ASCENT Communication Technology

C3000
DOSCIS 3.0
CMTS

User Guide

Revision B

ACT 1RU C3000 DOSCIS 3.0 CMTS
User Guide

ACT Document Number: C3000 CMTS UG Revision B

This document is produced to assist professional and properly trained personnel with installation and maintenance issues for the product. The capabilities, system requirements and/or compatibility with third-party products described herein are subject to change without notice.

For more information, contact ACT: Sales@ascentcomtec.com

Revision History

Revision	Date	Reason for Change
A	08/01/2013	Initial Release
B	05/02/2014	Section Updates

Packaging Instructions

Thank you for choosing the C3000 cable modem termination system (CMTS) equipment series. In order to ensure equipment proper operation for a longer life cycle, please read this user manual before use.

Warning: When installing the C3000, always connect the grounding first and disconnect it last when working with power cables. During the equipment operation, do not unplug the coaxial cable from the CMTS equipment to avoid loss of data and other important information.

Tips: Please pay special attention to the implications of the words in bold-face and regular script below when you read this manual.

- **Complete packaging list of CMTS equipment**

  When you open the packaging carton of the CMTS equipment, please confirm your CMTS equipment is complete and intact. If there is any appearance defect or parts shortage, please contact your distributor as soon as possible.

S/N	Name	Content Description	Quantity
1	Device	C3000 CMTS	1
2	Power cable		1
3	Twisted pair cable	1000M/100MBase-T twisted pair cable	1
4	Serial port cable	RJ-45 to RS232 (DB9 female)	1
5	Compact disc (optional)	Online version available	1

- **List of major files in the CD/Online**

S/N	File Name	Description
1	C3000-NMS APP	Setup program of CMTS network management system
2	C3000 Manual Guide	User manual of C3000 CMTS equipment and network management software

About This Guide

This document explains the essential Step of installation, operation and troubleshooting of Ascent C3000 CMTS in a DOCSIS compatible environment.

Scope

This document applies to cable service providers and system administrators who configure and operate the CMTS.

It is assumed that the reader has been acquainted with the routine operation and maintenance that is based on TCP/IP protocol and hybrid fiber coaxial (HFC) cable network.

Content

This manual includes the following:

The command line (CLI) manages the CMTS, describing the CLI interface for managing and configuring the CMTS as well as all debug commands.

Implications in the manual

This manual uses multiple fonts and symbols to distinguish the interface display text and user selection and input text:

Highlights	Usage	Use Case
Boldface	Key word: the text to be entered word by word when the CLI prompt pops up	C3000>exit
Italic	The parameters to be replaced by the actual values as indicated in the command	Ping [IP address]
Brackets	Parameters in CLI command: the parameters included in square brackets [] are the optional parameters, and the ones contained in braces {} are essential parameters.	Ping [IP address]
IP Address	IP address: the IP address is entered in the format of dotted decimal notation.	192.168.0.254
Mac Address	MAC address: MAC address is divided by “:” or “.”.	00:a0:73:1e:3f:89
Tab	Automatic command completion	

Contents

Chapter 1 About C3000

1.1 Overview

All C3000 CMTS series from ACT are developed based on DOCSIS3.0 and C-DOCSIS protocols. There are other product types with different form factor such as outdoor and DOCSIS-node.

C3000 series adopts DOCSIS3.0 channel binding technology, for downstream (DS), there are 16 QAM channels which has 1.1Gbps data rate; for upstream, there are 4 QPSK/QAM channels which could reach up to 160Mbps. C3000's downstream can be configured to data channels or IP QAM channel, for data port, there are 1000Mbps power port (RJ45) and 1000Mbps optical port (SFP). With layer 3 routing function and QoS, the unit can meet various working conditions and requirements from different operators.

The C3000 CMTS is suitable for IPTV or VOD, and other video service. It is cost effective to add value added services to the traditional HFC network.

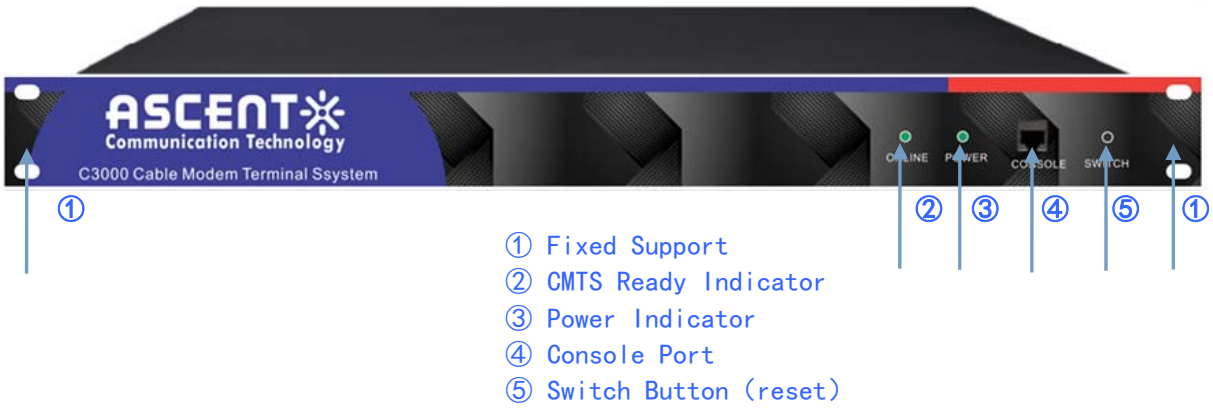
There are three ways to manage C3000: use CLI after log in via serial port Telnet, use web GUI and use network management software based on OAM.

C3000 series CMTS are compatible with DOCSIS3.0/2.0 cable modem.

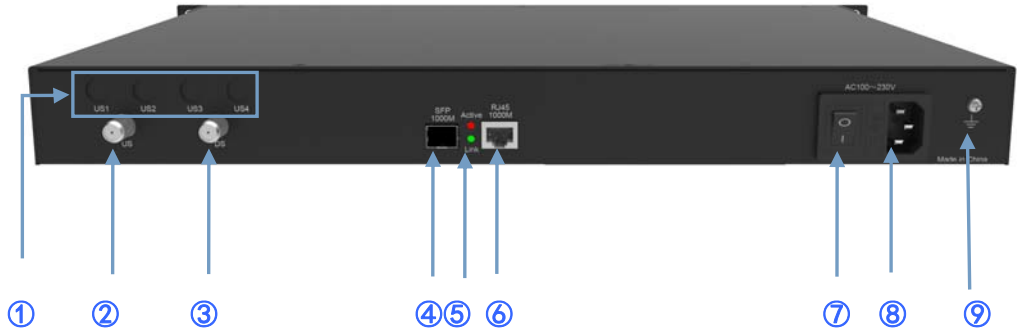
C3000 CMTS is in a 19 inch 1U standard chassis, it is tailor made for Headend deployment. It has wide coverage and high efficiency. Isolated upstream channels can reduce the funnel noise by 8dB.

1.2 Introduction to Equipment Appearance

Front



Back



① Independent US Input Port(option)
② US Input Port
③ DS Output Port
④ SFP Port
⑤ Ethernet Status LED
⑥ RF45 Port
⑦ Power Switch
⑧ AC Input
⑨ GND

1.3 Features

- Compatible with DOCSIS3.0, C-DOCSIS standard, work with all cable modem based on DOCSIS, support both EURO DOCSIS and DOCSIS.
- 16 DS channels bound, 64/256/1024QAM modulation mode optional. Data rate could reach up to 1.1Gbps@1024QAM.
- 4 US channels bound, could be configured to QPSK, 3-8 grade QAM mode, data rate could reach up to 160Mbps.
- Flexible on channels bound quantity set for operator's convenient planning and use of channel resource.
- Layer 3 routing functions, support static route, VLAN,NAT and DHCP relay agent.
- There are 1000M RJ45 port and SFP on data port, convenient and flexible.
- Built-in DHCP/TFTP server, support PPPoE.
- Load balancing.
- Support IPV6, multicast function.
- QoS based on service flow ensures bandwidth needs for various services.
- Ensure network transmit safety via various kinds of methods such as BPI+, CM identification, anti-DOS attack , user isolation and IP source checking.
- Real time upstream spectrum analysis function which helps to check US channel signal and noise status rapidly.
- Configuration parameters and running status can be checked directly from the large screen display on the panel, it can show real time upstream channels frequency spectrum.
- Support three management ways: use CLI after log in via serial port Telnet, use CLI to realize remote log in via web and network management software based on SNMP.

1.4 Specification

		Downstream		Upstream				
		Euro-DOCSIS	DOCSIS					
Modulation Mode		64QAM/256QAM/1024QAM		256QAM/64QAM/32QAM/16QAM/8QAM/QPSK				
Frequency Range (MHz)		112～1002 adjustable	91～857 adjustable	5～65 (85 Optional)				
Single channel bandwidth (MHz)		8	6	Single channel bandwidth (MHz)		6.4	3.2	1.6
Binding channel quantity		16		4				
Max. total data bandwidth (Mbps)		1100	857	160				
Single channel data rate (Mbps)	64QAM	41	27	Single channel data rate (Mbps)	256QAM	40.96	20.48	10.24
					128QAM	35.84	17.92	8.96
	256QAM	55	38		64QAM	30.72	15.36	7.68
					32QAM	25.60	12.80	6.40
Output level (dBmV)		45～58 adjustable 1 stepping			16QAM	20.48	10.24	5.12
					8QAM	15.36	7.68	3.84
					QPSK	10.24	5.12	2.56
				Receiving level (dBmV)		-1~+29	-4~+26	-7~+23
Single channel baud rate (Msymps)	64QAM	6.952	5.056941	Single channel baud rate (Msymps)		5.12	2.56	1.28
	256QAM	6.952	5.360537					
RF port number		1		1				
Reflection loss (dB)		> 14		> 14				
Output impedance (Ω)		75		Input impedance (Ω)		75		
Supported protocols		Euro-DOCSIS/DOCSIS2.0/1.1/1.0, TCP/IP, ARP, RIPv2, ICMP, VLAN, multicast, OSPF, DHCP, TFTP, SNMP, PPPoE, DHCP relay agent, Telnet Etc.						

Physical parameters			
Network Port	1000M SFP fiber (SC/APC)	Input voltage	AC100～240V, DC-48V customizable
	1000M RJ45 port	Consumed power	< 50W
RF port	F type plug	Net weight	2.50Kg
Controlling port	2 COM	Working conditions	Temperature 0～40℃; humidity <90%
Status display	HD LCD display	Dimension	W430mm H44mm D285mm

1.5 Factory Default

1) Network Interface

Network Interface	IP	Mask	Gateway
CMTS WAN Port	192.168.0.254	255.255.255.0	192.168.0.1

	Parameter	Value
Network Parameters	Default DHCP server	192.168.0.254
	CM DHCP server	192.168.0.254
	CPE DHCP server	192.168.0.254
	CM network mode	bridge（layer 2 bridging）
	CPE network mode	bridge（layer 2 bridging）
	DHCP safety certificate	Start
	Default Route	192.168.0.1

2) Built-in DHCP server

Scope Name	IP	Mask	Start Address	Ending Address	Gateway
Default Scope	192.168.0.0	255.255.255.0	192.168.0.2	192.168.0.252	192.168.0.1
CM Scope	192.168.0.0	255.255.255.0	192.168.0.2	192.168.0.100	192.168.0.1
CPE Scope	192.168.0.0	255.255.255.0	192.168.0.101	192.168.0.252	192.168.0.1

	Parameter	Value
DNS Server	Primary DNS Server Address	192.168.0.1
	Backup DNS Server Address	0.0.0.0

	Parameter	Value
Public Parameter	Boot File Name	cm.bin
	Boot Server Name	192.168.0.254
	Lease Expire	3600

3) RF Parameter

3.1 Downstream Channel

Channel No.	Status	Center Frequency (KHZ)	Standard	Modulation Mode	Output Frequency (dbmv)	Interleave Depth
1	DOCSIS	440000	ANNEX: A	64QAM	45	I12-17
2	DOCSIS	448000	ANNEX: A	64QAM	45	I12-17
3	DOCSIS	456000	ANNEX: A	64QAM	45	I12-17
4	DOCSIS	464000	ANNEX: A	64QAM	45	I12-17
5	DOCSIS	472000	ANNEX: A	64QAM	45	I12-17
6	DOCSIS	480000	ANNEX: A	64QAM	45	I12-17
7	DOCSIS	488000	ANNEX: A	64QAM	45	I12-17
8	DOCSIS	496000	ANNEX: A	64QAM	45	I12-17
9	DOCSIS	504000	ANNEX: A	64QAM	45	I12-17
10	DOCSIS	512000	ANNEX: A	64QAM	45	I12-17
11	DOCSIS	520000	ANNEX: A	64QAM	45	I12-17
12	DOCSIS	528000	ANNEX: A	64QAM	45	I12-17
13	DOCSIS	536000	ANNEX: A	64QAM	45	I12-17
14	DOCSIS	544000	ANNEX: A	64QAM	45	I12-17
15	DOCSIS	552000	ANNEX: A	64QAM	45	I12-17
16	DOCSIS	560000	ANNEX: A	64QAM	45	I12-17

3.2 Upstream Channel

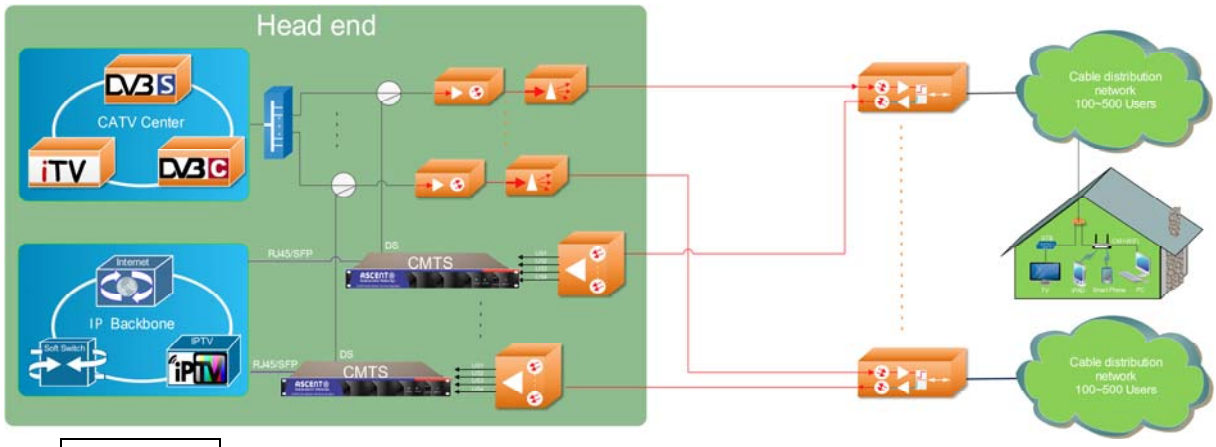
Channel Number	Status	Center Frequency (KHz)	Channel	Modulation Mode	Channel Bandwidth (KHz)	Channel Power (dbmV)
1	ON	28000	ATDMA	16QAM	3200	0
2	ON	32000	ATDMA	16QAM	3200	0
3	ON	36000	ATDMA	16QAM	3200	0
4	ON	40000	ATDMA	16QAM	3200	0

4) System Parameter

Parameter	Value
User name	admin
Password	admin
CM authority control	forbidden

1.6 Typical Application

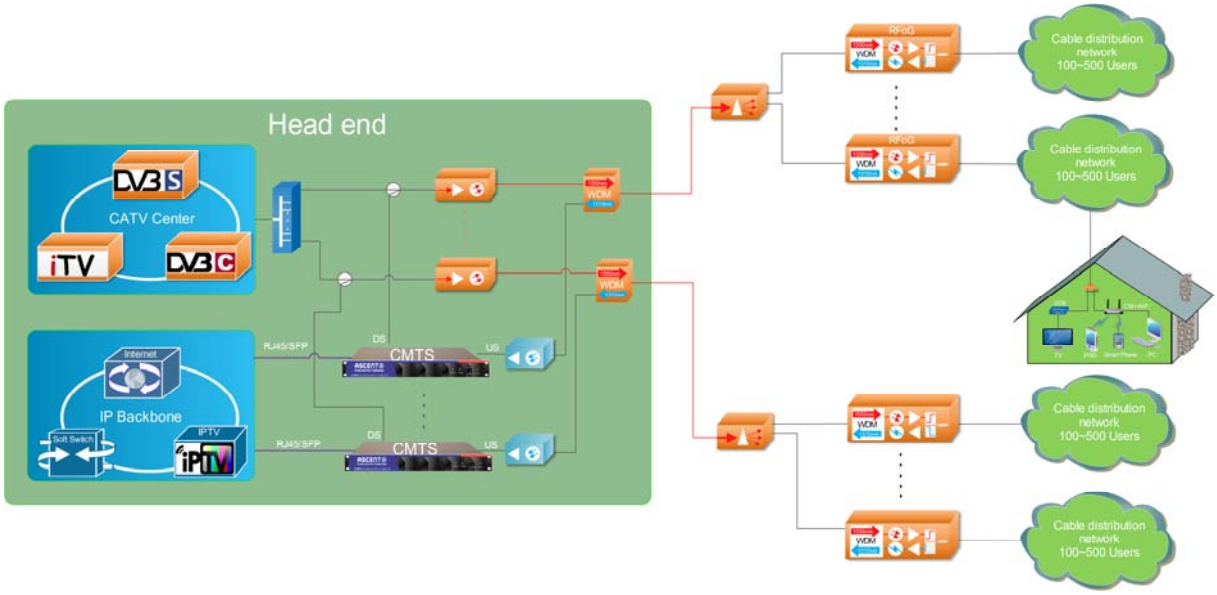
1.6.1 Head-end



FEATURES

- One CMTS shall be configured within the coverage of the optical transmitter.
- Generally 1000 ~ 2000 households can be covered.
- Four return paths can be physically isolated, in order to reduce the adding return noises.
- 1.1Gbps DS data bandwidth, to support the IPTV, VOD and other video services and meet the requirements of NGB.

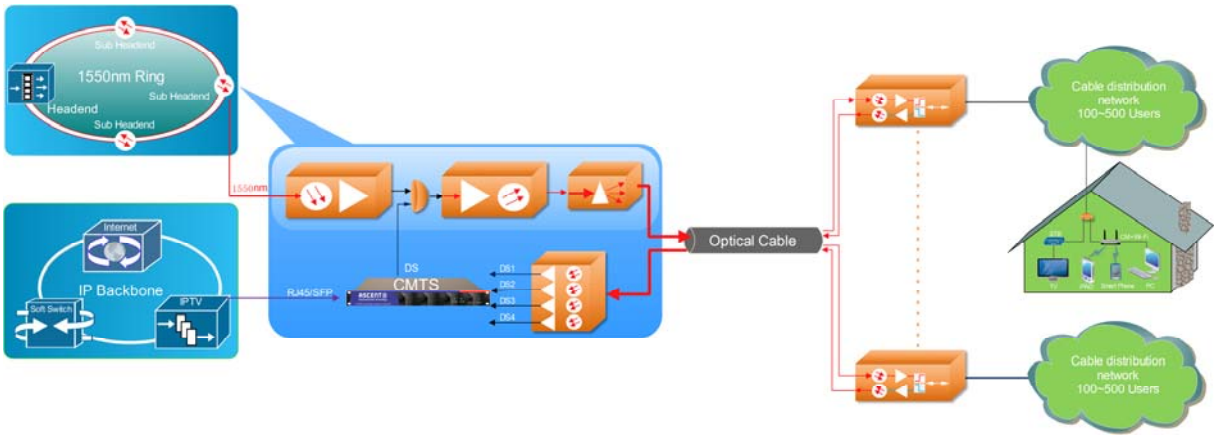
1.6.2 Deployed at the Head-end with RFoG return



FEATURES

- The 1550nm optical transmission network is used, and the RFoG optical node.
- The 1.1Gbps data bandwidth can meet the requirements of NGB.
- The mixed input port is chosen for the CMTS upstream.

1.6.3 Deployed at the sub Head-end



FEATURES

- It is suitable for the secondary Headend, optical transmission HFC system
- Each transmitter will have its own DS channels.
- Four return paths can be physically isolated to reduce the return noise.
- The 1.1Gbps data bandwidth is adequate to support the IPTV, VOD and other video services.

Chapter 2 Installations

2.1 Preparation

2.1.1 Preparation of HFC Network

2.1.1.1 Main Parameters

The HFC network must be bidirectional. The upstream frequency range is 5~65MHz, or 5~42MHz, or 5~85MHz; and the downstream is 88~860MHz (or 1000MHz), or 54~857MHz (or 1000MHz).

