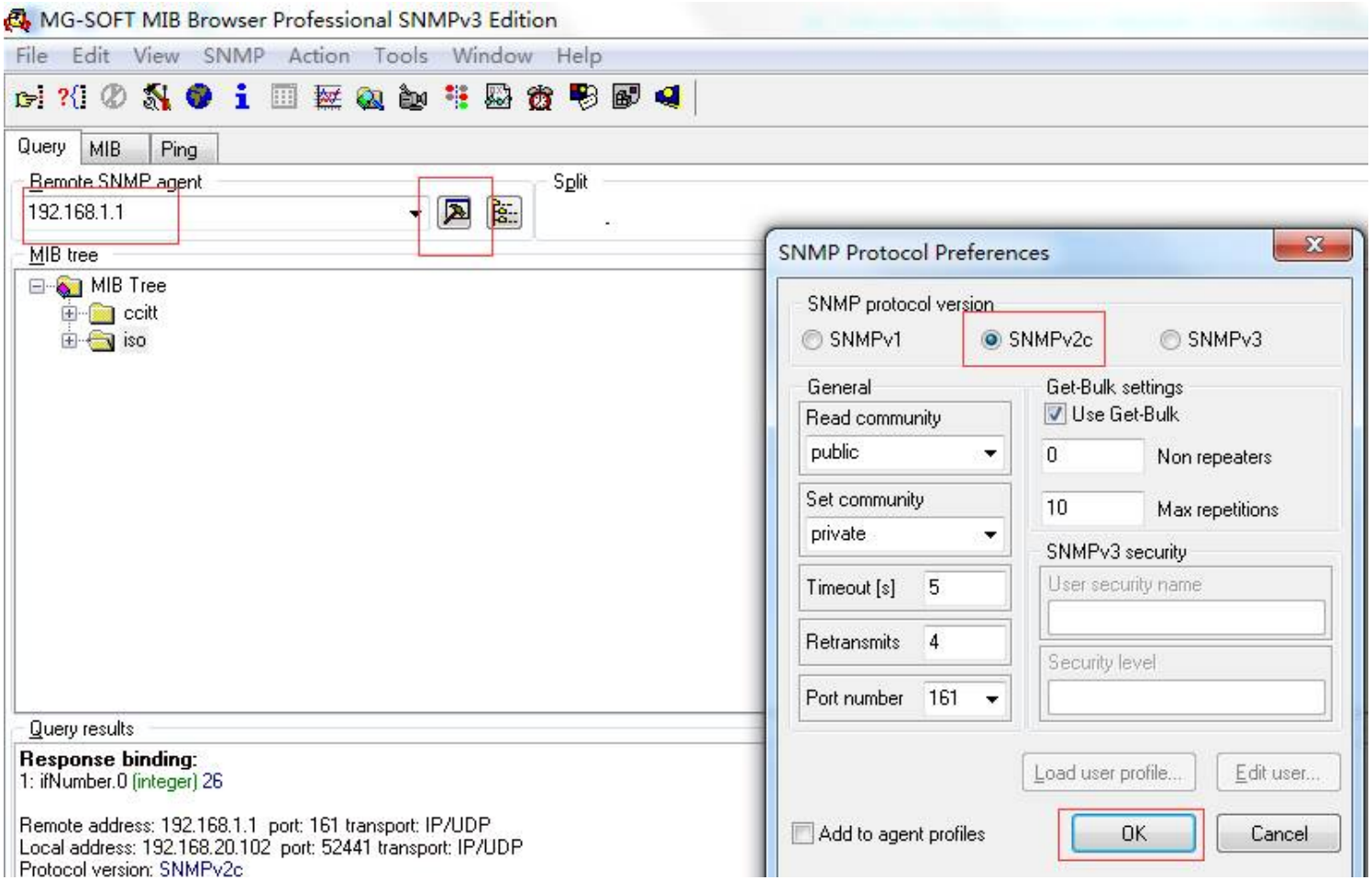


APPLICATION->SNMP

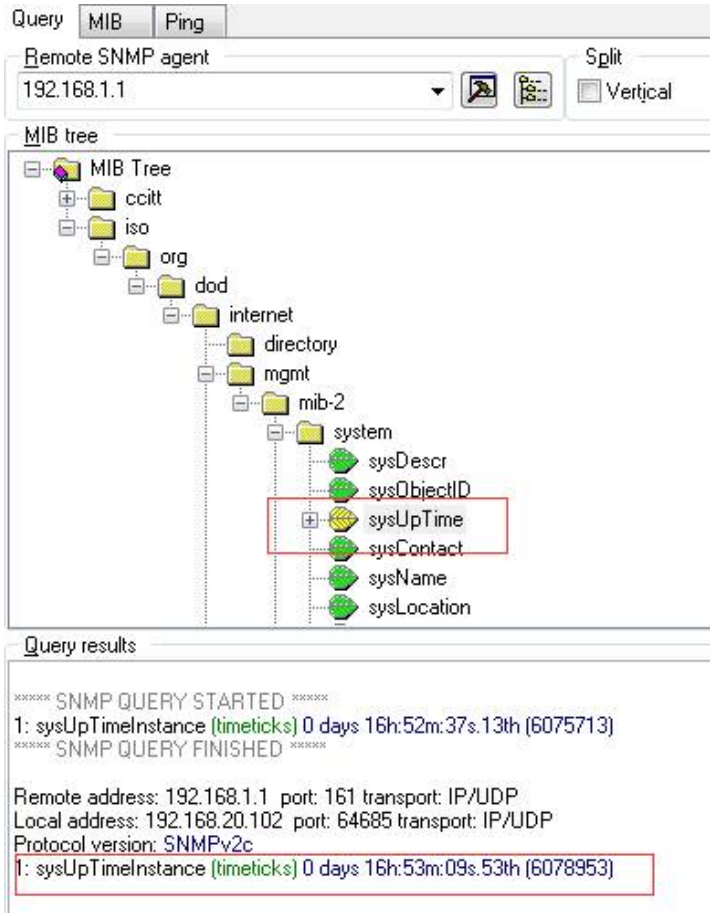
Below is picture for how to enable SNMP function, device support SNMP V1/V2



Download "MG-SOFT MIB Browser". below is picture for how to use the software.
Connect Remote SNMP agant.