In the downstream direction, before the signal gets into the optical transmitter, an interface shall be reserved for the input of CMTS downstream signal. Through adjusting the downstream output level of CMTS, the digital television signal (QAM) at the mixed output port shall be consistent with the downstream signal level of CMTS. At the end (terminal) of the HFC transmission, the downstream signal level shall be within -15~+15dBmV (no higher than 30dBmV), carrier to noise ratio (C/N) shall be not less than 30.5dB.

In the upstream direction, the receiving level at the CMTS upstream port is 0dBmV as default. We recommend that the upstream link loss design should be between 30 and 40dB to ensure the signal and noise entering the CMTS upstream port is balanced.

The design, construction, debugging and maintenance of HFC bi-directional transmission network shall comply with the relevant industry technical standards, such as Technical Specifications of HFC Network Physical Upstream Transmission Path (GY/T 180—2001), Technical Specification of CATV Broadcasting System (GY/T 106-1999), etc.

2.1.1.2 Frequency Planning

Because the C3000 downstream binds 16 channels, it is necessary to arrange 16 consecutive channels for it. Of course, if you don't need to bind so many channels, you can turn off those channels which can leave closed at the CMTS, and only the channels to be occupied by the CMTS can be reserved in the HFC.

We strongly recommend that the entire upstream frequency range be measured by a spectrum analyzer before the upstream signals is accessed to the CMTS, to observe the noise distribution. The upstream frequency points of CMTS shall be set at the bands without obvious noise interference. In general, the bands below 20MHz are subject to interference by various signals, especially shortwave radio which generates strong interference in the night, so we shall not use any frequency below 20MHz as conditions permit.

2.1.2 Preparation of IP Network

It is required to prepare a 1000M Ethernet port for WAN interface of CMTS, either port or electrical port (RJ-45). Assign an IP address to CMTS.

2.1.3 Preparation of Server

DHCP/TFTP/NMS Server, etc.

2.1.4 Preparation for Power Supply Safety

The room or rack used for the CMTS installation must be grounded in line with national standards.

The AC power supply is 90~240V, 50/60Hz, and the supply connecting lines and sockets must be capable of withstanding the power higher than 150W.

2.1.5 Preparation of Cable, Connector and Connecting Cable

Connecting line	Description	Type of connector
Coaxial cable	SYWV-75-5, RG-59 or RG-6	Type F
Internet cable	Twisted-pair cable	RJ-45
Fiber optic jumper	Used in the optical fiber connection	SC/APC
Serial port line	Connect CMTS panel, Console Interface，RJ-45 Joint，random distribution	RJ-45 Interface /RS232 plug

2.2 Installation of fixing device

Install CMTS equipment onto the rack that is well earthed, and fix it by screws firmly.

The grounding pile behind the C3000 must be connected to the grounding plate of the rack by the copper conductor.

Chapter 3 Getting Start

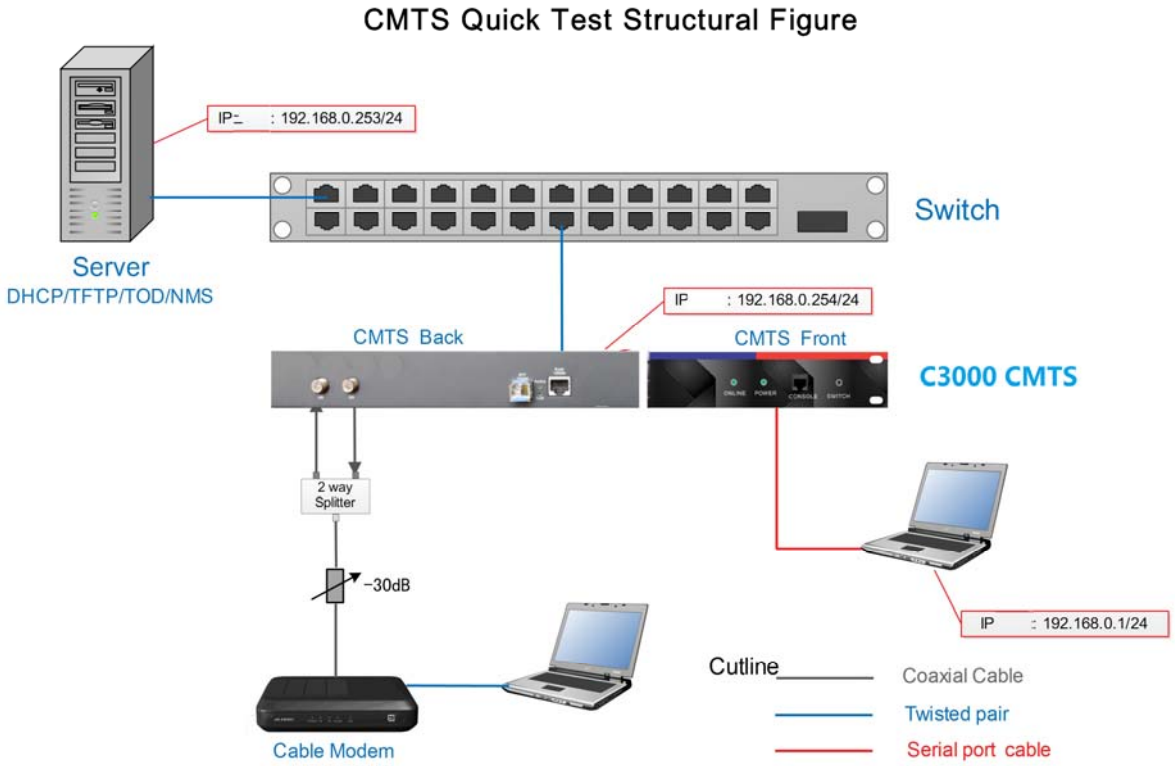
3.1 Testing of CMTS Equipment

Before accessing to the HFC network, it is required to test the CMTS equipment by connecting to the power and set up relevant parameters.

Before starting the following Step, please refer to Appendix B: Ex-factory Default Setup

Step 1

Connect the equipment according to the diagram below, and make sure the data port of CMTS has been connected into the switch before CMTS device is powered up.



Step 2

Turn on all equipment power supplies indicated in the connecting drawing, and the startup period of CMTS is about 2 minutes.

Step 3

Modify the console PC IP address: 192.168.0.1/24.

Step 4

Open the hyper terminal of console PC, with the configured baud rate of 115200, 8bit data,

none parity check and 1 stop bit. Connect the hyper terminal, the “C3000>” pops up, and then the startup of prompt CMTS is completed.

Step 5

CMD ping 192.168.0.254, check if the network connection status is in normal condition as shown:

```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [版本 5.1.2600]
(C) 版权所有 1985-2001 Microsoft Corp.

C:\Documents and Settings\Administrator>

C:\Documents and Settings\Administrator>cd \

C:\>ping 192.168.0.254

Pinging 192.168.0.254 with 32 bytes of data:

Reply from 192.168.0.254: bytes=32 time=1ms TTL=128
Reply from 192.168.0.254: bytes=32 time<1ms TTL=128
Reply from 192.168.0.254: bytes=32 time<1ms TTL=128
Reply from 192.168.0.254: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>_
```

Step 6

Configure the IP address of server-pc at 192.168.0.253/24, at the same time ping 192.168.0.254 to check the state of the network connection, configure the scope option of DHCP server, start the TFTP server and edit the CM configuration file.

(This step is optional, and the CMTS built-in server shall be used in default, which can be ignored. If it is necessary to use the external server, it shall be configured.)

Step 7

Confirmed step 5 OK, login the super terminal CMTS by telnet or console-pc，telnet login user name and password are admin，console, Login as below：

```
*****************************************************************
*  Welcome to Headend (CMTS) System command line interpreter    *
*  Press < ENTER > to connect and config this system            *
*****************************************************************

C3000>
C3000>
```

Step 8

The ex-factory default configuration of CM and CPE can be normally accessed to the network, the assigned IP address of CM is 192.168.0.2~192.168.0.100, and the assigned IP address of CPE is 192.168.0.101~192.168.0.252. The accessed terminal equipment of CMTS network can be seen through command show cm / show cp, as shown below:

```
C3>
C3>show cable modem
  MacAddress          IpAddress         Sid   Ver   Status    Us    Ds    CPEs  BPI Enb
  00:1f:a4:93:85:28   192.168.0.2       1     v3.0  Online    3     5     1     N/A

  total cm: 1 ; online cm: 1 ; offline cm: 0 ; other cm: 0

C3>show cable modem cpe
  MacAddress          IpAddress           Cm-MacAddress       Cm-IpAddress        dev-type
  bc:ee:7b:4d:c0:9d   192.168.0.101       00:1f:a4:93:85:28   192.168.0.2         host

  total cpe: 1
```

Step 9

Use an external server, verify Step 6 is OK, modify CM/CPE DHCP server address to the external IP server through the command, and remove the default IP of DHCP server;

no-helper-address 192.168.0.254

no-helper-address 192.168.0.254 cm

no-helper-address 192.168.0.254 cpe

Add an external DHCP server IP: helper-address 192.168.0.253 Note: the DHCP server can be configured with multiple IPs, and the terminal type can be designated, with the built-in CMTS given the priority. If it is necessary to use the external server, the IP address of built-in DHCP server must be deleted first, as shown below:

```
C3(config)#show cable helper-address
  helper-address
  192.168.0.254        cable-modem
  192.168.0.254        host

C3(config)#show built-in-dhcp-server
  IP Scope :                          cable-modem
  starting address :                  192.168.0.2
  end address :                       192.168.0.100
  netmask :                           255.255.255.0
  gateway address :                   192.168.0.1
  primary dns address :               0.0.0.0
  secondary dns address :             0.0.0.0
  bootserver address :                192.168.0.254
  bootfile name :                     cm.bin
  log server address :                0.0.0.0
  tod server address :                0.0.0.0
  lease time :                        7200

  IP Scope :                          host
  starting address :                  192.168.0.101
  end address :                       192.168.0.252
  netmask :                           255.255.255.0
  gateway address :                   192.168.0.1
  primary dns address :               192.168.0.1
  secondary dns address :             0.0.0.0
  bootserver address :                0.0.0.0
  bootfile name :
  log server address :                0.0.0.0
  tod server address :                0.0.0.0
  lease time :                        7200
```

```
C3(config)#no cable helper-address 192.168.0.254 cable-modem

C3(config)#no cable helper-address 192.168.0.254 host
```

```
C3(config)#cable helper-address 192.168.0.253 cable-modem

C3(config)#cable helper-address 192.168.0.253 host
```

```
C3(config)#show cable helper-address
  helper-address
  192.168.0.253        cable-modem
  192.168.0.253        host
```

Step 10

Set the CM/CPE at the mode of L3 (route).

Set the address of CM and CPE subnet interface, and use the command IP-address 172.16.0.1 255.255.255.0 cm to set the CM IP interface address, and use the command ip-address 172.17.0.1 255.255.255.0 cpe to set the CPE IP interface address.

```
C3(config)#
C3(config)#interface gige
C3(conf-if-gige)#ip address 172.16.0.1 255.255.255.0 cable-modem

C3(conf-if-gige)#ip address 172.17.0.1 255.255.255.0 host

C3(conf-if-gige)#show interface gige
  MacAddress:          00:02:5e:00:01:a1
  Fiber:               auto negotiate
  ip address           netmask
  192.168.0.254        255.255.255.0        gige
  172.16.0.1           255.255.255.0        cable-modem
  172.17.0.1           255.255.255.0        host
```

Set the CM and CPE network mode at L3 mode, use the command of net-mode route cm to set up CM network mode at L3 routing mode, and use net-mode route the command of net-mode route cpe to set up the CPE network mode at L3 routing mode.

```
C3(config)#network-mode cable-modem route

C3(config)#network-mode host route

C3(config)#show netmode
  cable modem net mode route
  cpe net mode route
 bootserver address :                0.0.0.0
 bootfile name :
 log server address :                0.0.0.0
 tod server address :                0.0.0.0
 lease time :                        7200
```

If the external server is used, verify the scope is well configured in Step 6; if the built-in DHCP server is used, the built-in DHCP scope shall be modified by using the command, as shown below:

Modify the CM scope: ip-scope cm -s 172.16.0.2 -e 172.16.0.254 -m 255.255.255.0 -g 172.16.0.1

Modify the CPE scope: ip-scope cpe -s 172.17.0.2 -e 172.17.0.254 -m 255.255.255.0 -g 172.17.0.1

Note: DNS, lease time and startup option parameters must be configured by reference.

```
C3#show built-in-dhcp-server cable-modem
  IP Scope :                          cable-modem
  starting address :                  192.168.0.2
  end address :                       192.168.0.100
  netmask :                           255.255.255.0
  gateway address :                   192.168.0.1
  primary dns address :               0.0.0.0
  secondary dns address :             0.0.0.0
  bootserver address :                192.168.0.254
  bootfile name :                     cm.bin
  log server address :                0.0.0.0
  tod server address :                0.0.0.0
  lease time :                        7200

  bootserver address :                192.168.0.254
  bootfile name :                     cm.bin
  log server address :                0.0.0.0
  tod server address :                0.0.0.0
  lease time :                        7200
```

Set the L3 mode at the static routing. If the external server is used, the static routing must be configured on the server. For example:

The setting of “route add 172.16.0.0 mask 255.255.255.0 192.168.0.254” is oriented to the default gateway of CM network, CMTS WAN IP.

The setting of “route add 172.17.0.0 mask 255.255.255.0 192.168.0.254” is oriented to the default gateway of CPE network, CMTS WAN IP.

```
C:\WINDOWS\system32\cmd.exe
C:\>
C:\>route add 172.16.0.0 mask 255.255.255.0 192.168.0.254

C:\>route add 172.17.0.0 mask 255.255.255.0 192.168.0.254

C:\>route print
===========================================================================
Interface List
0x1 ........................... MS TCP Loopback interface
0x2 ...00 22 19 fa 06 fc ...... Realtek RTL8102E Family PCI-E Fast Ethernet NIC
- 数据包计划程序微型端口
===========================================================================
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0     192.168.18.1  192.168.18.222      20
        127.0.0.0        255.0.0.0        127.0.0.1      127.0.0.1       1
      172.16.0.0    255.255.255.0    192.168.0.254  192.168.18.222       1
      172.17.0.0    255.255.255.0    192.168.0.254  192.168.18.222       1
      192.168.0.0    255.255.255.0      192.168.0.1  192.168.18.222      20
      192.168.0.1  255.255.255.255        127.0.0.1      127.0.0.1      20
    192.168.0.255  255.255.255.255      192.168.0.1  192.168.18.222      20
     192.168.18.0    255.255.255.0   192.168.18.222  192.168.18.222      20
   192.168.18.222  255.255.255.255        127.0.0.1      127.0.0.1      20
   192.168.18.255  255.255.255.255   192.168.18.222  192.168.18.222      20
        224.0.0.0        240.0.0.0   192.168.18.222  192.168.18.222      20
  255.255.255.255  255.255.255.255   192.168.18.222  192.168.18.222       1
Default Gateway:      192.168.18.1
===========================================================================
Persistent Routes:
  None

C:\>
```

Step 11

Set up the required upper and lower channel parameters (refer to the section of CLI interpretation).

3.2 Access to actual network

After the testing and configuration of relevant CMTS parameters, the CMTS can be accessed to the actual network. There are two types of access ports:

The RF port: connecting to the HFC network

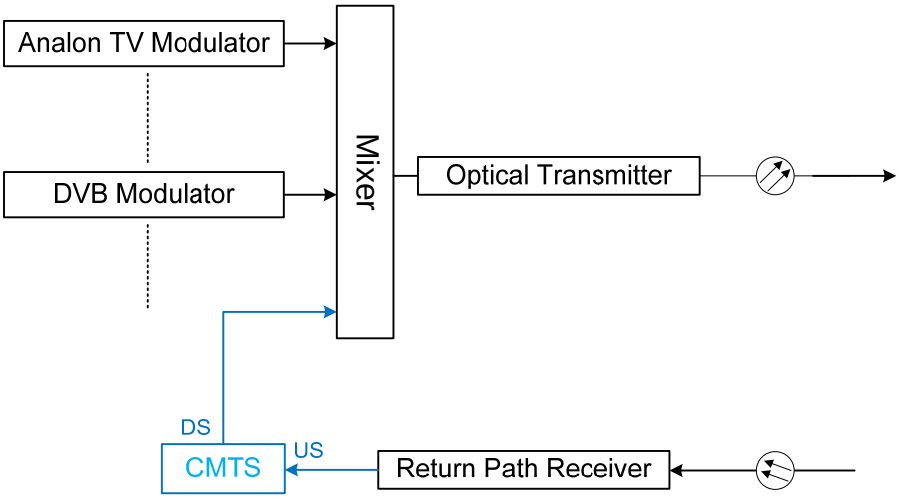
IP network ports: connecting to the Ethernet (1000M optical or electrical port)

3.2.1 Connection to the HFC Network

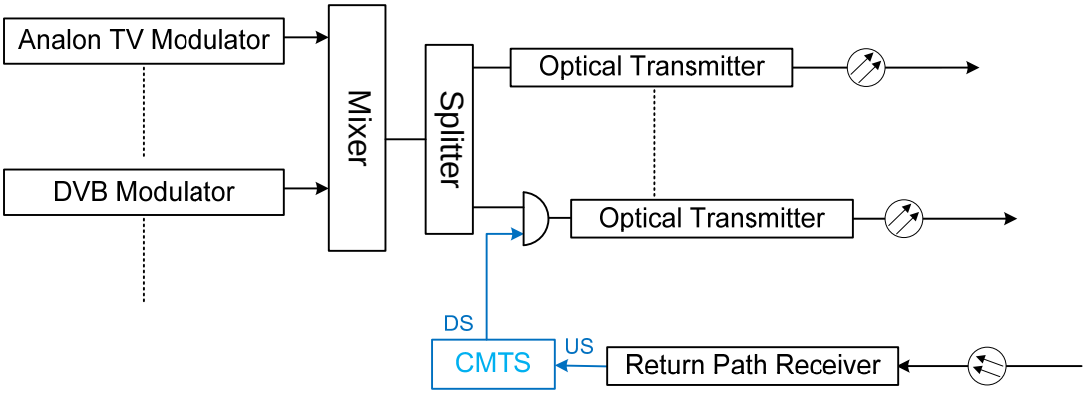
3.2.1.1 Different Access Points

According to the different CMTS installation locations, there are several access methods as follows:

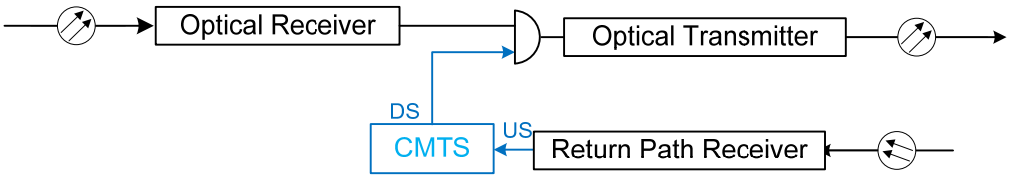
(1) Master front end room of small-sized HFC



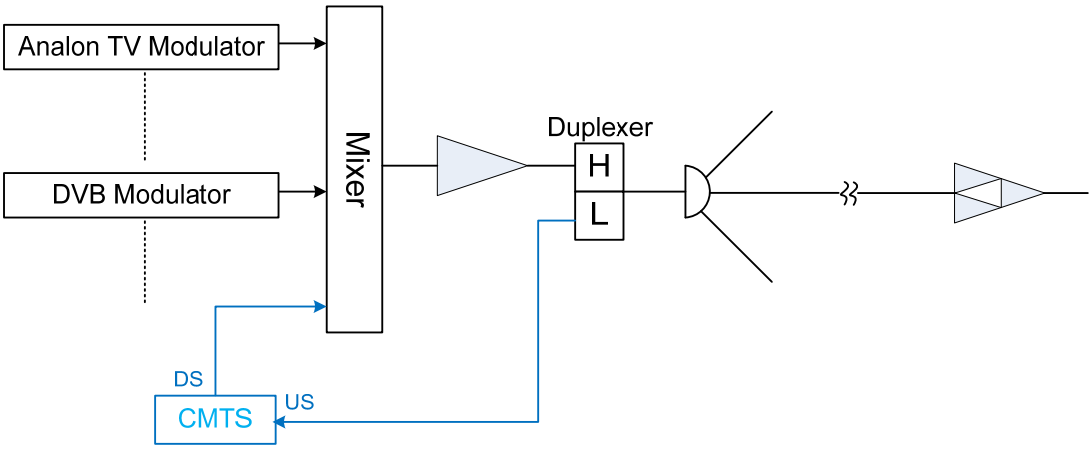
(2) Master front end room of large-sized HFC



(3) Sub-front end room at CATV



(4) In a small-sized CATV room (pure coaxial cable network)



3.2.1.2 About the Upstream Port Connection

With four upstream channels at C3000, there are two configurations for the input port: in the first configuration, 4 channels share one input receiving port, and the single port configuration must be used when it is necessary to realize the upstream channel binding; and in the second configuration, the four upstream channels correspond to the four independent input receiving ports, which is conducive to reduce the influx noise generated by the mixing of multiple-channel return signals. Indeed, independent input cannot achieve the channel binding function. The default upstream input configuration of C3000 CMTS-D-1-AC is single-port input.

3.2.2 Connection to the IP Network

There are two WAN ports of C3000, SPF and RJ45. Both are 1000M, and can be chosen according to the type of IP network port available in the headend. The default interface is RJ45, and SFP optical transceiver module shall be purchased by the customer separately according to the actual needs.

Note: make sure the CMTS equipment is well grounded.

Note: make ensure that the CMTS equipment is connected to the HFC network and IP network before connecting to the power supply.

Chapter 4 Management CMTS by CLI

4.1 Summary

4.1.1 About the CLI (Command Line Interface) Operation Grades

For convenient management, Ascent C3000 series CMTS offers 3 user modes at different operation grades including normal mode, admin mode and super user mode. All configurations can only be set at the super admin mode. The normal mode can only be used for operation viewing. By the command "enable", it can be switched to super mode, which could be confirmed by password. By the CLI interface, the setting of the CMTS network parameters, RF parameters and Ascent's unique functions can be completed, and the information about the system operation, CM and CPE can be checked.

4.1.2 How to Use CLI

4.1.2.1 CLI Rules

Usage	Notes	Example
Automatically completion of commands and parameters	Use TAB	
Commands Automatically Identification	CMTS recognize incomplete character stringcommand parameters, automatically matching complete commands	example： copy run start replace copy running-config start-config
History Commands	Use the up and down keys	
Show commands and parameters	use ? or TAB	
{ }	{ } affirmatively chosen item	
[ ]	[ ] optinal	
<>	<>needs to be filled by actural value	

4.1.2.2 CLI Input Rules

CLI Input Command Parameters, separated by" "(space)

IP Address	IP Address Dot-decimal notation	192.168.1.1
MAC Address	Hexadecimal [":" "." "-"] interval	00.01.02.03.04.05 00-01-02-03-04-05 00:01:02:03:04:05

4.2 Manage CMTS by CLI

Functions for CMTS Management are as following:

- Connect Configuration Serial Port
- Check CMTS Hardware/software Version
- Check System Running Configuration
- Switch User Management Mode
- Saving Configuration or replacing starting Configuration
- Restore the factory default configuration
- Reboot CMTS System
- Change Password
- Modify CMTS Host Name

4.2.1 Connect Configuration Serial Port

Start console pc hyperterminal, Baud rate (115200)，data bits(8bit), parity check (none), stop bits(1). Connect hyperterminal.

4.2.2 Checking CMTS Hardware/software Version

Use"show version" after any prompt, check the CMTS hardware/software version.

Step	Command	show version
1	Notes	Show current CMTS hardware/software version
	Examples	C3000>show version Running image:R.v4.2.14.0904+C.v4.3.0.r2.3218.14.0904 HW version: BCM93218.AP.v3.10

4.2.3 Checking System Running Configuration

Checking current CMTS system running configuration parameters by "show running-config"after C3000# prompt.

Step	Command	Show running-config
1	Notes	Show current CMTS running configuration parameters
	Examples	C3000#show running-config --interface upstream channel-- upstream channel: 1 channel 1 status enable channel 1 frequency 30000 channel 1 bandwidth 3200 channel 1 profile 10 channel 1 type ATDMA channel 1 power 0

		channel 1 docsis-30-enhanced-mode disable ……

4.2.4 Switching User Management Mode

There are three operation grades for CMTS:

Common administrator/administrator/privilege administrator

Log in via connecting serial port or TELNET, CMTS will default it as common user mode, C3000> prompt, enter the privilege user mode, C3000# prompt, use Enable command (need password, the defaulted password is “admin”).

Step	Command	enable
1	Notes	Shift from common user mode to privilege user mode (need password verification), by ”C3000#”
	Example	C3000>enable password:****** C3000#

Step	Command	config
2	Notes	Shift from privilege user mode to privilege user configure mode by ”C3000(config)#”
	Example	C3000#config C3000(config)#

Step	Command	exit
3	Notes	Exit current configuration mode
	Example	C3000(config)#exit C3000#

4.2.5 Saving Configuration or replacing starting Configuration Parameters

There will be no instant saving for CLI revising configuration for CMTS system, use “copy” to save the current running configuration to specified config files name (Max. 32 characters [aA-zA] or [0-9]) or system start configuration.

Step	Command	copy [<filename> | running-config] [start-config | <filename>]
1	Notes	Save current running configuration parameters to disc， <filename> Max. 32 characters or use those config files which has been saved to replace the CMTS start configurations.If need to enter privilege configuration mode, use”C3000 (config) #” prompt.
		[<filename> | running-config]

		<filename>	File name for those configfiles which has been saved on that disc
		running-config	Current running configuration parameters
		[start-config | <filename>]	
		start-config	CMTS system starting running configuration
		<filename>	File names for those config files saved on that disc
	Example	C3000(config)#copy running-config start-config C3000(config)#copy running-config test-cfg C3000(config)#copy test-cfg start-config	

4.2.6 Restore the factory default configuration

Restore CMTS factory default configuration or password by "system reset" after"C3000#".

Step	Command	system reset [password | config]	
1	Notes	Restore factory default password or running configuration	
		[password | config]	
		password	Restore default password
		config	Restore default running configuration
	Examples	C3000#system reset password C3000#system reset config	

4.2.7 Reboot CMTS system

Use "system reboot" to reboot CMTS after "C3000#"

Step	Command	system reboot
1	Notes	Reboot CMTS
	Examples	C3000#system reboot

4.2.8 Modify Password

Use "password" command to modify privilege mode password or use "console-password" to modify telnet log in password.

Step	Command	password
1	Notes	modify privilege mode password

	Examples	C3000#password Current Passwd:***** new Passwd:****** ack Passwd:******
2	Command	console-password
	Notes	Modify telnet log in password
	Examples	C3000# console-password Current Passwd:***** new Passwd:****** ack Passwd:******

4.2.9 Modify CMTS Host Name

Use “hostname” to modify CMTS host name after”C3000#”, the factory default name is C3000.

Step	Command	Hostname <string>	
1	Notes	Modify CMTS Host Name	
		<string>	Customized Host name, Max. 32 haracters
	Examples	C3000#hostname c-cmts c-cmts#	

4.3 Configure CMTS Parameters by CLI

There are several functions for CMTS configuration:

- Configure GIGE port IP address
- Configure Static Route
- Configure QAM (DS Channel) RF Port Parameters
- Configure US Channel Port Parameters
- Configure DHCP Server
- Configure VLAN
- Conigure built-in DHCP server scope
- Configure DHCP relay
- Configure DHCP GIADDR main mode
- Configure inserting DHCP OPTION 82 option
- Configure L2VPN
- Configure Access Control List(ACL)
- Configure CMTS network mode
- Configure cable modem remote-quest
- Configure cable flap-list

- Configure CMTS subnets interactive visiting control
- Configure DHCP IP address peek
- Configure load balancing for both US and DS channels
- Configure CPE CLASS
- Configure SNMPLiteracy group name
- Configure network time protocol Service
- Configure CMTS system time
- Configure upstream channel automatic frequency hopping

4.3.1 Configure GIGE Port IP Address

Configure CMTS GIGE access and subnet IP parameter under privilege administrator mode

Step1 Enter into privilgege configuration mode (”C3000(config)#”)

Step2 Enter into GIGE Port Configuration Mode (”C3000 (conf-if-gige) #”)

Step3 Set GIGEor subnet IP Address (”C3000 (conf-if-gige) #”)

Step4 Set GIGE optical module forced 1000M or auto negotiation (only connected SFP effectively)

Step5 Exit Current Access

Step	Commands	interface gige	
1	Notes	Enter into GIGE Port Configuration Mode	
	Examples	C3000(config)#interface gige C3000(conf-if-gige)#	
2	Command	[no] ip address {[dhcp | <ipaddress> <netmask>]} [<strings>|cable-modem|host|mta|secondary]	
	Notes	Set access IP address parameters	
		{[dhcp | <ipaddress> <netmask>]}	
		dhcp	The WAN Interface IP Address will be obtained from DHCP automatically
		<ipaddress> <netmask>	IP address and subnet mask
		[<strings>|cable-modem|host|mta|secondary]	
			Default Value WAN Interface
		<strings>	CPE-CLASS Name, basedon customized definition option 60 Parameters
		cable-modem	Cable modem subnet
		host	Cable modem downlink to host subnet
		mta	VOIP subnet
		secondary	sub-access

	Examples	C3000(conf-if-gige)#ip address 192.168.0.254 255.255.255.0 C3000(conf-if-gige)#ip address 192.168.1.1 255.255.255.0 cable-modem C3000(conf-if-gige)#no ip address 192.168.0.254 255.255.255.0
3	Command	[no] auto-negotiate
	Notes	Set GIGE optical module forced 1000M or auto negotiation (only connected SFP effectively)
	Examples	C3000(conf-if-gige)# auto-negotiate C3000(conf-if-gige)# no auto-negotiate
4	Command	Exit
	Notes	Exit current configuration interface mode
	Examples	C3000(conf-if-gige)#exit C3000(config)#

4.3.2 Configure Route

Configure CMTS static route or strategy route under privilege administrator mode

Notes: Strategy route based on source IP and mask

Step1 Enter into privilege configuration mode (”C3000#”)

Step2 Set CMTS Route

Step	Commands	[no] route {[host|net|policy]} {<ipaddress> [<netmask>]} gw <gateway>	
1	Notes	Set CMTS Route	
		{[host|net|policy]}	
		host	Specific IP Address Host
		net	Destination Network
		policy	Strategy Route
		{<ipaddress> [<netmask>]}	
		<ipaddress>	Destination IP or network number, strategy route based on source IP
		[<netmask>]	IP mask, host ignore this option
		<gateway>	Gateway (the next jump) IPAddress
	Examples	C3000#route host 192.168.2.1 gw 192.168.1.1 C3000#route net 192.168.2.0 255.255.255.0 gw 192.168.1.1 C3000#route policy 192.168.2.0 255.255.255.0 gw 192.168.1.1 C3000#no route net 192.168.2.0 255.255.255.0 gw 192.168.1.1	

4.3.3 Configure QAM (DS channel) RF Interface Parameter

Configure CMTS DS channel RF parameter under privilege administrator mode:

Step1 Enter into privilege configure mode”C3000 (config) #”)

Step2 Enter into QAM access configure mode”C3000 (conf-if-qam) #”)

Step3 Set QAM channel RF parameter”C3000 (conf-if- qam) #”)

Step4 Apply QAM channel configuration

Step5 Exit current access

<table>
<tr><td>Step</td><td>Command</td><td colspan="4">interface qam</td></tr>
<tr><td rowspan="2">1</td><td>Notes</td><td colspan="4">Enter into QAM access configuration mode</td></tr>
<tr><td>Examples</td><td colspan="4">C3000(config)#interface qam
C3000(conf-if-qam)#</td></tr>
<tr><td rowspan="19">2</td><td>Command</td><td colspan="4">Channel {<0-16>|<1,2,3,...>} {frequency|modulation|annex|power|interleaver|status} {value}</td></tr>
<tr><td rowspan="18">Notes</td><td colspan="4">Setup QAM channel RF parameter</td></tr>
<tr><td colspan="4">{<0-16>|<1, 2, 3,. ..>}</td></tr>
<tr><td><0-16></td><td colspan="3">DS channel NO. 1~16,0 ,all channel</td></tr>
<tr><td><1, 2, 3, ...></td><td colspan="3">Assign many channels, use ”,” to separate them</td></tr>
<tr><td colspan="4">{frequency|modulation|annex|power|interleaver|status}</td></tr>
<tr><td rowspan="2">frequency</td><td colspan="3">DS channel output center frequency, the channel no. is 0, the frequency will increase by 8Mhz or 6 Mhz according to annex</td></tr>
<tr><td>{value} Khz</td><td colspan="2"><88000-1000000></td></tr>
<tr><td rowspan="3">modulation</td><td colspan="3">DS channel modulation mode</td></tr>
<tr><td rowspan="2">{value}</td><td colspan="2">64QAM</td></tr>
<tr><td colspan="2">256QAM</td></tr>
<tr><td colspan="2">1024QAM</td></tr>
<tr><td rowspan="3">annex</td><td colspan="3">DS Channel DOCSIS Standard</td></tr>
<tr><td rowspan="2">{value}</td><td>A</td><td>Euro DOCSIS</td></tr>
<tr><td>B</td><td>DOCSIS</td></tr>
<tr><td>power</td><td>{value}</td><td colspan="2"><45-60> dbmv
The max. value will adjust automatically according to channel quantity</td></tr>
<tr><td rowspan="2">interleaver</td><td colspan="3">Interleave depth</td></tr>
<tr><td>{value}</td><td colspan="2">If EURO DOCSIS, ignore this item</td></tr>
<tr><td rowspan="3">status</td><td colspan="3">Channel Status</td></tr>
<tr><td rowspan="2">{value}</td><td>DOCSIS</td><td>DOCSIS channel</td></tr>
<tr><td>ipqam</td><td>IPQAM</td></tr>
</table>

					channel
				shutdown	Turnoff channels
	Examples	C3000(conf-if-qam)#channel 0 frequency 387000 C3000(conf-if-qam)#channel 1,2,3,4 modulation 64qam			
3	Command	application qam			
	Notes	QAM channel parameter configuration is not immediately effect, use this command apply RF configuration parameter			
	Examples	C3000# application qam			
4	Command	Exit			
	Notes	Exit current configuration access mode			
	Examples	C3000(conf-if-qam)#exit C3000(config)#			

4.3.4 Configure US channel Interface Parameters

Configure CMTS US Channel RF Parameter under privilege administrator mode:

Step1 Enter into privilege configure mode”C3000 (config) #”)

Step2 Enter into US channel port configure mode (”C3000 (conf-if-ups) #”)

Step3 Set US Channel RF Parameter”C3000 (conf-if- ups) #”)

Step4 Apply US channel configure

Step5 Exit current access

Step	Command	interface upstream	
1	Noted	Enter into US channel access configure mode	
	Examples	C3000(config)#interface upstream C3000(conf-if-ups)#	
2	Command	channel {<0-4>|<1,2,3,...>} {frequency|bandwidth|profile|type|power|docsis-30-enhanced-mode|status} {value}	
	Notes	Set US channel RF parameter	
		{<0-4>|<1,2,3,...>}	
		<0-4>	US channel NO.1~4,0 all channel
		<1,2,3,...>	Assign many channels, use ”,” to separate channels
		{frequency|bandwidth|profile |power| type |docsis-30-enhanced-mode|status}	
		frequency	US channel center frequency, the channel No. is 0, the frequency will increase according to channel bandwidth, default as 3.2Mhz

			{value} Khz	<5000-65000>	
		bandwidth	US channel bandwidth		
			{value} Khz	1600	
				3200	
				6400	
		profile	Downstream DOCSIS Standard		
			{value}	<0-16>, will choose according to channel type:ATDMA/SCDMA	
		power	US channel receiving power		
			{value}	<-13-23> db	
		type	Channel Type		
			{value}	ATDMA	
				SCDMA	
		DOCSIS 3.0 enhanced-mode	DOCSIS3.0 enhance mode, enable this item Docsis2.0 cable modem can not be used		
			{value}	Enable	ON
				shutdown	OFF
		status	Channel Status		
			{value}	Enable	ON
				shutdown	OFF
		spectrum-rule	Frequency hopping rules		
			{value}	1-40	
	Examples	C3000(conf-if-ups)#channel 0 frequency 20000 C3000(conf-if-ups)#channel 1,2,3 bandwidth 3200			
3	Command	application upstream			
	Notes	US channel parameter configuration is not immediate effect, use this command to apply RF configuration parameter			
	Examples	C3000# application upstream			
4	Command	Exit			
	Notes	Exit current configure access mode			
	Examples	C3000(conf-if-ups)#exit C3000(config)#			

4.3.5 Configure DHCP Server

Configure helper-address(DHCP server IP address) under privilege administrator mode：

Step1 Enter into privilege configure mode”C3000 (config) #”)

Step2 Set DHCP server parameter (”C3000 (config) #”)

Step	Command	[no] cable helper-address {<ipaddress>}

		[<strings>|cable-modem|host|mta]	
1	Notes	Set DHCP Server IP address	
		{<ipaddress>}	DHCP Server IPAddress
		choose specified subnet	
		[<strings>|cable-modem|host|mta]	
			Default all subnet sharing that DHCP server
		<strings>	CPE-CLASS name, based on user defined, option 60 parameter
		cable-modem	Cable modem subnet
		host	Cable modem downlink to host subnet
		mta	VOIP subnet
	Examples	C3000(config)#cable helper-address 192.168.1.1 cable-modem C3000(config)#no cable helper-address 192.168.1.1 cable-modem	

4.3.6 Configure VLAN

Set VLAN scope 2-3700, the vlan can assign subnet access including cable mode, host, MTA and CPE-class ,VLAN tag mode including gige(out from CMTS WAN), DOCSIS(HFC DS) and both (double way tag). CMTS could support Max. 255 VLANs, if enabled L2VPN, you will need adding corresponding VLAN.

Configure CMTS VLAN under privilege administrator configure mode:

Step1 Enter into privilege configure mode”C3000 (config) #”)

Step2 Enter into VLAN access configure mode”C3000 (conf-if-vlan <num>) #”)

Step3 Set VLAN Parameter (”C3000 (conf-if-vlan <num>) #”)

Step4 Set VLAN IP network address(prompt ”C3000(conf-if-vlan <num>)#”)

Step5 Exit current Access

Step	Command	interface vlan <num>	
1	Notes	Enter into VLAN interface configure mode	
	Examples	C3000(config)#interface vlan 100 C3000(conf-if-vlan 100)#	
2	Command	Vlan port {<strings>|cable-modem|host|mta}	
	Notes	Set the VLAN interface, a VLAN can be assigned to mutiple subnets interfaces,and each sub network can only in a VLAN	
		[<strings>|cable-modem|host|mta]	
		<strings>	CPE-CLASS name, basedon user defined option 60 parameter
		cable-modem	Cable modem subnet
		host	Cable modem downlink to host subnet

		mta	VOIP subnet
	Examples	C3000(conf-if-vlan 100)#vlan port cable-modem C3000(conf-if-vlan 100)#vlan port host	
3	Command	Vlan tag { outbound | inbound |both}	
	Notes	Set vlan tag	
		{ outbound | inbound |both }	
		outbound	Data packet OUT CMTS WAN insert tag
		inbound	data packet to DS (HFC) insert tag
		Both	IN/OUT CMTS data packet bidirectional inserting tag
	Examples	C3000(conf-if-vlan 100)#vlan tag outbound	
4	Command	[no] ip address <ip_addr> <mask>	
	Notes	Set the VLAN IP network address, a VLAN can configure mutiple IP networks, and each IP network only on a VlAN	
		<ip_addr> <mask>	
		<ip_addr>	IP network number for the specified VLAN
		<mask>	IP network mask for the specified VLAN
	Examples	C3000(conf-if-vlan 100)#ip address 10.1.1.0 255.255.255.0 C3000(conf-if-vlan 100)#no ip address 10.1.1.0 255.255.255.0	
5	Command	Exit	
	Notes	Exit current configuration port mode	
	Examples	C3000(conf-if-vlan 100)#exit C3000(config)#	

4.3.7 Configure built-in DHCP Server Action Scope

CMTS has built-in DHCP server, Max. 32 scopes. You may configure appointed action scope based on IP subnet including starting address, ending address, subnet mask, gateway, DNS, starting server, starting file name, lease time, log server and TOD server. If using built-in DHCP server, you will need pointing the subnet DHCP server IP to CMTS WAN IP.