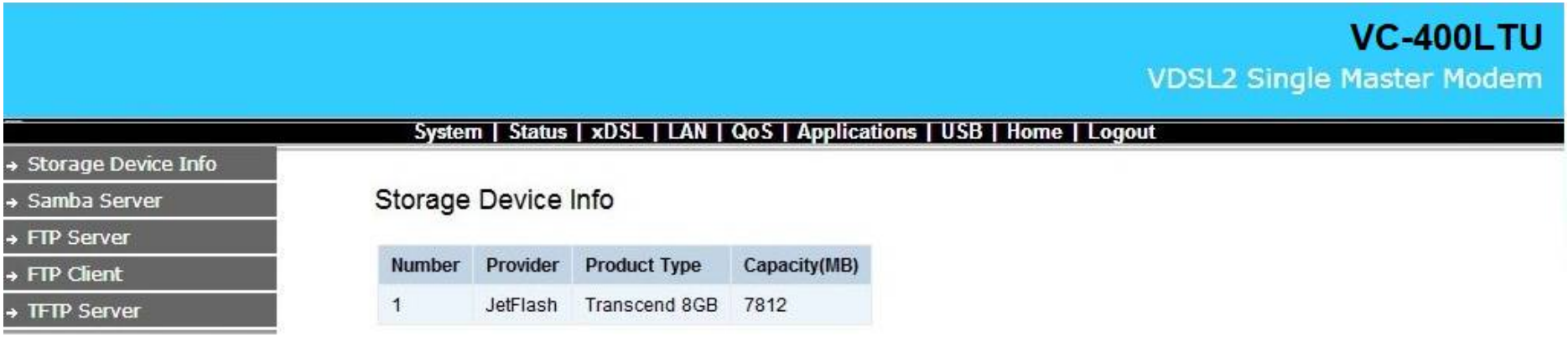
Select OID:1.3.6.1.2.1.1.3
System Up Time



4.8 USB setup

USB-Storage Device Info

Insert a U disk into the USB interface, then login 192.168.16.249,select "USB"->" Storage Device Info". Confirm the system has mounted the U disk**.**