Configure CMTS built-in DHCP server under privilege administrator mode:

Step1 Enter into privilege configure mode" C3000 (config) #")

Step2 Set DHCPAction scope Parameter (" C3000 (config) #")

Step	Command	built-in-dhcp-server {<string>|default|cable-modem|host|mta} {start-ip|end-ip|netmask|gateway|lease-time|dns|boot-server |log-server|tod-server} {value} [value]	
1	Notes	Set DHCP subnet Action scope	
		{<string>|default|cable-modem|host|mta}	
		<string>	Cpe-class user define subnet, based on

			option 60 parameter	
		default	Default Action scope	
		cable-modem	Cable modem subnet Action scope	
		host	Host subnet Action scope	
		mta	Voip subnet Action scope	
		{start-ip|end-ip|netmask|gateway|lease-time|dns|boot-server|log-server|tod-server}		
		start-ip	Action scope starting IP address	
			{value}	<a.b.c.d>
		end-ip	Action scope ending IP address	
			{value}	<a.b.c.d>
		netmask	Action scope subnet mask	
			{value}	<a.b.c.d>
		gateway	Action scope subnet gateway IP address	
			{value}	<a.b.c.d>
		lease-time	Action scope address lease time	
			{value}	<1-65535>
		dns	Action Scope DNS IP address and spare DNS IP address	
			{value} [value]	<a.b.c.d> [<a.b.c.d>]
		boot-server	Action Scope starting server IP and starting file name	
			{value} [value]	<a.b.c.d> <string>
		log-server	Action scope log server IP	
			{value}	<a.b.c.d>
		tod-server	Action scope TOD server IP	
			{value}	<a.b.c.d>
	Examples	C3000(config)#built-in-dhcp-server cable-modem start-ip 192.168.0.2		

4.3.8 Configure DHCP Relay

CMTS default doing Bridge passthrough to those DHCP message for subnets, enable DHCP relay function, CMTS will relay DHCP message to appointed DHCP server.

Set DHCP relay under privilege administrator mode

Step1 Enter into privilege configure mode (”C3000 (config) #”)

Step2 Set DHCP relay (”C3000 (config) #”)

Step	Command	[no] dhcp relay
1	Notes	Enable/disableDHCP relay
	Examples	C3000(config)#dhcp relay

		C3000(config)#no dhcp relay

4.3.9 Configure DHCP GIADDR Main Mode

CMTS default using CM subnet interface and host subnet interface IP inserting giaddr fields as relay, enable giaddr main mode, CMTS will distinguish terminal type and use matching subnet interface IP inserting DHCP message giaddr fields.

Set DHCP relay under privilege administrator mode

Step1 Enter into privilege configuration mode (”C3000 (config) #”)

Step2 Set DHCP GIADDR main mode (”C3000 (config) #”)

Step	Command	[no] dhcp-giaddr-primary
1	Notes	Enable/disable DHCP relay GIADDR main mode
	Examples	C3000(config)#dhcp-giaddr-primary C3000(config)#no dhcp-giaddr-primary

4.3.10 Configure Inserting DHCP Option 82

CMTS defaults not insert OPTION 82, if enable this function, CMTS will insert OPTION 82 parameters, and the remote id: is CMTS MAC address, CircuitID: vid :< num>/cm-mac:

<xx:xx:xx:xx:xx:xx>/cpe-mac: <xx:xx:xx:xx:xx:xx>, CMTSCapability id 9 "cdocsis3.0 v1.1 16-downstreams 4-upstreams"

Set insert DHCP OPTION 82 under privilege administrator mode

Step1 Enter into privilege administrator mode (”C3000 (config) #”)

Step2 Set DHCP GIADDR main mode”C3000 (config) #”

Step	Command	[no] dhcp option 82
1	Notes	Enable/disableDHCP relay agent insert OPTION 82
	Examples	C3000(config)#dhcp option 82 C3000(config)#no dhcp option 82

4.3.11 Configure L2VPN

CMTS default has no 802.1q analysis HFC US data, if enable it, the CMTS will insert vlan tag on those data of L2VPN from CM configure files out of WAN interface, for those L2VPN data entered into WAN interface, the CMTS will strip the VLAN tag.

Set L2VPN under privilege administrator mode

Step1 Enter into privilege configuration mode (”C3000 (config) #”)

Step2 Set DHCP GIADDR main mode (”C3000 (config) #”)

Step	Command	[no] cable l2-vpn-service dot1q
1	Notes	Enable/disable L2VPN
	Examples	C3000(config)#cable l2-vpn-service dot1q C3000(config)#no cable l2-vpn-service dot1q

4.3.12 Configure Access Control List (ACL)

CMTS support ACL control, it can support Max.100 ACL rules, and each rule can be assigned to different interface

Set visit control list under privilege administrator mode:

Step1 Enter into privilege configuration mode C3000 (config) #”

Step2 Enter into privilege configuration ACL rule mode”C3000 (conf-ip-acl-rule <num>) #”)

Step3 Set ACL rule C3000 (conf-ip-acl-rule <num>) #”)

Step4 Set ACL rule priority”C3000 (conf-ip-acl-rule <num>) #”)

Step5 Enter into ACL Interface (”C3000 (conf-ip-acl-if <string>) #”)

Step6 Assign ACL Interface Rule (”C3000 (conf-ip-acl-if <string>) #”)

Step7 Enable or disable ACL (”C3000 (config) #”)

Step	Command	[no] ip access-rule <num>	
1	Notes	Create or delete ACL rules	
		<num>	Rule ID,1~255
	Examples	C3000(config)#ip access-rule 10 C3000(config)#no ip access-rule 10	
2	Command	Permit|deny|rule-vlan|rule-policy-route <protocol_name>|all {sourceIP Mask|any } {destIP Mask|any } {sourcePortStart End|any } {destPortStart End|any }	
	Notes	Select Rules	
		Permit|deny|rule-vlan|rule-policy-route	
		Permit	allow
		deny	forbid
		rule-vlan	Vlan rules, matching rules inserting vlan tag
		rule-policy-route	Policy route rules, matching rules, use policy route
		Specified Protocols	
		<protocol_name>|all	
		all	All IP data package
		<protocol_name>	Assign IP protocol type data packet including icmp、igmp、ftp、tftp、snmp、

			telnet,etc.
		Assign source IP and mask or any source IP	
		{sourceIP Mask|any }	
		sourceIP Mask	<a.b.c.d> <m.m.m.m>
		any	Any source IP
		Assign destination IP and mask or any destination network	
		{destIP Mask|any }	
		destIP Mask	<a.b.c.d> <m.m.m.m>
		any	Any destination network
		Assign source port scope or any source port	
		{sourcePortStart End|any }	
		sourcePortStart End	<start> <end>,the fixed port for start and end are the same
		any	Any source port
		Assign destination port scope or any destination port	
		{destPortStart End|any }	
		destPortStart End	<start> <end>, the fixed port will be the same for both start and end
		any	Any destination Port
	Examples	C3000(conf-ip-acl-rule 10)#permit all any any any any C3000(conf-ip-acl-rule 10)#permit icmp 192.168.1.1 255.255.255.0 any any any	
3	Command	rule-priority <num>	
	Notes	Set rule priority	
		<num>	Rule Priority 0(Min.)-255(Max.)
	Examples	C3000(conf-ip-acl-rule 10)#rule-priority 255	
4	Command	ip access-list host|gige|docsis-mac	
	Notes	Enter ACL assign interface	
		host|gige|docsis-mac	
		host	CMTS host identity
		gige	CMTS WAN Interface
		docsis-mac	CMTS DS HFC Interface
	Examples	C3000(config)#ip access-list host C3000(conf-ip-acl-if host)#	
5	Command	[no] access-rule <num>	
	Notes	Assign ACLrules to the access	
		<num>	ACL rule ID
	Examples	C3000(conf-ip-acl-if host)#access-rule 10 C3000(conf-ip-acl-if host)#no access-rule 10	
6	Command	[no] ip access-control	
	Notes	Enable or disable ACL	

	Examples	C3000(config)# ip access-control C3000(config)#no ip access-control

4.3.13 Configure CMTS network mode

CMTS support L2 brige connection, L3 route and L2, L3 mixture network mode. L2 bridging mode, CMTS will passthough all passed data message and only deal with those data packet enabled DHCP relay or L2 VPN, for L3 route mode, CMTS will transmit data packet based on L3 IP protocols. CMTS default transmitting L2, L3 network mode for CM and CPE sunbet.

Set CMTS network mode under privilege administrator mode:

Step1 Enter into privilege configuration mode”C3000 (config) #”)

Step2 Set CMTS network mode network mode”C3000 (config) #”)

Step	Command	network-mode cable-modem|host bridge|route	
1	Notes	Set cable modem subnet or CPE subnet network mode	
		cable-modem|host	
		cable-modem	Cable modem subnet
		Host	CPE subnet
		bridge|route	
		bridge	Layer 2 bridging mode
		route	Layer 3 bridging mode
	Examples	C3000(config)#network-mode cable-modem bridge	

4.3.14 Configure cable modem remote-quest

CMTS support cable modem remote query, set query period and SNMP read group name.

CMTS will obtain seasonal online CM parameters remotely including US/DS receiving/transmitting power and DS reference micro level parameter.

Set CMTS network mode under privilege configuration mode：

Step1 Enter into privilege configuration mode”C3000 (config) #”)

Step2 Set CMTS network mode (”C3000 (config) #”)

Step	Command	cable modem remote-query <num> <string> <string>	
1	Notes	Set CMTS checking cable modem running parametersperiod and SNMP reading group name	
		<num>	Query period 300~1800 second, 0 Disable query
		<string>	SNMP read group name, Max. 50 characters, default as public
		<string>	NMP write group name, Max. 50 characters,

			default as private
	Examples	C3000(config)# cable modem remote-query 600 public private	

4.3.15 Configure cable flap-list

CMTS support cable flap real time statistics, cable flap is mainly used for disgnose HFC network signal quality, offers reference for HFC network failure, setting flap statistics to save intervals.

Set cable flap deadtime under privilege administrator mode:

Step1 Enter into privilege configuration mode”C3000 (config) #”

Step2 Set CMTS network mode (”C3000 (config) #”)

Step	Command	cable flap-list aging <num>	
1	Notes	Set cable flap statistics dead time, if exceeded, zero clearing, it will start recounting.	
		<num>	Cable flap statistic dead time, 15~43200 mintutes, default as 60 minutes0 forbid flap statistics
	Examples	C3000(config)# cable flap-list aging 60	

4.3.16 Configure CMTS subnet exchanging visit controlling

CMTS defaults prohibiting HFC subnet exchanging visit, if disable this item; the exchanging visit can be functioned.

Set CMTS network mode under privilege configuration mode：

Step1 Enter into privilege configuration mode”C3000 (config) #”

Step2 Set CMTS network mode”C3000 (config) #”

Step	Command	[no] subnet-isolation
1	Notes	Enable/disable CMTS subnet exchange visiting control
	Examples	C3000(config)# subnet-isolation C3000(config)#no subnet-isolation

4.3.17 Configure DHCP IP address smooping

CMTS default enable DHCP IP address snooping , those host with IP address assigned by illegal DHCP server or host with manual binding IP address can not be accessed into network.

Set DHCP IP address snooping under privilege administrator mode：

Step1 Enter into privilege configuration mode”C3000 (config) #”

Step2 Enter CMTS network mode (”C3000 (config) #”)

Step	Command	[no] ip snooping

1	Notes	Enable/disable DHCP IP Address snooping
	Examples	C3000(config)# ip snooping C3000(config)#no ip snooping

4.3.18 Configure CMTS US/DS Channel Loading Balancing

CMTS defaults automatical balancing US/DS CM quantity, it will use DCC and UCC dynamic balancing CM to banlanced channels or groups according to realtime channel utilization rate periodically.

Set CMTS US/DS channel loading balancing under privilege administrator mode：

Step1 Enter into privilege configuration mode”C3000 (config) #”)

Step2 Set CMTS US/DS channel loading balancing parameter”C3000 (config) #”)

Step3 Set CMTS load balancing group”C3000 (conf-load-bal-group <num>) #”)

Step4 Set CMTS eliminate load balancing”C3000 (config) #”)

Step	Command	load-balance method| period|overload| difference| init-tech {<value>}			
1	Notes	Set CMTS US/DS channel load balancing parameter			
		method| period|overload| difference| init-tech|exclude			
		method	<value>	disable	Disable load Balancing
				dynamic	Dynamic banlancing bsed on channel utilization
				static	Balancing based on Min. bandwidth
		period	<value>	Balancing period, 60~3600 seconds，defauly 60 seconds	
		overload	<value>	Utilization percentage 1~100，if the channel utilization exceed , start dynamic balancing	
		difference	<value>	Channel utilization difference value percentage 1~100, if exceed, start dynamic balancing	
		init-tech	<value>	DCC/DBC mode	
				broadcast-ranging	Init-tech(1)
				period-ranging	Init-tech(2)
				unicast-ranging	Init-tech(3)
				direct	Init-tech(4)
	Examples	C3000(config)#load-balance method dynamic			
2	Command	[no] load-balance docsis-group <num>			

	Notes	Setup or delete responsible balancing group	
		<num>	Balancing group ID，1~255
	Examples	C3000(config)# load-balance docsis-group 1 C3000(conf-load-bal-group 1)# C3000(config)# no load-balance docsis-group 1	
3	Command	Channel downstream|upstream <num>|<num1,num2,…> add|remove	
	Notes	Add or delete US/DS channel to balancing group	
		downstream|upstream	
		downstream	DS channel
		upstream	US channel
		<Num>|<num1, num2…>	
		<num>	DS channel <1-16>,US channel <1-4>
		<num1, num2…>	Assign many channels, use ”,” to separate ,<1,2,…>
		add|remove	
		Add	add channel to balancing group
		Remove	delete channel from balancing group
	Examples	C3000(conf-load-bal-group 1)#channel upstream 1 add C3000(conf-load-bal-group 1)#channel downstream 1,2,3,4 remove	
4	Command	cable-modem single-mac| range-macs| mac-oui {<mac_address> [<mac_address>]} add|remove	
	Notes	Add/delete cable modem MAC address scope to balancing group	
		single-mac| range-macs| mac-oui	
		single-mac	Assigned MAC address cable modem
		range-macs	Cable modem MAC address scope address scope
		mac-oui	Cable modem MAC address OUI
		{<mac_address> [<mac_address>]}	
		<mac_address>	MAC address <xx.xx.xx.xx.xx.xx> MAC OUI <xx.xx.xx>
		[<mac_address>]	MAC address <xx.xx.xx.xx.xx.xx>, range-macs required
		add|remove	
		add	add channel to balancing group
		remove	delete channel from balancing group
5	Command	load-balance exclude cable-modem single-mac| range-macs| mac-oui {<mac_address> [<mac_address>]} add|remove	

	Notes	Add/delete cable modem MAC address scope to delete balancing group	
		single-mac| range-macs| mac-oui	
		single-mac	Assigned MAC address cable modem
		range-macs	Cable modem MAC address scope
		mac-oui	Cable modem MAC address OUI
		{<mac_address> [<mac_address>]}	
		<mac_address>	MAC address <xx.xx.xx.xx.xx.xx> MAC OUI <xx.xx.xx>
		[<mac_address >]	MAC address <xx.xx.xx.xx.xx.xx>, range-macs ,required
		add|remove	
		add	add channel to balancing group
		Remove	delete channel from balancing group
	Examples	C3000(config)#load-balance exclude cable-modem single-mac 1.1.1.1.1.1 add C3000(config)#load-balance exclude cable-modem single-mac 1.1.1 removte	

4.3.19 Configure CPE CLASS

CMTS support uder defined CPE class subnet based on option 60 parameter, it can assign IP, VLAN to assigned CPE-class

Set CPE CLASS under privilege administrator mode：

Step1 Enter into privilege configuration mode (”C3000 (config) #”)

Step2 Enter into CPE CLASS configuration mode (” C3000 (conf-cpe-class <string>) #”)

Step3 Set CPE CLASS (” C3000 (conf-cpe-class <string>) #”)

Step	Command	[no] cpe-class <string>	
1	Notes	Add or delete cpe-class	
		<string>	User defined cpe-class name, Max. 50 characters
	Examples	C3000(config)# cpe-class user-test C3000(conf-cpe-class user-test)# C3000(config)#no cpe-class user-test	
2	Command	[no] dhcp option 60 <string>	
	Notes	Add/delete DHCP option 60 parameters to cpe-class	
		<string>	Option 60 character string, Max.50 characters
	Examples	C3000(conf-cpe-class user-test)# dhcp option 60 stbtest C3000(conf-cpe-class user-test)# no dhcp option 60 stbtest	

4.3.20 Configure SNMP read-write group name

Set CPE CLASS under privilege administrator mode：

Step1 Enter into privilege configuration mode (”C3000 (config) #”)

Step2 Set SNMP read-write group name (”C3000 (config) #”)

Step	Command	snmp community <read_string> <write_string>	
1	Notes	Set SNMP read-write group name	
		< read_string >	Read group name, Max. 15 characters
		<write_string>	Write group name, Max. 15 characters
	Examples	C3000(config)# snmp community public private	

4.3.21 Configure Network Time Protocol (NTP) service

Set NTP service, CMTS will get autosynchronous network time

Set NTP service under privilege administrator mode：

Step1 Enter into privilege configuration mode (”C3000 (config) #”)

Step2 Network Time Protocol (NTP) service (”C3000 (config) #”)

Step	Command	ntp server <ip_address>|scheck [<timezone>]	
1	Notes	Set network time Protocol (NTP) service	
		<ip_address>	Time server IP address
		scheck	Immediately execute time synchronization
		[<timezone>]	Time zone:minutes -720~780, default Beijing time zone
	Examples	C3000(config)# ntp server 1.1.1.1 480 C3000(config)# ntp server scheck	

4.3.22 Set CMTS system time

Set CMTS system time under privilege mode

Step1 Enter privilege configuration mode (”C3000 (config) #”)

Step2 Set CMTS system time (”C3000 (config) #”)

Step	Command	system clock <date_string> <time_string>	
1	Notes	Set CMTS system time	
		<date_string>	Date: yyyy-mm-dd
		<time_string>	Time: H:M:S
	Examples	C3000(config)# system clock 2013-12-31 23:59:59	

4.3.23 Set the CMTS static anchor

Set static multicast in privileged administrator mode:
The CMTS default automatic learning legal multicast address through the query message detection multicast router, and can also through the command manually add the legitimate multicast address.
Step 1: Enter the privileged mode (prompt"C3000(config)#")
Step 2: Add or remove static multicast (prompt"C3000(config)#")

Step	Command	[no] cable igmp-static-group <ip_addr>	
1	Notes	<ip_addr>	
		<ip_addr>	The multicast address is valid
	Example	C3000(config)# cable igmp-static-group 239.1.1.1 C3000(config)# no cable igmp-static-group 239.1.1.1	

4.3.24 Set the CMTS TELNET or WEB login time-out

Set the SSH or WEB login timeout under the privileged administrator mode:

The CMTS default SSH and WEB login timeout 5 minutes, and it can be ordered through the custom timeout.
Step 1: Enter the privileged mode (prompt"C3000(config)#")
Step 2: Set the timeout period (prompt"C3000(config)#")

Step	Command	Timeout {ssh|webs} < Minutes >	
1	Notes	{ssh|webs} < Minutes >	
		Ssh	telnet(ssh)timeout
		Webs	Webs timeout
		< Minutes >	Unit minutes
	Example	C3000(config)# timeout ssh 60 C3000(config)# timeout webs 60	

4.3.25 Set the CM access control

Set the CM access network permissions in privileged administrator mode
The CMTS default allows all CM access network, through the command to prohibit or allow to specify the CM access network.

Step 1: Enter the privileged mode (prompt"C3000(config)#")
Step 2: Set the specific CM network access permissions (prompt"C3000(config)#")
Step 3: Set the CM access network accessing control model

Step	Command	[no] cable modem {<ip_addr>|<mac_addr>} disable-forwarding	
1	Notes	{<ip_addr>|<mac_addr>}	
		<ip_addr>	The specified CM IP address online
		<mac_addr>	The specified CM MAC address
	Exaple	C3000(config)#cable modem 1.1.1.1 disable-forwarding C3000(config)#cable modem 00.01.02.03.04.05 disable-forwarding C3000(config)#no cable modem 00.01.02.03.04.05 disable-forwarding	
2	Command	cable modem permit-mode disable-forwarding| enable-forwarding	
	Notes	disable-forwarding| enable-forwarding	
		disable-forwarding	The default for all CM prohibits

			access network, but only the CM with the permissions can access the Internet.
		enable-forwarding	The default for all CM allows access network, but only the CM without permissions can't access network.
	Example	C3000(conf-if-gige)#cable modem permit-mode enable-forwarding	

4.3.26 Set the CM IPv4, IPv6 support mode

Set the CM IPv4, IPv6 support mode in privileged administrator mode
Step 1: Enter the privileged mode (prompt"C3000(config)#")
Step 2: Set the CM IPv4, IPv6 mode (prompt"C3000(config)#")

Step	Command	cable ip-provisioning-mode {ipv4|ipv6|apm|dpm}	
1	Notes	{ipv4|ipv6|apm|dpm}	
		ipv4	IPv4 mode
		ipv6	IPv6 mode
		apm	alternate mode
		dpm	dual-stack mode
	Example	C3000(config)# cable ip-provisioning-mode ipv4	

4.3.27 Set upstream channel automatic frequency hopping

Step 1: Enter the privileged mode (prompt"C3000(config)#")

Step 2: Set the frequency hopping group mode (prompt"C3000(config)#")

Step 3: The distribution of frequency hopping group to channel

Step 4: Set the frequency hopping cycle

Step	Command	[no] spectrum rule <num>	
		Create hopping rules	
1	Notes	<num>	Frequency hopping rules 1-40
	Example	C3000(config)# spectrum rule 1 C3000(conf-spec-rule 1)# no spectrum rule 1	
2	Command	[no] frequency {<num>|band} [<start freq> <end freq>]	
		Setting the frequency hopping to the specified frequency or frequency range	
	Notes	{<num>|band}	
		<num>	The specified frequency，5-65Khz
		Band	The frequency range，5-65Khz
		[<start freq> <end freq>]	Suitable for using band
		<start freq>	Start frequency，5-65Khz
		<end freq>	End frequency，5-65Khz
	Example	C3000(conf-spec-rule 1)#frequency 40000 C3000(conf-spec-rule 1)#frequency band 40000 49000	
3	Command	[no] channel-width <start bandwidth> <end bandwidth>	
		Set channel bandwidth hopping rules	
	Notes	<start bandwidth> <end bandwidth>	

		<start bandwidth>	Channel bandwidth
		<end bandwidth>	The pass band bandwidth
	Example	C3000(conf-spec-rule 1)#channel-width 6400 3200	
4	Command	[no] profile <num> snr-threshold <snr> [<back snr>]	
		Channel modulation parameters are set according to the channel SNR hopping	
	Notes	<num>	Channel profile
		<snr>	Channel SNR，below this value the trigger frequency hopping
		<back snr>	Channel SNR，higher than the value of rebound, the default back snr > snr 3db rebound
	Example	C3000(conf-spec-rule 1)#profile 11 snr-threshold 28 31	
5	Command	correctable-fec threshold <num>	
		According to the channel error correcting data percentage trigger frequency hopping	
	Notes	<num>	The percentage of error correcting data，0-100，0 do not trigger, exceeding this the trigger frequency hopping
	Example	C3000(conf-spec-rule 1)# correctable-fec threshold 10	
6	Command	uncorrectable-fec threshold <num>	
		According to the channel error correcting data percentage trigger frequency hopping	
	Notes	<num>	Not correcting data percentage，0-100，0 do not trigger, exceeding this the trigger frequency hopping
6	Command	uncorrectable-fec threshold <num>	
		According to the channel error correcting data percentage trigger frequency hopping	
	Notes	<num>	Not correcting data percentage，0-100，0 do not trigger, exceeding this the trigger frequency hopping
	Example	C3000(conf-spec-rule 1)# uncorrectable -fec threshold 10	
7	Command	action frequency| modulation| channel-width	
		Setting the frequency hop	
	Notes	frequency| modulation| channel-width	
		frequency	Frequency priority
		modulation	Modulation priority
		channel-width	Bandwidth priority
	Example	C3000(conf-spec-rule 1)# action frequency| modulation	
8	Command	Application of frequency hopping rules to the channel, as shown in the upstream channel set	
	Example	C3000(conf-if-ups)#channel 1 spectrum-rule 1	

4.3.28 Set command alias

Step 1: Enter the privileged mode (prompt"C3000(config)#")

Step 2: Set command alias (prompt"C3000(config)#")

Step	Command	alias <alias cmd> <command>	
1	Notes	<alias cmd> <command>	
		<alias cmd>	alias
		<command>	Compelte command
	Example	C3000# alias scm show cable modem	

4.4 Check CMTS system by CLI

Check CMTS system by CLI, items are as following:

- Check CMTS ARP list
- Check CMTS warning log
- Check CMTS bridge list
- Check CMTS built-in DHCP server scope
- Check cable flap-list statistics
- Check cable flap-list configuration
- Check dhcp server IP address (helper-address)
- Check cable modem status
- Check cable modem remote- query configuration
- Check cable modem remote- query status
- Check CMTS system time
- Check cpe class configuration
- Check dhcp parameters
- Check CMTS GIGE IP address parameters
- Check CMTS GIGE statistics
- Check DS channel (qam) configuration
- Check US channel (upstream) configuration
- Check vlan
- Check CMTS loading balance configuration
- Check CMTS loading balance group status
- Check CMTS system log
- Check CMTS multicasting statistics and activity dialog
- Check CMTS network mode
- Check strategy route
- Check static route
- Check CMTS subnet exchanging visit control status
- Check current running configuration parameters

4.4.1 Check CMTS ARP List

Step	Command	Show arp
1	Notes	Show CMTS system ARP list
	Examples	C3000>show arp MacAddress IpAddress interface status f0:de:f1:40:97:57 192.168.0.253 gige capture f0:de:f1:40:97:57 192.168.190.254 gige capture

4.4.2 Check CMTS warning log

Step	Command	show alarm
1	Notes	Show CMTS system warning log
	Examples	C3000>show alarm

4.4.3 Check CMTS bridge list

Step	Command	Show bridge
1	Notes	Show CMTS system bridge list
	Examples	C3000>show bridge MacAddress IpAddress interface status tag sid dev-type f0:de:f1:40:97:57 192.168.18.254 gige timeout 0 0 N/A

4.4.4 Check CMTS built-in DHCP server scope

Step1 Enter into privilege mode (”C3000#”)

Step	Command	show built-in-dhcp-server [<strings>|cable-modem|host|mta]	
1	Notes	Show CMTS built-in DHCP server scope	
		[<strings>|cable-modem|host|mta]	Assigned scope name, defaukt display all scopes
	Examples	C3000> show built-in-dhcp-server cable-modem IP Scope : cable-modem starting address : 192.168.0.2 end address : 192.168.0.100 netmask : 255.255.255.0 gateway address : 192.168.0.1 primary dns address : 0.0.0.0 secondary dns address : 0.0.0.0 bootserver address : 192.168.0.254 bootfile name : cm.bin log server address : 0.0.0.0 tod server address : 0.0.0.0 lease time : 7200	

4.4.5 Check cable flap-list statistics

Step	Command	show cable flap-list [<ip_address>|<mac_address>|downstream|upstream] [<channel>]		
1	Notes	Show cable flap-list statistics, default display all cable modem flap statistics		
		[<ip_address>|<mac_address>|downstream| upstream]		
		<ip_address>	Assign cable modem or host IP address	
		<mac_address>	Assign cable modem or host MAC address	
		downstream	Assign DS channel cable modem	
			{<channel>}	Channel ID,<1~16>
		upstream	Assign US channel cable modem	
			{<channel>}	Channel ID,<1~4>
	Examples	C3000#show cable flap-list MacAddress Ins Hit Miss CRC P-Adj Flap Time 00:13:71:dc:3d:9e 0 395 0 0 0 0 1970-1-1 1:28:31 00:13:71:e0:28:a4 0 395 0 0 0 0 1970-1-1 2:32:37 24:76:7d:06:8a:82 0 412 0 0 0 0 1970-1-1 1:29:1		

4.4.6 Check cable flap-list configuration

Step	Command	show cable flap-list config
1	Notes	Show cable flap-list configuration
	Examples	C3000> show cable flap-list config flap-list aging interval: 60

4.4.7 Check DHCP server IP address (helper-address)

Step	Command	show cable helper-address
1	Notes	Show dhcp server IP address
	Examples	C3000> show cable helper-address helper-address 192.168.0.254 cable-modem 192.168.0.254 host

4.4.8 Check cable modem status

Step	Command	show cable modem

		[<ip_address>|<mac_address>|downstream|upstream|online|offline|version] [<value>]			
1	Notes	Show cable modem status, default display all CM connected to CMTS			
		[<ip_address>|<mac_address>|downstream|upstream|online|offline|version]			
		<ip_address>	Assign cable modem or host IP address<a.b.c.d>		
		<mac_address>	Assign cable modem or host MAC address <xx:xx:xx:xx:xx:xx>		
		downstream	Show assigned DS channel cable modem		
			[<value>]	DS channel ID <1~16>	
		upstream	Assigned US channel cable modem		
			[<value>]	US channel ID <1~4>	
		online	Show online cable modem		
		offline	Show offline cable modem		
		version	Show assigned version cable modem		
			[<value>]	V11	Docsis 1.1
				V20	Docsis 2.0
				V30	Docsis 3.0
	Examples	C3000#show cable modem MacAddress IpAddress Sid Ver Status Us Ds CPEs BPI Enb 00:13:71:dc:3d:9e 192.168.18.207 12 v2.0 Online 3 4 0 N/A 00:13:71:e0:28:a4 192.168.18.217 13 v2.0 Online 3 11 0 N/A 24:76:7d:06:8a:82 192.168.18.204 1 v2.0 Online 1 5 1 N/A			

4.4.9 Check cable modem remote- query configuration

Step	Command	show cable modem remote-query config
1	Notes	Show cable modem remote- query configuration
	Examples	C3000>show cable modem remote-query config remote-query interval(s): 300 SNMP community string: "public"

4.4.10 Check cable modem remote- query Status

Step	Command	show cable modem [<ip_address>|<mac_address>|downstream|upstream] [<channel>] remote-query
1	Notes	Show cable modem remote- query Parameters

		[<ip_address>|<mac_address>|downstream|upstream]		
		<ip_address>	Assign cable modem or host IP address	
		<mac_address>	Assign cable modem or host MAC address	
		downstream	Assigned DS channel cable modem	
			[<channel>]	DS channel ID，<1~16>
		upstream	Assigned US channel cable modem	
			[<channel>]	US channel ID，<1~4>
	Examples	C3000#show cable modem remote-query MacAddress IpAddress Rx Us SNR Pwr Micro Ds SNR Pwr Micro Staus Pwr Ref Ref 00:13:71:dc:3d:9e 192.168.18.207 2.4 3 40.3 48.7 0 4 40.9 20 31 Online 00:13:71:e0:28:a4 192.168.18.217 2.5 3 41.1 48.4 0 11 41 21.2 31 Online 24:76:7d:06:8a:82 192.168.18.204 2.4 1 42.1 46.7 0 5 41.7 19.8 30 Online		

4.4.11 Check CMTS System Time

Step	Command	show clock
1	Notes	Show CMTS system time
	Examples	C3000>show clock system time: 2013-9-11 12:48:39

4.4.12 Check CPE class Configuration

Step	Command	show cpe-class
1	Notes	Show user defined cpe-class, based on dhcp option 60 parameters
	Examples	C3000#show cpe-class cpe-class "stb-test" dhcp option 60 "stb-str"

4.4.13 Check DHCP Parameter

Step	Command	show dhcp [relay| option-82| giaddr-primary]	
1	Notes	Show DHCPrelay agent and optiona parameters	
		relay	DHCP relay agent function status
		option-82	DHCP relay agent insert option -82option status

		giaddr-primary	DHCP relay agent giaddr insert primary IP optionfunction status
	Examples	C3000#show dhcp dhcp relay dhcp insert option 82 no dhcp giaddr primary	

4.4.14 Check CMTS GIGE IPAddress Parameters

Step	Command	show interface gige
1	Notes	Show GIGE IP Address Parameters
	Examples	C3000#show interface gige MacAddress: 00:02:5e:00:01:dd ip address netmask 192.168.0.254 255.255.255.0 192.168.2.1 255.255.255.0 cable-modem

4.4.15 Check CMTS GIGE Statistics

Step	Command	show interface gige statistics
1	Notes	Show GIGE interface status statistics
	Examples	C3000>show interface gige statistics Gige link speed : 1000BaseT FDX Tx pkts:5 TX bytes: 210 Rx pkts:715 RX bytes: 85407 Rx rate:0 bps Tx rate:0 bps

4.4.16 Check DS channel (qam) configuration

Step	Command	show interface qam [<channel>]	
1	Notes	Show DS channel status, default display all DS channels	
		[<channel>]	Appinted DS channel,<1~16>
	Examples	C3000>show interface qam interface downstream 1 Status: DOCSIS Frequency: 387000000 Modulation: 64QAM Annex: A Interleaver depth: I128-4 Power level(dBmV): 45 Utilization(%): 1	

		Index: 101 interface downstream 2 Status: DOCSIS Frequency: 395000000 Modulation: 64QAM Annex: A Interleaver depth: I128-4 Power level(dBmV): 45 Utilization(%): 1 Index: 102 interface downstream 3 Status: DOCSIS Frequency: 403000000 Modulation: 64QAM Annex: A Interleaver depth: I128-4 Power level(dBmV): 45 Utilization(%): 1 Index: 103 interface downstream 4 Status: DOCSIS Frequency: 411000000 Modulation: 64QAM Annex: A Interleaver depth: I128-4 Power level(dBmV): 45 Utilization(%): 1 Index: 104 …

4.4.17 Check US channel Configuration

Step	Command	show interface upstream [<channel>]	
1	Notes	Show US channel status, default disaplay all US channels	
		[<channel>]	Appointed US channel, <1~4>
	Examples	C3000>show interface upstream interface upstream 1 Status: Enable Frequency: 30000000 Bandwidth: 3200000 Power level(dB): 0 Profile:	

		ATDMA-MediumNoiseQPSK Channel type: ATDMA Docsis 3.0 Enhanced mode: Disable Minislot: 4 Timing offset: 0 Data-backoff: 3 6 Ranging-backoff: 2 5 Pre-equalization: Enable Utilization(%): 0 Index: 201 interface upstream 2 Status: Enable Frequency: 33200000 Bandwidth: 3200000 Power level(dB): 0 Profile: ATDMA-MediumNoiseQPSK Channel type: ATDMA Docsis 3.0 Enhanced mode: Disable Minislot: 4 Timing offset: 0 Data-backoff: 3 6 Ranging-backoff: 2 5 Pre-equalization: Enable Utilization(%): 0 Index: 202 …

4.4.18 Check VLAN

Step	Command	show interface vlan [<vlan id>]	
1	Notes	Show VLAN status, default display all VLAN	
		[<vlan id>]	Apponited VLAN <2-3700>
	Examples	C3000#show interface vlan interface valn : 100 vlan port : cable-modem tag mode : gige interface valn : 200 vlan port : host tag mode : both	

4.4.19 Check CMTS load balancing configuration

Step	Command	show load-balance config
1	Notes	Show CMTS load balancing parameters
	Examples	C3000#show load-balance config Load-balance basic configuration: Load Balancing Mode :DYNAMIC (Run Time Traffic Stats) Collection/Analysis Period :60 DCC init-tech for ATDMA :broadcast-ranging(init-tech 1) DCC init-tech for SCDMA :broadcast-ranging(init-tech 1) DBC init-tech for ATDMA :broadcast-ranging(init-tech 1) DBC init-tech for SCDMA :broadcast-ranging(init-tech 1) Dynamic Mode Parameters Channel Overload Trigger Threshold : >=60% of channel capacity Channel Load Difference Threshold : >=20% of channel capacity

4.4.20 Check CMTS load balancing status

Step	Command	show load-balance docsis-group [<group_id>]	
1	Notes	Show CMTS load balancing group status, default displaying all load balancing group	
		[<group_id>]	Balance group ID <1~255>
	Examples	C3000#show load-balance docsis-group Load-Balance group not exist Load-Balance exclude mac-address: exclude mac-address: not exist exclude mac-address OUI: not exist exclude mac-address Range: not exist	

4.4.21 Check CMTS system log

Step	Command	show logging
1	Notes	Show CMTS running log
	Examples	C3000>show logging 2013-9-6 12:40:39 : system start 2013-9-6 12:42:57 : system update firmware ok 2013-9-6 12:44:12 : system start 2013-9-9 9:43:55 : system start 2013-9-9 10:3:58 : 192.168.0.253 :webs login 2013-9-9 10:4:16 : 192.168.0.253 :webs login 2013-9-9 10:12:50 : 192.168.0.253 :webs login 2013-9-10 8:16:18 : system start

		2013-9-10 8:18:40 : system update firmware ok 2013-9-10 8:20:16 : system start 2013-9-10 10:31:48 : system start 2013-9-11 5:13:40 : system start 2013-12-31 18:6:36 : system start 2013-12-31 18:57:59 : system start 2013-12-31 19:3:18 : system start 2013-12-31 19:4:15 : 192.168.0.253 :webs login 2013-12-31 19:6:22 : 192.168.0.253 :webs login 2013-12-31 19:29:23 : 192.168.0.253 :webs login 2013-12-31 19:29:25 : 192.168.0.253 :webs login 2013-12-31 19:54:0 : system update firmware ok …

4.4.22 Check CMTS multicasting statistics and activity dialogue

Step	Command	show multicast statistics
1	Notes	Show CMTS multicasting dialogue statistics status
	Examples	C3000#show multicast statistics Multicast Info: IgmpGeneralMemQueries : 0 IgmpGrpSpecificQueries : 0 IgmpQueriesUsRxDropped : 0 IgmpV2MemRptsUsRxUsTx : 0 IgmpV2MemRptsUsRxDropped : 0 IgmpV2UPnPRptsUsRxDropped : 0 IgmpV2MemRptsDsRxDropped : 0 IgmpLeaveGrpUsRxUsTx : 0 IgmpLeaveGrpDsRxDropped : 0 IgmpV3MemRptsUsRxUsTx : 0 IgmpV3MemRptsUsRxDropped : 0 IgmpV3MemRptsUsRxBadAsmGroup : 0 IgmpV3MemRptsUsRxBadSsmGroup : 0 IgmpV3MemRptsDsRxDropped : 0 IgmpUsRxUnsupportedDropped : 0 IgmpDsRxUnsupportedDropped : 0 MldGeneralMemQueries : 0 MldGrpSpecificQueries : 0 MldQueriesUsRxDropped : 0 MldV1SolicitedNodeRptsUsRx : 0 MldV1MemRptsUsRxUsTx : 0 MldV1MemDoneUsRxUsTx : 0

		MldV1MemRptsUsRxDropped : 0 MldV1MemRptsDsRxDropped : 0 MldV2MemRptsUsRxUsTx : 0 MldV2MemRptsUsRxDropped : 0 MldV2MemRptsUsRxBadAsmGroup : 0 MldV2MemRptsUsRxBadSsmGroup : 0 MldV2MemRptsDsRxDropped : 0 MldUsRxUnsupportedDropped : 0 MldDsRxUnsupportedDropped : 0 NonMldUsForwarded : 0 NonMldDsForwarded : 0 HmePackets : 0
2	Command	show multicast session-group [<ip_address>]
	Notes	Show CMTS activity multicasting dialogue, default display all dialogues
		[<ip_address>] — Appointed multicasting address
	Examples	C3000#show multicast session-group No multicast sessions are active

4.4.23 Check CMTS Network Mode

Step	Command	show netmode
1	Notes	Show CMTS subnet network mode
	Examples	C3000#show netmode cable modem net mode bridge cpe net mode bridge

4.4.24 Check Strategy Route

Step	Command	show policy-route
1	Notes	Show CMTS strategy route table
	Examples	C3000#show policy-route src ip address netmask gateway 10.1.2.0 255.255.255.0 192.168.0.2

4.4.25 Check Static Route

Step	Command	show visits-control
1	Notes	Show CMTS static route table
	Examples	C3000#show static-route ip address netmask gateway 0.0.0.0 0.0.0.0 192.168.0.1

4.4.26 Check CMTS subnet exchanging visiting control status

Step	Command	show visits-control
1	Notes	Show CMTS subnets exchange visisting control status
	Examples	C3000>show visits-control no visits-control

4.4.27 Check Current Running Configuration Parameters

Step	Command	show running-config
1	Notes	Show CMTS running configuration parameters
	Examples	C3000#show running-config --interface upstream channel: ups 1 Status: Enable Frequency: 30000000 Bandwidth: 3200000 Power level(dB): 0 Profile: ATDMA-MediumNoiseQPSK Channel type: ATDMA Docsis 3.0 Enhanced mode: Disable Minislot: 4 Timing offset: 0 Data-backoff: 3 6 Ranging-backoff: 2 5 Pre-equalization: Enable ups 2 Status: Enable Frequency: 33200000 Bandwidth: 3200000 Power level(dB): 0 Profile: ATDMA-MediumNoiseQPSK Channel type: ATDMA Docsis 3.0 Enhanced mode: Disable Minislot: 4 Timing offset: 0 Data-backoff: 3 6 Ranging-backoff: 2 5 Pre-equalization: Enable …