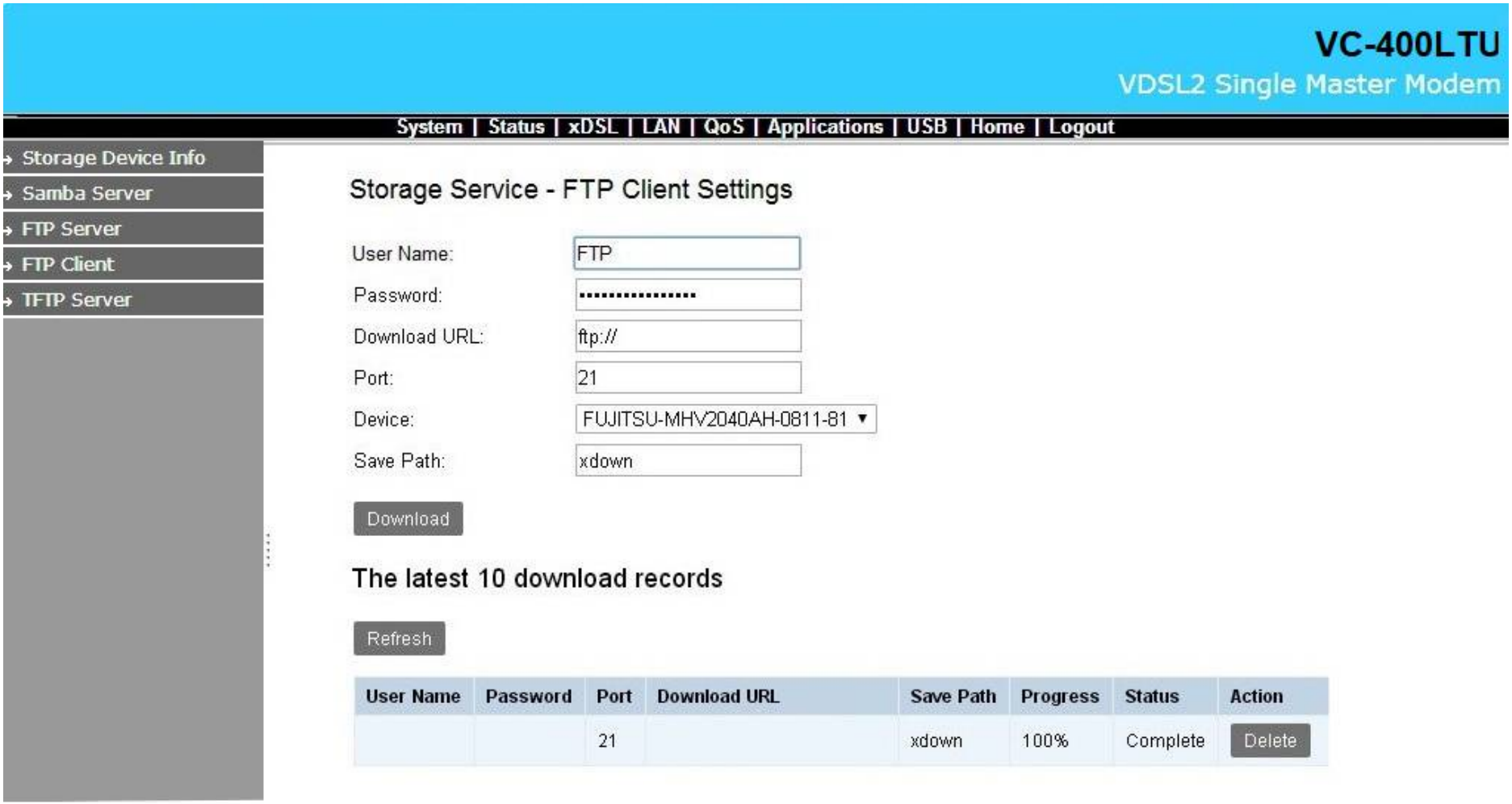
USB->Samba Service

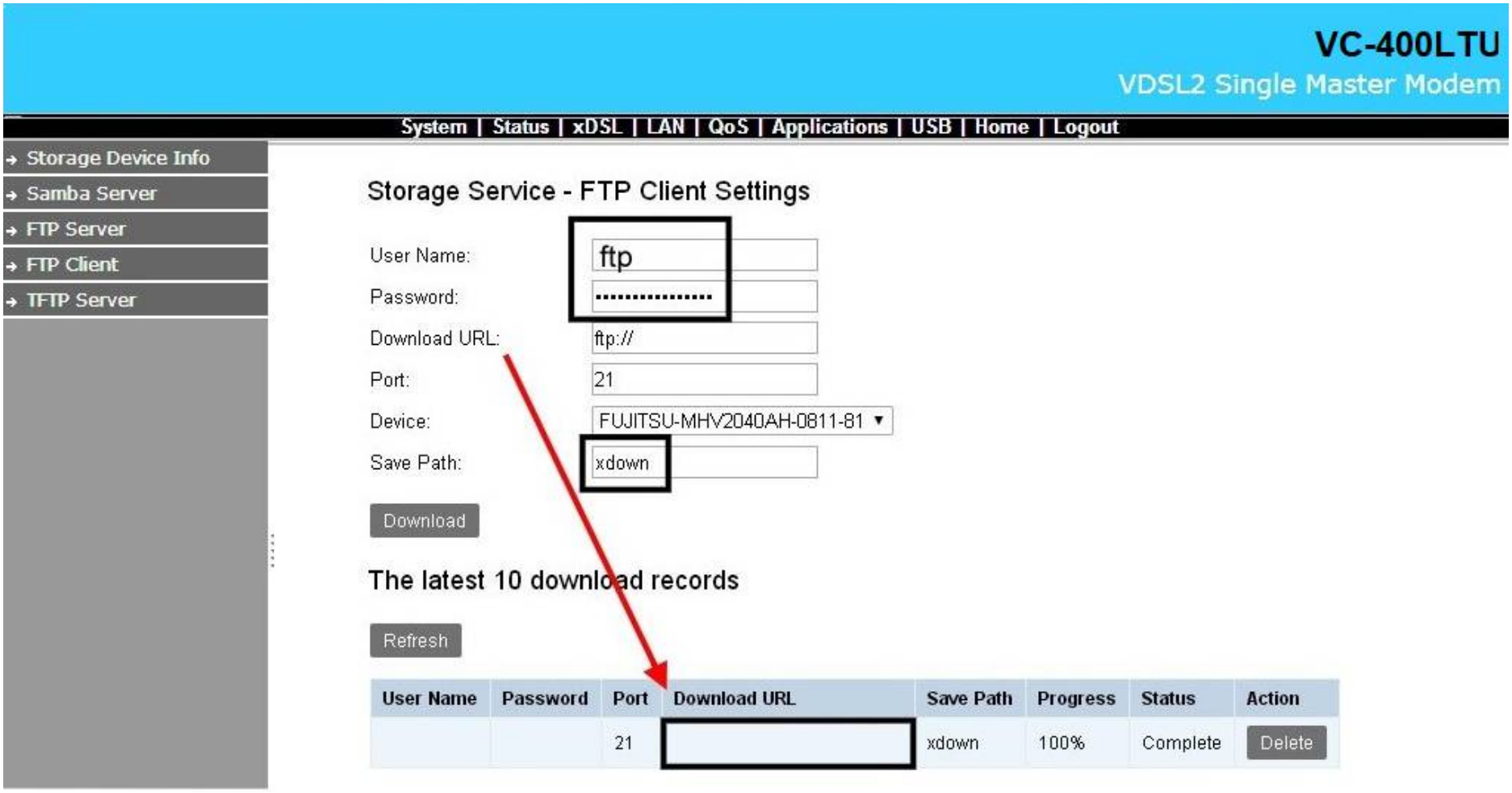
USB-> FTP Server

Below is picture for how to enable FTP Server function.

USB-> FTP Client

Below is picture for how to enable FTP Client function. Input FTP Client Settings, then chick "Download"


VC-400LTU
VDSL2 Single Master Modem
System | Status | xDSL | LAN | QoS | Applications | USB | Home | Logout
Storage Device Info
Samba Server
FTP Server
FTP Client
TFTP Server
Storage Service - FTP Client Settings
User Name: FTP
Password: ••••••••••••••••
Download URL: ftp://
Port: 21
Device: FUJITSU-MHV2040AH-0811-81
Save Path: xdown
Download
The latest 10 download records
Refresh
User Name | Password | Port | Download URL | Save Path | Progress | Status | Action
21 | xdown | 100% | Complete | Delete


VC-400LTU
VDSL2 Single Master Modem
System | Status | xDSL | LAN | QoS | Applications | USB | Home | Logout
Storage Device Info
Samba Server
FTP Server
FTP Client
TFTP Server
Storage Service - FTP Client Settings
User Name: ftp
Password: ••••••••••••••••
Download URL: ftp://
Port: 21
Device: FUJITSU-MHV2040AH-0811-81
Save Path: xdown
Download
The latest 10 download records
Refresh
User Name | Password | Port | Download URL | Save Path | Progress | Status | Action
21 | | xdown | 100% | Complete | Delete

Click "Refresh", Make sure the status is complete.