		--interface downstream channel: qam 1 Status: DOCSIS Frequency: 387000000 Modulation: 64QAM Annex: A Interleaver depth: I128-4 Power level(dBmV): 45 qam 2 Status: DOCSIS Frequency: 395000000 Modulation: 64QAM Annex: A Interleaver depth: I128-4 Power level(dBmV): 45 … qam 16 Status: DOCSIS Frequency: 507000000 Modulation: 64QAM Annex: A Interleaver depth: I128-4 Power level(dBmV): 45 --cpe class: cpe class not exist --interface vlan: interface vlan not exist --interface gige 0: MacAddress: 00:02:5e:00:01:dd ip address netmask 192.168.0.254 255.255.255.0 --static route: ip address netmask gateway 0.0.0.0 0.0.0.0 192.168.0.1 --policy route: policy route not exist --built-in-dhcp-server: IP Scope : cable-modem starting address : 192.168.0.2 end address : 192.168.0.100 netmask : 255.255.255.0 gateway address : 192.168.0.1

		primary dns address : 0.0.0.0 secondary dns address : 0.0.0.0 bootserver address : 192.168.0.254 bootfile name : cm.bin log server address : 0.0.0.0 tod server address : 0.0.0.0 lease time : 7200 … --cable helper-address: helper-address 192.168.0.254 cable-modem 192.168.0.254 host --ip access list: no ip access control --load balance: Load-balance basic configuration: Load Balancing Mode :DYNAMIC (Run Time Traffic Stats) Collection/Analysis Period :60 DCC init-tech for ATDMA :broadcast-ranging(init-tech 1) DCC init-tech for SCDMA :broadcast-ranging(init-tech 1) DBC init-tech for ATDMA :broadcast-ranging(init-tech 1) DBC init-tech for SCDMA :broadcast-ranging(init-tech 1) Dynamic Mode Parameters Channel Overload Trigger Threshold : >=60% of channel capacity Channel Load Difference Threshold : >=20% of channel capacity Load-Balance group not exist Load-Balance exclude mac-address: exclude mac-address: not exist exclude mac-address OUI: not exist exclude mac-address Range: not exist --static ip address: static ip address not exist --visits control: no visits-control --ip snooping: ip snooping --network mode: cable modem net mode bridge cpe net mode bridge --dhcp relay:

		dhcp relay --dhcp giaddr primary: no dhcp giaddr primary --dhcp insert option 82: dhcp insert option 82 --l2-vpn-service: cable l2-vpn-service dot1q --cable remote: remote-query interval(s): 300 SNMP community string: "public" --cable flap aging interval: flap-list aging interval: 60 --NTP server: NTP Server: 0.0.0.0 TimeNoze(Minutes): 480 --log server: syslog Server: 0.0.0.0

4.4.28 Check the prohibition for accessing network CM MAC table

Step	command	show cable modem disable-forwarding the prohibition for accessing network CM MAC table
1	notes	Display the current CMTS
	example	C3000#show cable modem disable-forwarding 00.01.02.03.04.05

4.4.29 Check the SSH or WEB login timeout

Step	command	show timeout
1	notes	Show the current CMTS SSH or WEB login timeout
	example	C3000#show timeout Telnet and SSH timeout periods <minutes> :5 Webs timeout periods <minutes> : 5

4.4.30 Check the current CM static multicast

Step	command	C3000#show cable igmp-static-group
1	notes	Show the current CM static multicast
	example	C3000#show cable igmp-static-group static-group address: 239.1.1.1

4.4.31 Check the current CM ip-provision-mode

Step	command	show cable ip-provision-mode
1	notes	Show the current CMTS CM access IPv4, IPv6 mode
	example	C3000#show cable ip-provision-mode cable provisioning mode : IPv4

Chapter 5 Management CMTS by Embed Web

5.1 Summary

5.1.1 About Ember Web

The built-in Web server of Ascent C3000 CMTS series is the management for CMTS which is based on HTTP protocols. Users can manage & configure CMTS via Web log in. Main functions are as following:

- Checking running status
- Setting network interface parameters
- Setting RF interface parameters
- CM & CPE management
- CMTS management

5.1.2 Setting Common Operations

Application: Once finished configuration, click “Application”, all your configurations will be effective and saved in CMTS memories.

Add: If need any add or revise for listed configuration, click “Add”, then you can add a new listed configuration item.

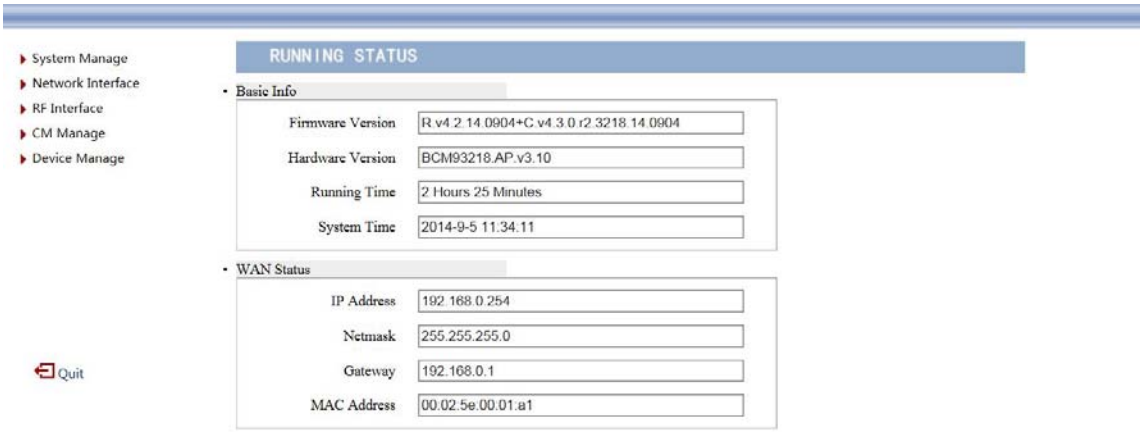
Delete: Choose the appointed item from the listed configuration, click “DELETE” to delete that item.

Query: You may check suitable listed item by clicking QUERY via keywords setting.

Web user timeout handling: If there is no operation in Web setting page for a long time, the system will be timeout status, it will log off.

5.2 System Management

5.2.1 Running Status:



Current Running Status

Software Version: Show CMTS current software version

Hardware Version: Show CMTS current hardware version

Running Time: Show total running time of the CMTS from the power on point last time

System Time: Show current CMTS system time

IP Address: Show WAN interface IP address

Subnet Mask: Show WAN interface subnet mask

Gateway Address: Show WAN interface gateway address

MAC Address: Show WAN interface MAC address

5.2.2 Change Password

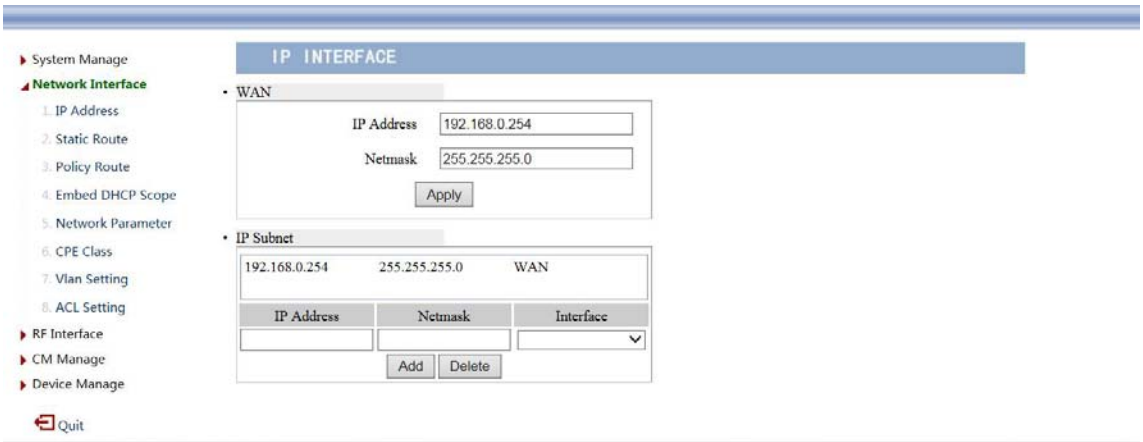
It can prohibit unauthorized users logging in web setting page by changing passing word. The defaulted user name is admin, password is admin. User name can not be changed but the password could be.

Notice: The password support Max. 15 English letters, case-sensitive, please pay special attention on this point.

5.3. Network Interface Settings

5.3.1 IP Address Setting

Set WAN Interface and IP subnet address and subnet mask, Max. 32 Interface IP addresses.



IP Address: Configure Interface IP address

Subnet Mask: Configure interface subnet mask

Subnet Interface: Including WAN, CM, CPE, MTA, Secondary and CPE-Class

5.3.2 Static Router Setting

After setting static router, the message which has been appointed to destination will transmit it as your appointed path, there could be Max.32 static routers.

Destination Address: The destination network IP Address which the static route will arrive

Subnet Mask: The destination network subnet mask which the static route will arrive

The next jump address: The next route IP address needed before data arrived its destination address

5.3.3 Strategy Route Setting

Strategy Route is a mechanism of rote choice according to your own strategy. The strategy could limit data flow from special network to specified gateway. Appoint data flow source subnet via configuration for source IP address and subnet mask, it can configure max. 32 strategy routes.

Source IP Address: The address of data packet source

Subnet Mask: The mask of data packet source

Gateway Address: The gateway address will be sent to by qualified data flow

5.3.4 Built-in DHCP Scope Setting

If using built-in DHCP server, you must configure the DHCP action scope. Assign IP address and other network parameters for both CM and CPE, max. 32 scopes.

Starting Address: The starting address for domain address pool

End Address: The end address for action scope address pool, the end address should not be less than its starting address

Subnet Mask: The action scope subnet mask

Subnet Gateway: The subnet gateway address of action scope

Domain DNS: Set the domain DNS server address

Start Server: The action scope start server IP address

Start File Name: the action scope start server file name

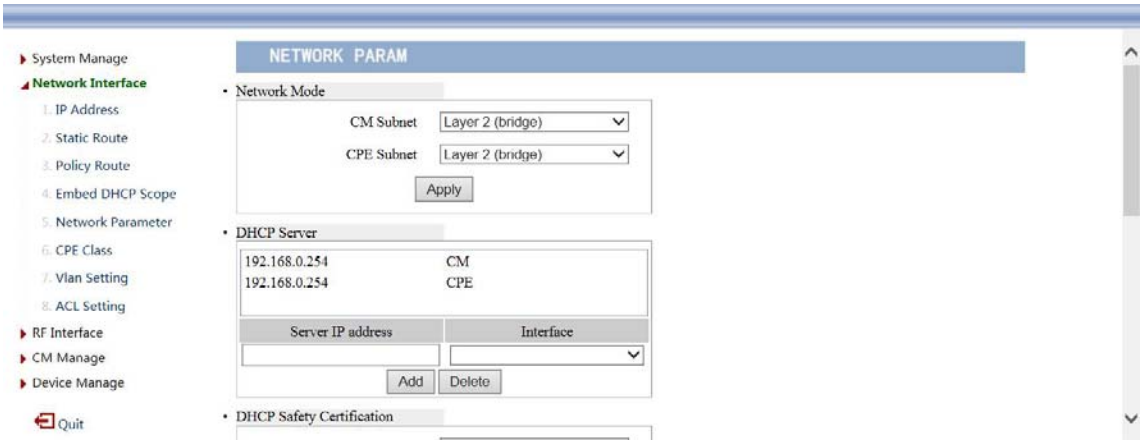
Log Server: Action scope log server IP address

Time Server: Action scope TOD server IP address

Lease Time: The time duration for assigning IP address to DHCP user end

5.3.5 Network Parameters Setting

Configuration for other network control parameters



Network Mode: Set the CMTS to transmit CM & CPE data packet through layer 2 bridging or layer 3 route

DHCP Server: Set DHCP server IP address for CMTS subnet access, Max. 32 DHCP servers

DHCP Safety Certificate: If started this option, those IP address host assigned by illegal DHCP server or manual binding IP host can not be accessed into network

DHCP Relay-agent: if choose this option, the CMTS will assign relay agent message to specified DHCP server

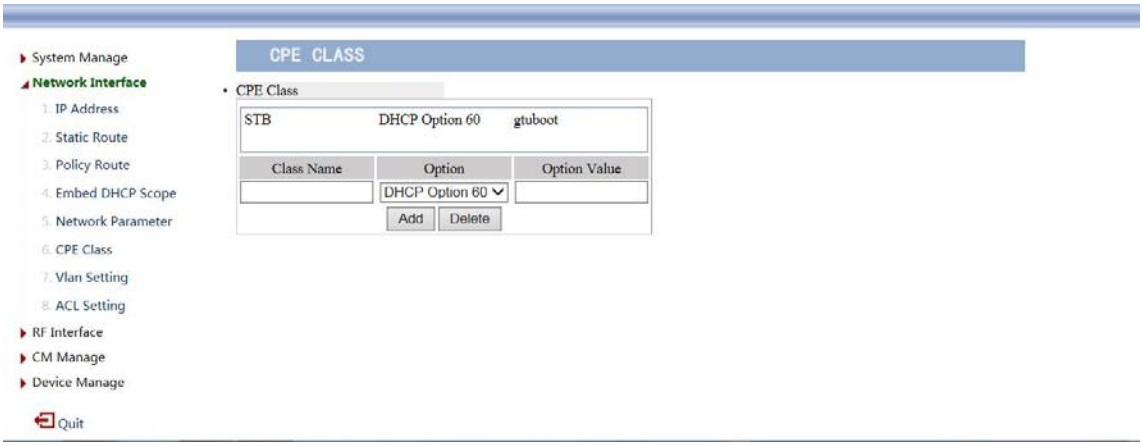
DHCP Giaddr Main Mode: If enabled, the CMTS will fill the DHCP message's Giaddr filed by WAN interface IP address. If disabled, the CMTS will distinguish the terminal type and then use matching subnet access IP address to fill the DHCP message's Giaddr field.

DHCP Option 82: If enabled, the CMTS will insert DHCP 82 parameters into DHCP message

L2VPN: If enabled, the CMTS will insert VLAN Tag into those data packet outflow from WAN interface according to L2VPN parameters from CM configuration files, it will stripping VLAN Tag for L3VPN data packet that entered into WAN interface.

5.3.6 CPE Class Setting

The CMTS support user defined CPE-Class subnet based on DHCP option 60 parameters; it can assign IP address, DHCP field and VLAN to appointed CPE-Class, Max. 32 CPE-Class.



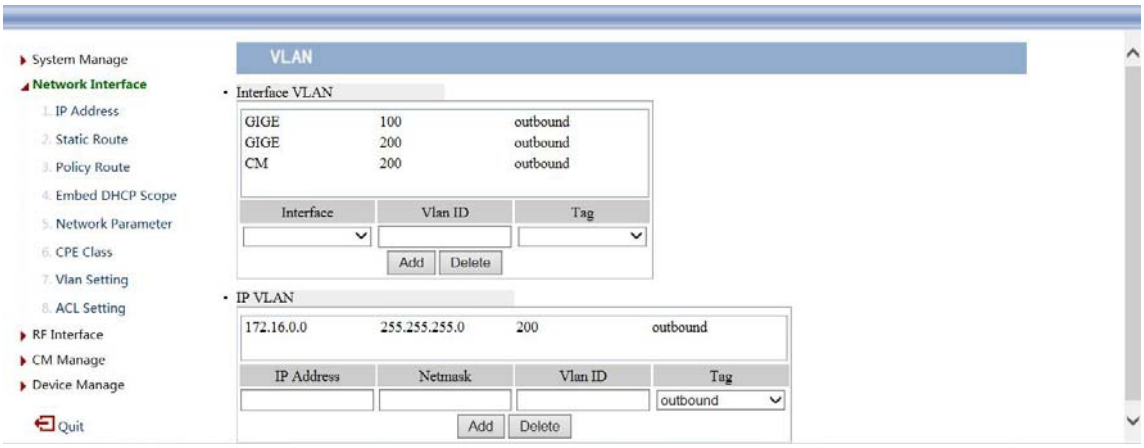
Class Name: User defined CPE-Class name, it supports Max. 50 numbers or letters.

Option: DHCP Option 60

Option Value: DHCP option 60 parameters, it supports Max. 50 numbers or letters

5.3.7 VLAN Setting

VLAN (Virtual LAN), the CMTS can configure VLAN based on IP subnet and access, it supports Max. 255 VLAN, set the VLAN ID range as 1~65535. If L2VPN enabled, you need add corresponding VLAN.



Access: The access includes CM (Cable Modem subnet), CPE (Cable Modem downlink to host subnet), MTA (VOIP subnet) and CPE-Class

VLAN ID：Range（1～65535）

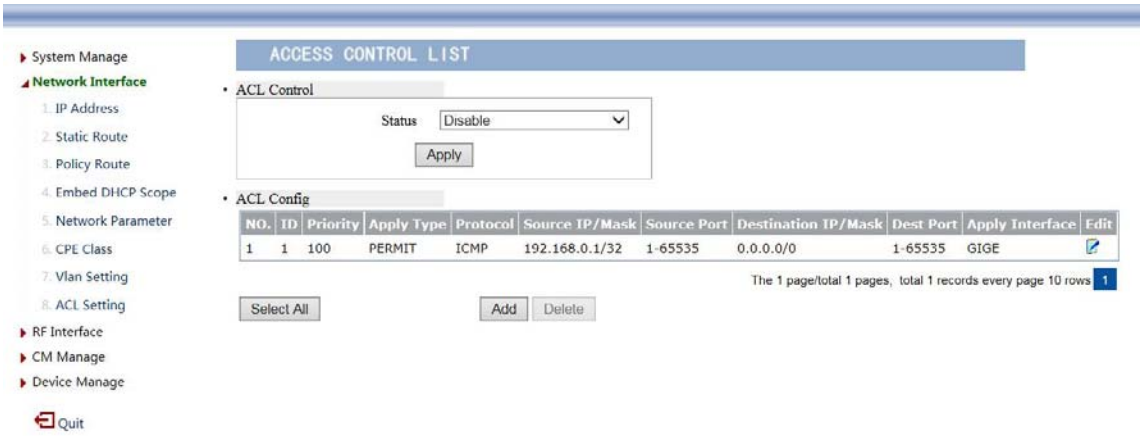
Tag: Outbound stands for inserting Tag into those data packet from CMTS WAN interface, inbound stands for inserting Tag into data packet transmitted to DS (HFC).Both means insert Tag to both IN and OUT data packet of CMTS.

IP Address: Corresponding network IP address based on IP subnet VLAN's

Subnet Mask: Network mask based on IP subnet VLAN

5.3.8 ACL Setting

ACL (Access Control List), CMTS supports ACL control, Max. 100 ACL rules, it can assign the same rule to different access.



ACL Control: If enabled, the CMTS will filter passing data packet by ACL rules.

Select All: Set all ACL rules as SELECTED or NOT SELECTED status.

ADD: Add a new ACL rule

Delete: Delete selected ACL rule

User can edit ACL rule parameter by double click any rule or edit icon. If click ADD, fill in ACL rule parameters and then click to finish.

Rule ID: RULE ID (1~255)

Priority Level: The priority level is 0~255. 255 is the highest priority.

Application Type: ALLOW & Forbidden means after rules matched, whether allow the data packet pass. VLAN rules means adding Tag to data packet after rules matched. Strategy rules means the strategy routing for data packet after rules matched.

Protocol: the network protocols type of data packet

Source IP/Mask: Control PC in local area network by source subnet, if only control 1 PC host, set the subnet mask as 255.255.255.255

Source Port Range: The range for source port range. It will be only activated after setting protocols as TCP/UDP. If user wants to match all source port, set it as: 1~65535. The starting port number should not be bigger than ending port number. If need configuration for only 1 port, set both the starting port and the ending port as the same.

Destination IP/Mask: Input destination subnet which would be controlled

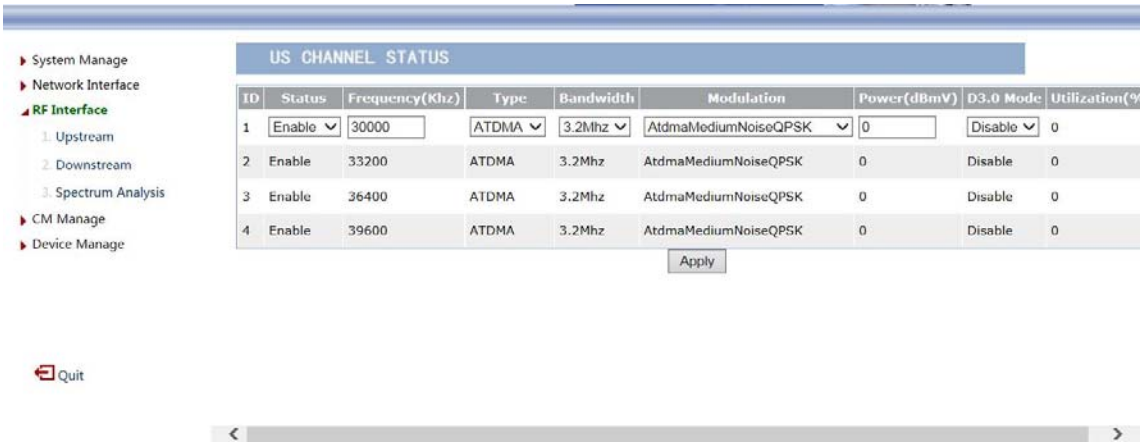
Destination Port Range: Input destination port range which would be controlled

Application Interface: The source access for data packet, control data packet from some access by this configuration item

5.4 RF Interface Setting

5.4.1 US Channel Setting

Set US Channel RF Parameters:



ID	Status	Frequency(Khz)	Type	Bandwidth	Modulation	Power(dBmV)	D3.0 Mode	Utilization(%
1	Enable	30000	ATDMA	3.2Mhz	AtdmaMediumNoiseQPSK	0	Disable	0
2	Enable	33200	ATDMA	3.2Mhz	AtdmaMediumNoiseQPSK	0	Disable	0
3	Enable	36400	ATDMA	3.2Mhz	AtdmaMediumNoiseQPSK	0	Disable	0
4	Enable	39600	ATDMA	3.2Mhz	AtdmaMediumNoiseQPSK	0	Disable	0

Status: ON/OFF US channel

Center Frequency: US channel center frequency (5000～65000KHz), it will increase as the channel bandwidth increased

Channel Type: The US channel types are ATDMA or SCDMA

Channel Bandwidth: The US channel bandwidth is 6.4 MHz/3.2MHz/1.6MHz

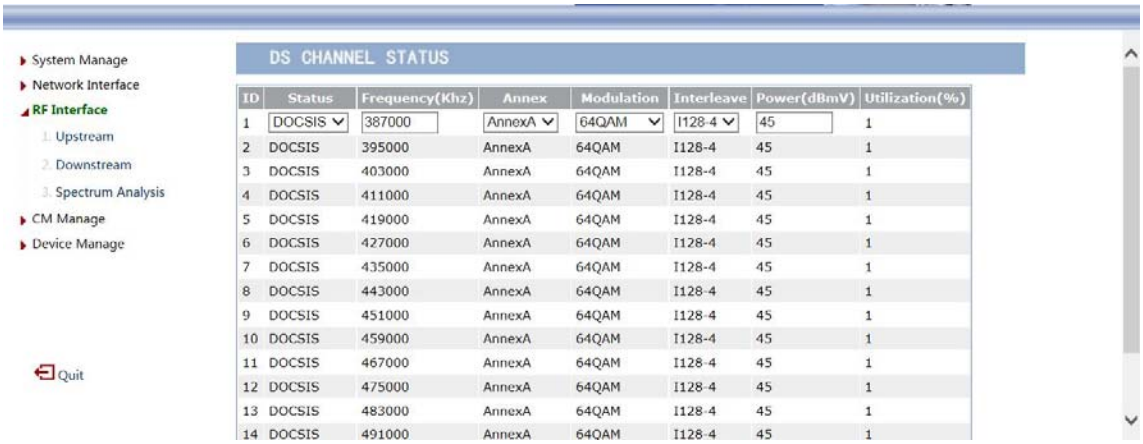
Modulation Mode: US channel modulation mode

Power: US channel receiving power（-13～23dBmV）。

C3000.0 Enhanced Mode: If enabled, only DOCSIS 3.0 CM can be connected to CMTS

5.4.2 DS Channel Setting

Set DS Channel (QAM) RF Interface Parameter:



ID	Status	Frequency(Khz)	Annex	Modulation	Interleave	Power(dBmV)	Utilization(%)
1	DOCSIS	387000	AnnexA	64QAM	I128-4	45	1
2	DOCSIS	395000	AnnexA	64QAM	I128-4	45	1
3	DOCSIS	403000	AnnexA	64QAM	I128-4	45	1
4	DOCSIS	411000	AnnexA	64QAM	I128-4	45	1
5	DOCSIS	419000	AnnexA	64QAM	I128-4	45	1
6	DOCSIS	427000	AnnexA	64QAM	I128-4	45	1
7	DOCSIS	435000	AnnexA	64QAM	I128-4	45	1
8	DOCSIS	443000	AnnexA	64QAM	I128-4	45	1
9	DOCSIS	451000	AnnexA	64QAM	I128-4	45	1
10	DOCSIS	459000	AnnexA	64QAM	I128-4	45	1
11	DOCSIS	467000	AnnexA	64QAM	I128-4	45	1
12	DOCSIS	475000	AnnexA	64QAM	I128-4	45	1
13	DOCSIS	483000	AnnexA	64QAM	I128-4	45	1
14	DOCSIS	491000	AnnexA	64QAM	I128-4	45	1

Status: Set the DS channel as DOCSIS channel/IPQAM channel or fobidden

Center Frequency: The DS channel output center frequency (88000～1000000KHz), it will add as 8MHz or 6 MHz according to DOCSIS, the DS channel frequency range should not be higher than 192 MHz

DOCSIS Standard: The DS channel DOCSIS standard is DOCSIS or EURO DOCSIS

Modulation Mode:The DS channel modulation mode is 64QAM/256/QAM/1024QAM

Interleave Depth: PLS ignore this option if EURO DOCSIS

Power: DS channel output power（20～60dBmV）

5.4.3 Spectral Analysis

Get real-time US Channel Spectral:

5.5 CM Management

5.5.1 CM Flap List

Show all Cable Flap-List statistics, users can check Cable Flap-List according to MAC address of CM.

5.5.2 CM & CPE Status

Show all CM and Host status connected to CMTS, you may check CM from US/DS channel even Cable modem.

Delete CM：Delete chosen Cable Modem

Reboot CM：Reboot chosen Cable Modem

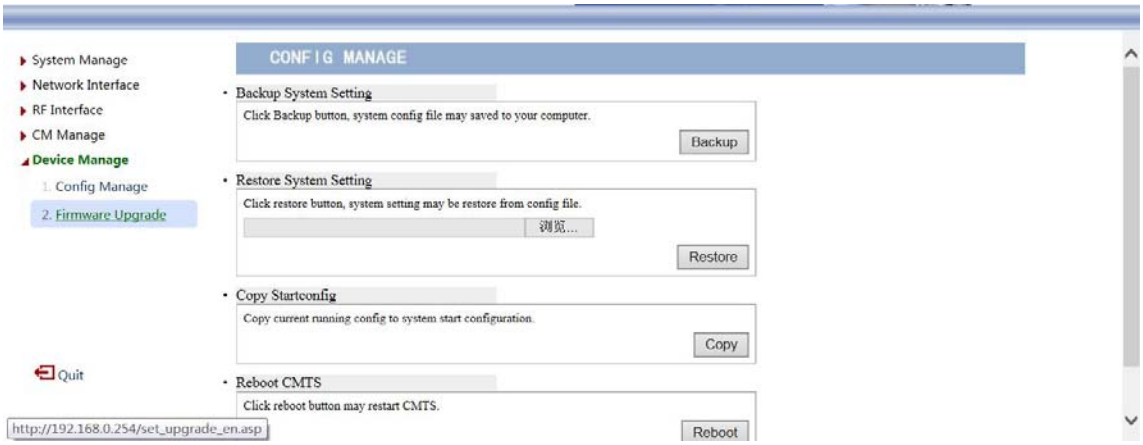
Reboot all CM：Reboot all CM connected to CMTS

5.6 CMTS Management

5.6.1 Configuration Management

Back-up: Save the CMTS current configuration to PC so that you may restore settings by those files (named as.cfg). Do not edit any back-up configuration files or else, it can not be restored from this equipment again.

Restore system configuration from files: Choose a back-up file （*.cfg） then you may set restore.

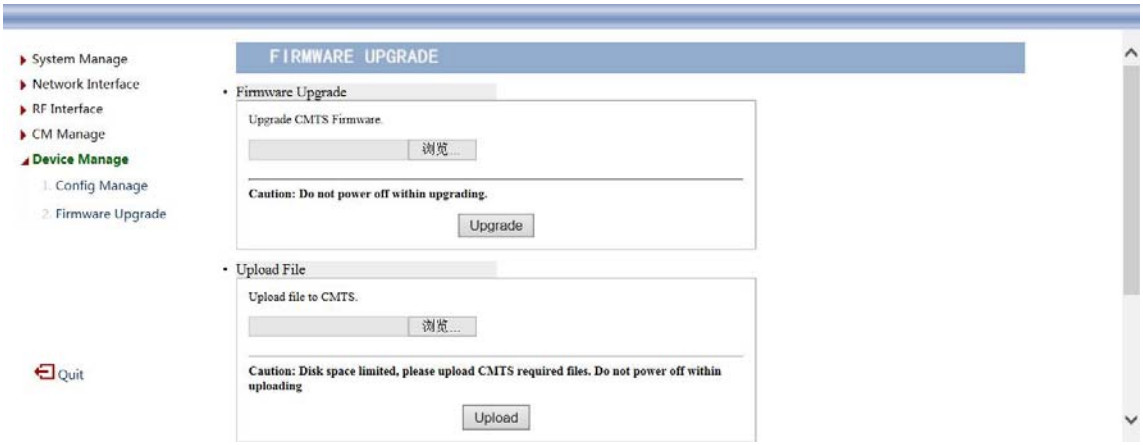


Save Configuration: Save CMTS current running configuration to system booting configuration

Reboot: The configuration will not be lost after rebooting, the network transmission will be break off while rebooting

5.6.2 Software Upgrading

Choose an upgrading file; you may upgrade the current running software on that CMTS in order to get more functions and more stable performance. PLS back-up current configuration files before upgrading. PLS do not power off while upgrading.



Upload File: Choose any file and it could be uploaded to CMTS, PLS pay attention that the disk space is limited, if it is not necessary for CMTS, do not upload. Do not power off while uploading or else, there will be data loss.

Chapter 6 NMS System

6.1 Overview

C3000 CMTS NMS network management software is used for the configuration, monitoring, maintenance and safety management of CMTS, CM and CPE and other equipment in the network. It manages CMTS based on OAM protocol and manages CM and CPE based on the SNMP protocol, and runs on the Windows operating system. It can be installed in the server room, and also can realize remote management. The operating status and transmission quality of the CMTS equipment can be viewed through the network management software in a real-time manner. The NMS offers separate management interface for each CMTS.

The main functions of network management software include: CMTS management, CM management, network configuration, RF management, traffic statistical chart, spectrum analysis, operation log, etc., each of which will be described in details.

6.2 Features

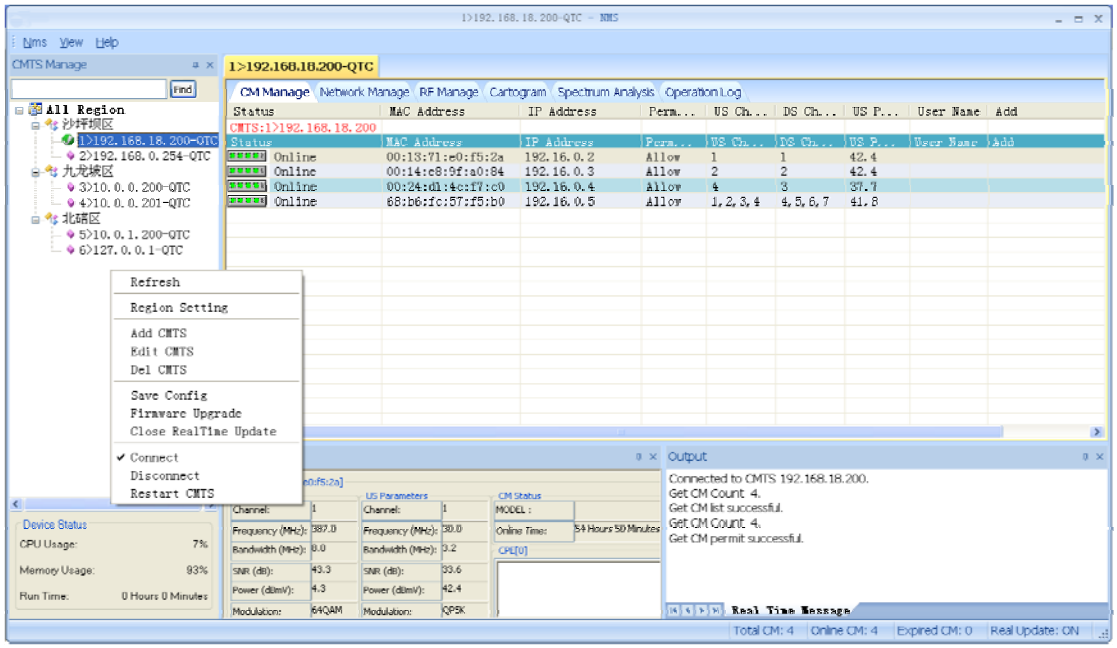
- English/Chinese Interface
- Concentration and regional management
- It supports the CMTS offline configuration.
- Real-time display operation and running state
- Adequate CM management
- Efficient network configuration
- Controllable RF management
- Network traffic and online CM statistics
- Complete operating log and screening
- Normative equipment management
- Monitoring of CPU and memory utilization rate
- Optional interface appearance style

6.3 Functions

6.3.1 CMTS Management

Functions of CMTS management are:

- Distributed Management for CMTS
- ADD CMTS
- DELETE CMTS
- CHECK CMTS
- CMTS software upgrading
- CMTS running status display.



CMTS management window completes the CMTS management, and CMTS is displayed in the window with tree area. The user can fill in the relevant information to find the CMTS, each item indicates single CMTS. Click the right mouse button at the view window, then the CMTS menu will pop up, and choose the corresponding management functions by the menu. Operations are as following:

1) Renew

All the “renew” operations in the software display the contents of the database synchronously.

2) Regional settings

The administrator can add, edit and delete areas according to the distribution of CMTS, and include the CMTS into related areas for facilitate management.

Note: when the CMTS list is NULL, a region can be created first before adding the CMTS. When adding a CMTS, the CMTS must correspond to a certain area.

3) Add CMTS

In the dialog box of adding the CMTS, select the CMTS area and fill out the CMTS name, IP address and MAC address. SNMP Read/Write indicates the CM read / write group name accessed by CMTS(we don't use any, users can fill it at random), "real-time update" indicates real-time update status of the CMTS, and the selection of "automatic start" indicates the starting of CMTS real-time update when starting the network management software, vice versa.

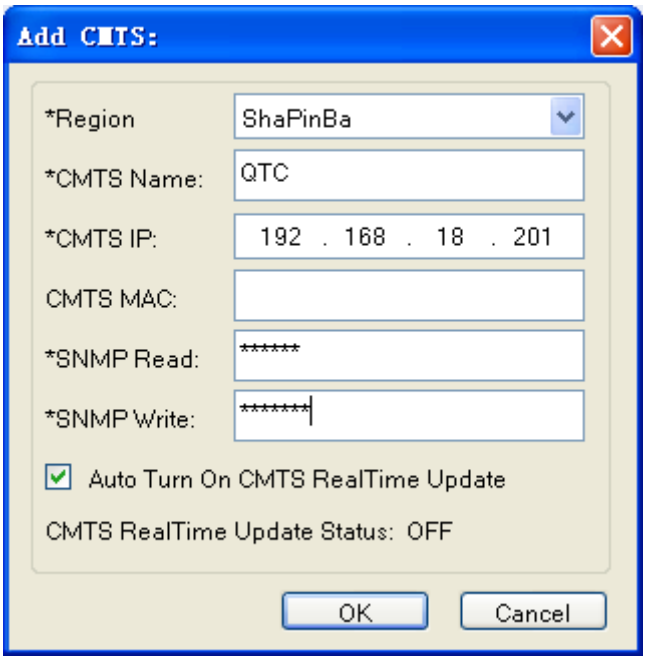
Note: the items with "*" are mandatory.

3) Save Configurations

Save the current CMTS configurations as booting configurations.

4) Software Upgrading

Update CMTS software by remote login via NMS



5) Close real-time update

According to CMTS "real-time update" status display, if the current CMTS's real-time update status is open, it will show "closed real-time update", or else it will be displayed as "start display real-time update". If it has been started, CMTS status changing info will be sent to NMS automatically.

6) Connections

Connect to the selected CMTS. If "√" is displayed on the left of the menu, it indicates that CMTS is "connected", otherwise is in the "disconnect" state.

7) Running status

Display the current CPU and memory utilization rate of the CMTS, as well as the running time of CMTS.

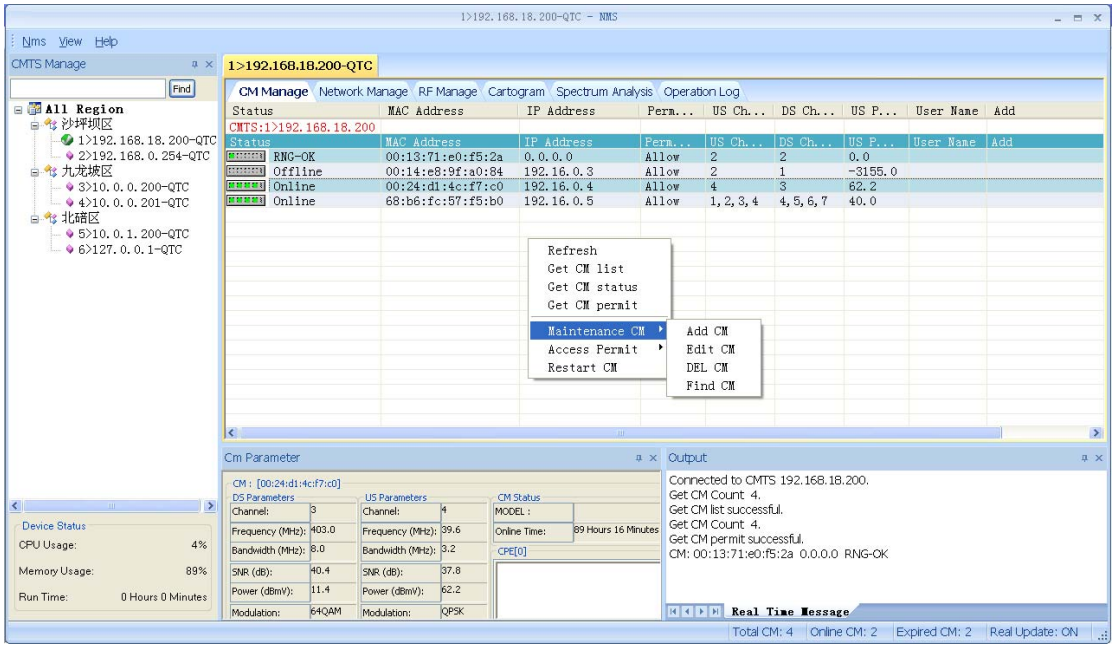
6.3.2 CM Management

Functions can be realized by CM management are:

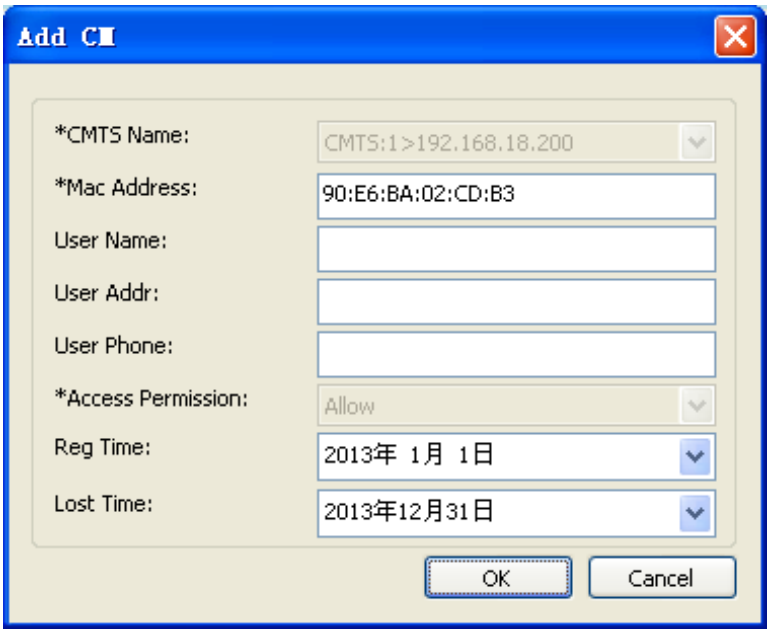
- Real-time acquisition of CM status
- CM permission control
- CM operation and maintenance
- Browsing, query and ranking of CM information

User can manage from the pop menu by right click, operations are as following:

Acquisition of CM list: update the CM list of CMTS.
Acquisition of CM status: update all CM status information in the CM list, and get the single CM status information by double clicking a certain CM.
Acquisition of CM permission: update the access permission of CM



Notice: Once the CMTS disconnected, user cannot get CM list, CM status and CM authority, all those functions are forbidden.



Maintenance of CM: Add/Editing / Removal of CM.

Note: the items with "*" are mandatory.

Search of CM: Search CM through the MAC address, IP address, user name, address and telephone number, and the found CM will be highlighted.

CM access permission: "Allow" and "forbid" CM access.

Reboot of CM: Reboot the CM

CM sequencing: Click the title of CM list to sequence the CM list by "CM status", "MAC address", "IP address", "access permission", "upstream channel", "downstream channel" and "return path power".