USB-> TFTP Server

Below is picture for how to enable TFTP Server function.

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

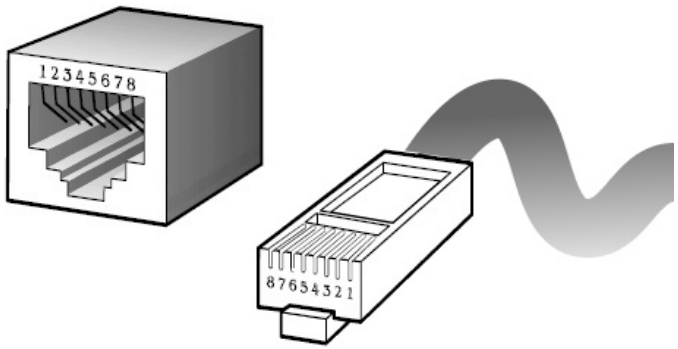


Figure A-1 Standard RJ-45 repectacle/connector

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)

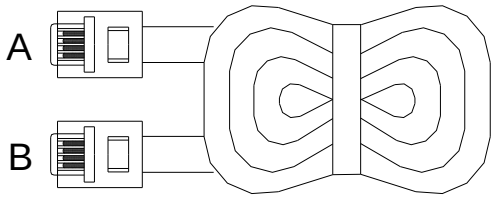


Figure A-4 Telephone cable

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

- Adopts ARM Cortex A9 dual-core processor
- Supports G.998.4 G.INP
- Supports up to 100 Mbps symmetric
- Support 8 bands selectable
- Support USB 2.0 for connecting USB Dongle
- Supports IPv4/IPv6 NTP Client
- Support static routing for IPv4 and IPv6 forwarding
- Mac Address based filtering
- Web-based management
- Support IGMP snooping v2/v3
- Compliant with IEEE 802.3 & 802.3u Ethernet Standard
- Support VLAN Tag pass through
- Compliant with ITU-T G993.2 VDSL2 standard
- Support 8 queue MFC/DSCP both type QoS
- Supports HTTP/HTTPS web management
- Support SSL / SSH security
- Compliant with ITU-T G993.2 VDSL2 standard
- Support remote management and monitor
- Support configuration backup and restore
- On board surge protection for Line port

- Support CO side bridge mode
- Supports Dual Firmware Image Backup
- Supports SNMP v1/v2
- On board POTS/ISDN splitter
- Supports 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:	IEEE802.3/802.3u standards ITU-T G992.1/G992.3/G992.5/G993.1/ G993.2/G998.4 standards
Physical Interface:	4 x RJ-45 10/100 Mbps Ethernet port 1 x RJ-11 / Terminal combo for VDSL2 line port 1 x RJ-11 connector for POTS/ISDN device 1 x Reset Button for resetting to factory default 1 x USB2.0 for connecting USB dongle
Flow control:	Full duplex: IEEE 802.3x Half duplex: Back pressure
LED Indicators:	1 x Power LED 4 x Link/Active Status for Ethernet port 1 x Link LED for VDSL2 port 1 x USB LED 1 x CO LED
Switch method:	Store and forward
Typical Power Consumption:	4.4W (Full load, without USB port)
Power Input:	Input Voltage: 12 VDC (Commerical-grade power adapter)
EMC Certification:	EMI Compliant: FCC EMS Compliant: CE mark
Operating Temperature:	0°C ~ 50°C (32°F ~ 122°F) Fanless, free air cooling

Storage Temperature:	-20°C ~ 70°C (-4°F ~158°F)
Humidity:	10% to 90% (non-condensing)
Weight:	About 0.4 kgs
Dimensions:	184 x 146 x 40 mm (7.2" x 5.74" x 1.57")

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-400LTU 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:	VDSL Link cannot be established.
Cause:	VDSL 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-400LTU(CO) side and CPE side when both are power on. VC-400LTU(CO) side will do link speed function depending on phone wire length, therefore if VC-400LTU(CO) side can't detect CPE 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 VDSL power driver.

4. Question:	What is VDSL2? (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 CO modem with CPE Modem 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 VDSL2 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-400LTU 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-400LTU is a Master side(CO side), it must be connected to the VC-400RTU(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-400LTU 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 or WAN 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-400LTU maximum Ethernet frame MTU is 1518 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 port are auto-negotiation VDSL. 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.

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.