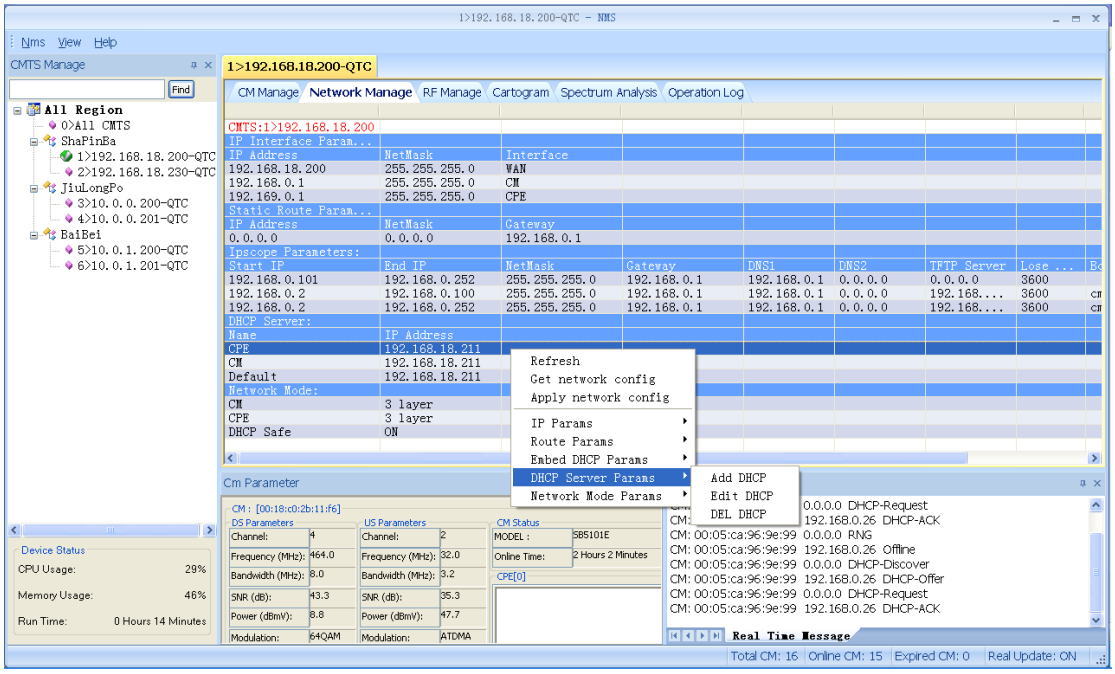
CM parameters: When using the mouse to double-click the single CM, acquire the CM status, display the upper and lower parameters of CM in the CM parameter dialogue box, CM model, online time and CPE of the corresponding CM.

Indicate the total number of CMs, number of online CMs, number of expired CMs and CMTS real-time update status.

6.3.3 Network parameter

Main Features:

- Real-time access to network configuration
- Real-time setting of network configuration (application of network configuration)
- Off-line configuration: in advance is not connected state editing network configuration, and then connect the CMTS through the "application of network configuration" to load the configuration



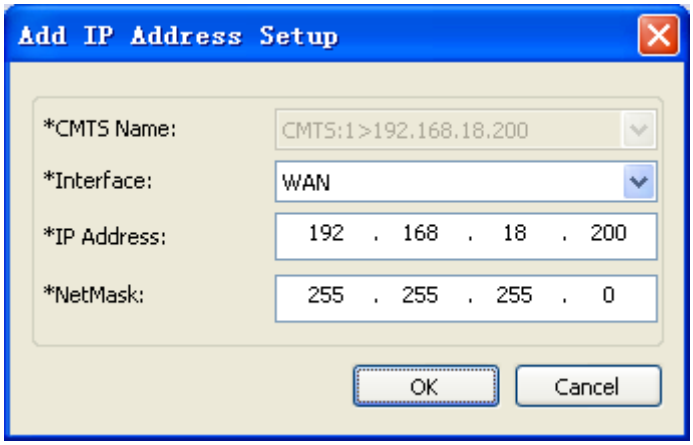
Right click the popped menu of the window to manage, and the specific operation includes:

- Acquisition of network configuration
- Acquire the all the network parameters of the CMTS in a real-time manner.
- Application network configuration
- Set all the network parameters of the CMTS as the content shown in the window.

Note: when the CMTS is not connected, "acquisition of network configuration" and "application of network configuration" will be disabled.

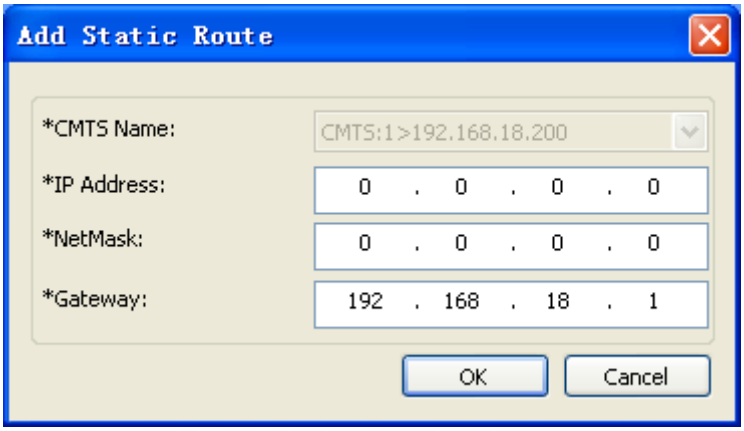
1) IP parameters

Add, edit and delete the IP address of the corresponding "interface" of the CMTS.



2) Static routing parameters

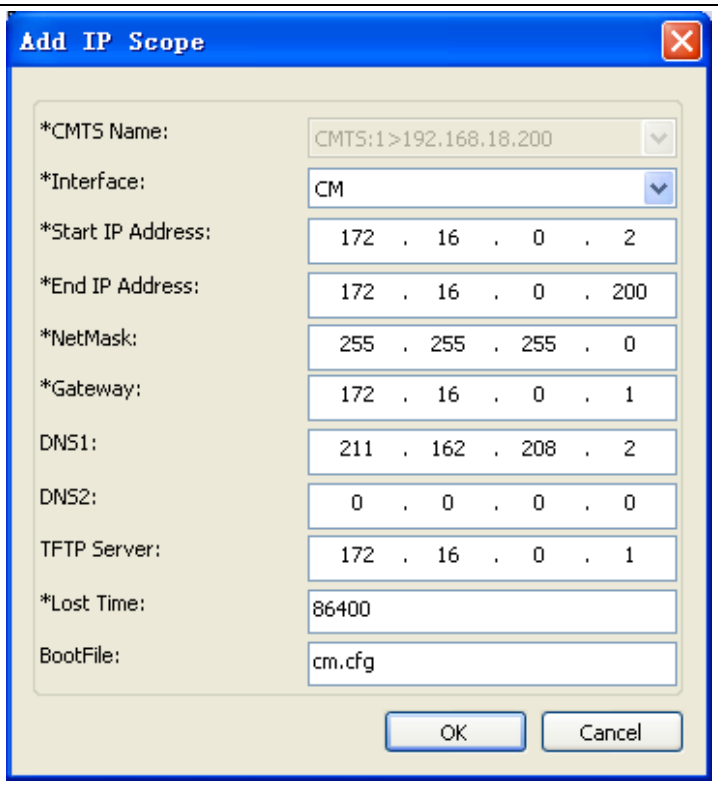
Add and delete the CMTS static routing list.



3) Built-in DHCP server parameters

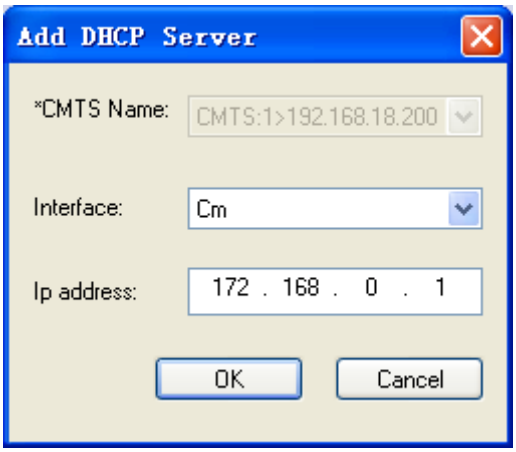
Add, edit and delete the scope of built-in DHCP server of CMTS

Note: the items with “*” are mandatory.



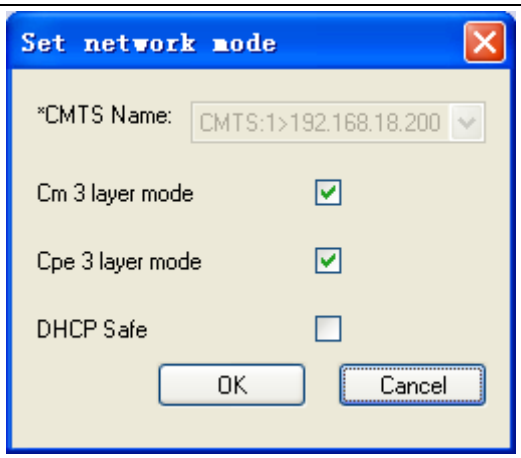
4) DHCP server parameters

Add, edit and delete the DHCP server of the CMTS, including configurations for CM server, HOST server, MTA server.



5) Network mode

Add and edit CM, CPE network model (2-level switching or 3-level routing), DHCP security cortication of CMTS which is opened or not



6.3.4 RF Parameters

Main Features:

- Edit the upstream/downstream channel configuration;
- Acquire the upstream/downstream channel configuration;
- Set the upstream/downstream channel configuration;
- Off-line configuration

When the CMTS is not connected, the upstream/downstream channel configuration can be edited in advance, before connecting the CMTS device and load the configuration through the "application upstream/downstream channel configuration".

Operations are as follows:

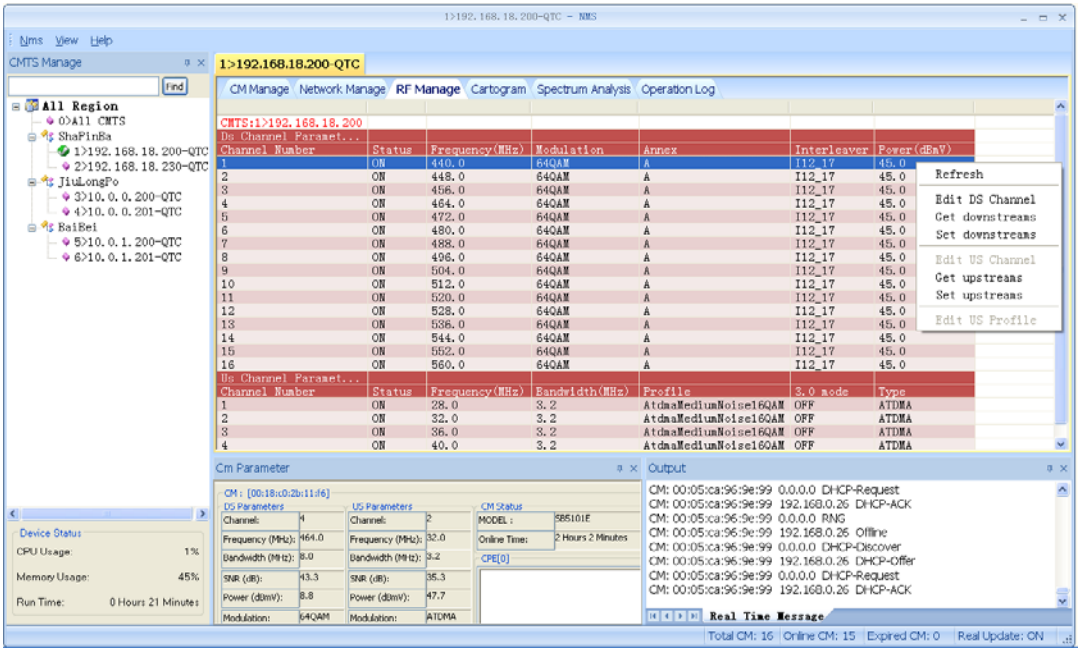
Right click the popped menu of the window to manage, and the specific operation includes:

1) Acquire the downstream channel configuration

Acquire the real time downstream channel configuration of the CMTS

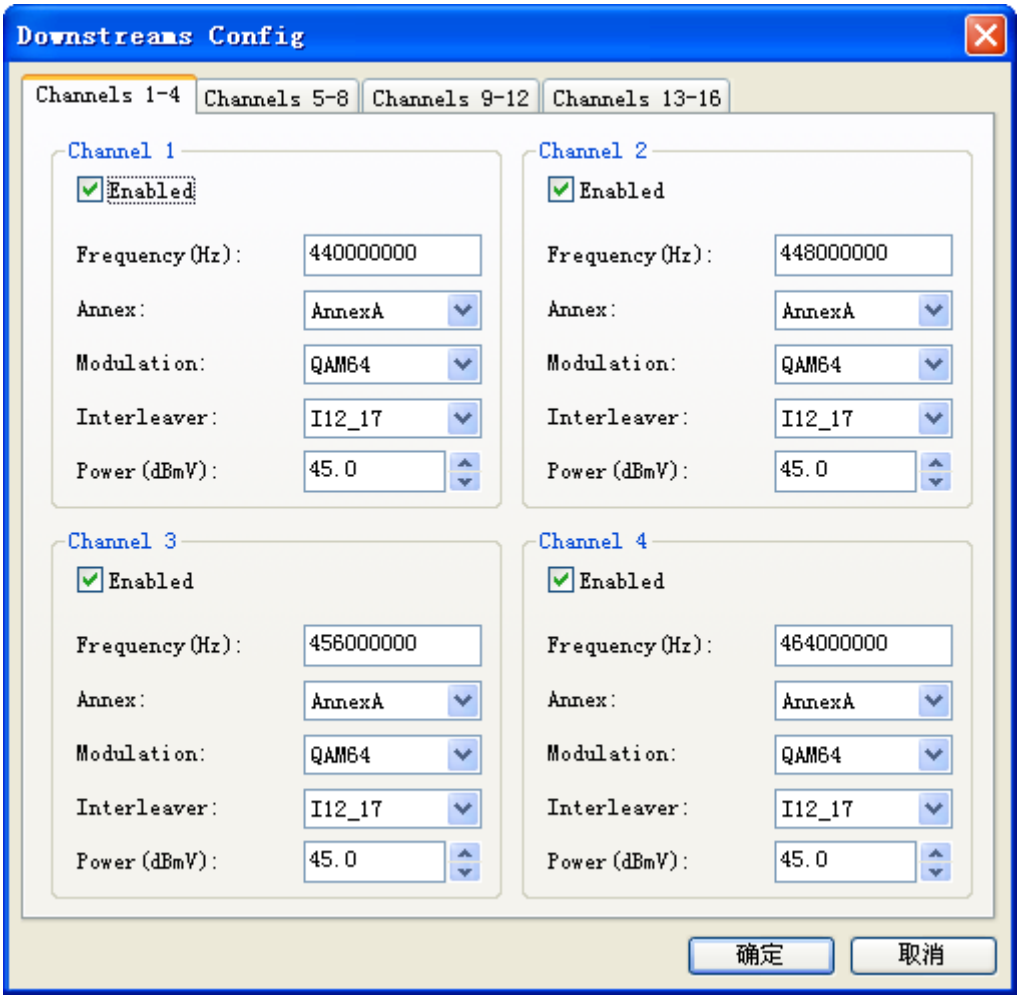
2) Application of downstream channel configuration

Set the real time downstream channel configuration of the CMTS



3) Edit the downstream channels

Set the status, frequency, standard, modulation, interleaving depth and output power of downstream channels, and the downstream channel parameters include:



Status: indicates whether the downstream channel is enabled or not;

Center frequency range of the downstream channel: 88MHz ~ 862MHz

DOCSIS standard: "A" indicates the European standard, and "B" indicates American Standard;

Modulation methods: including "QAM64", "QAM256" and "QAM1024";

Interleaving depths: different options of interleaving depths for different corresponding DOCSIS standards;

Output power range: 40～62(dBmV);

4) Acquire the upstream channel configuration

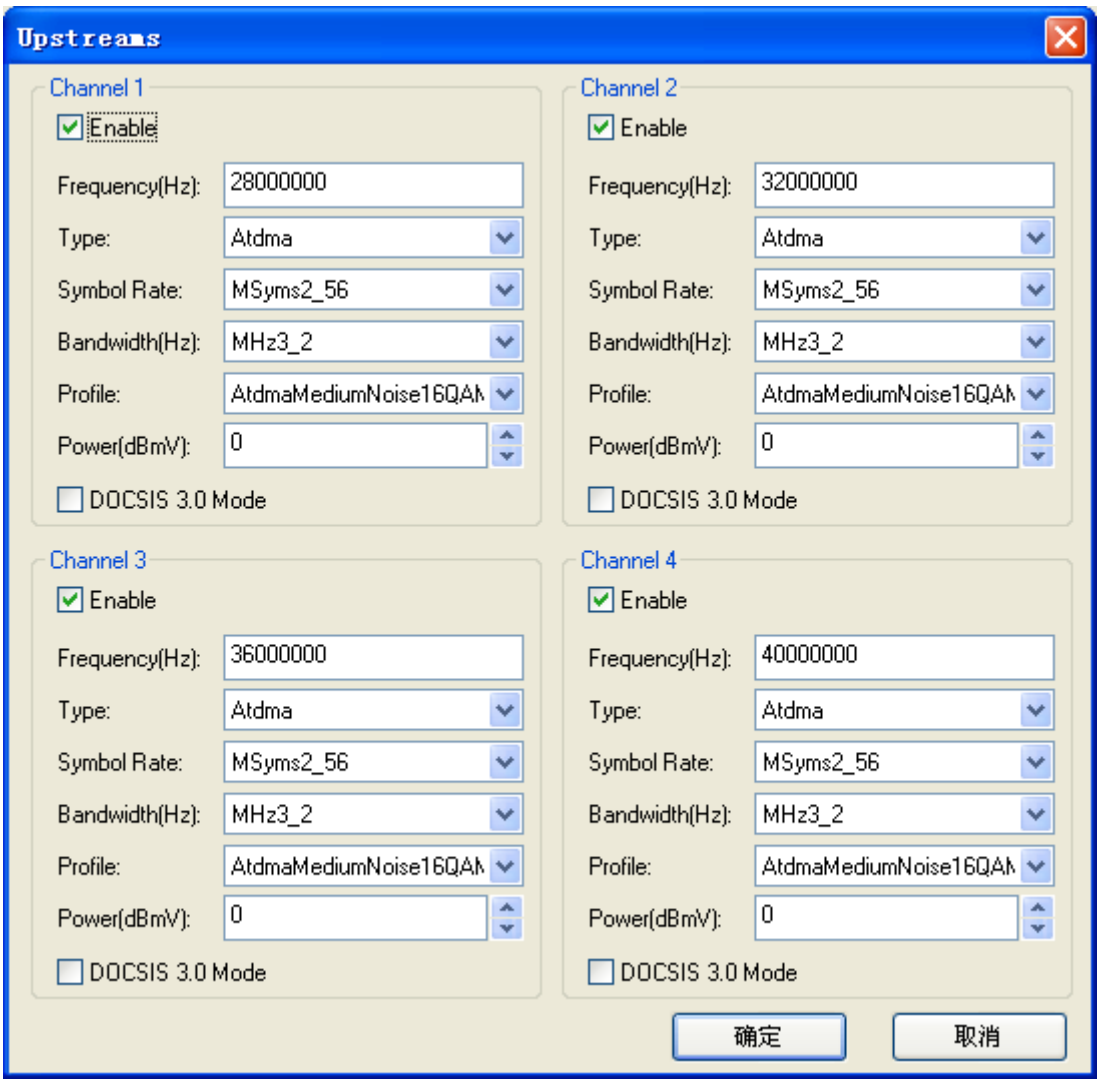
Acquire the upstream channel configuration of the CMTS in a real-time manner.

5) Application of upstream channel configuration

Set the upstream channel configuration of the CMTS in a real-time manner.

6) Edit the upstream channels

Set the status, frequency, channel type, the baud rate (corresponding bandwidth), configuration files, the output power and DOCSIS 3.0 compatibility mode on the upstream channels. The upstream channel parameters including:



Status: indicates whether the upstream channel is enabled or not;

Center frequency range of the upstream channel: 5MHz ~ 65MHz

The upstream channel types: include "ATDMA" and "SCDMA";

Bandwidth corresponds to the baud rate: the baud rates of 1.28Msym/s, 2.56Msym/s and 5.12Msym/s correspond to 1.6MHz, 3.2 MHz and 6.4 MHz channel bandwidth accordingly;

Choose the upstream channel configuration file

Upstream channel input power range: -13 ~ 13 (dBmV);

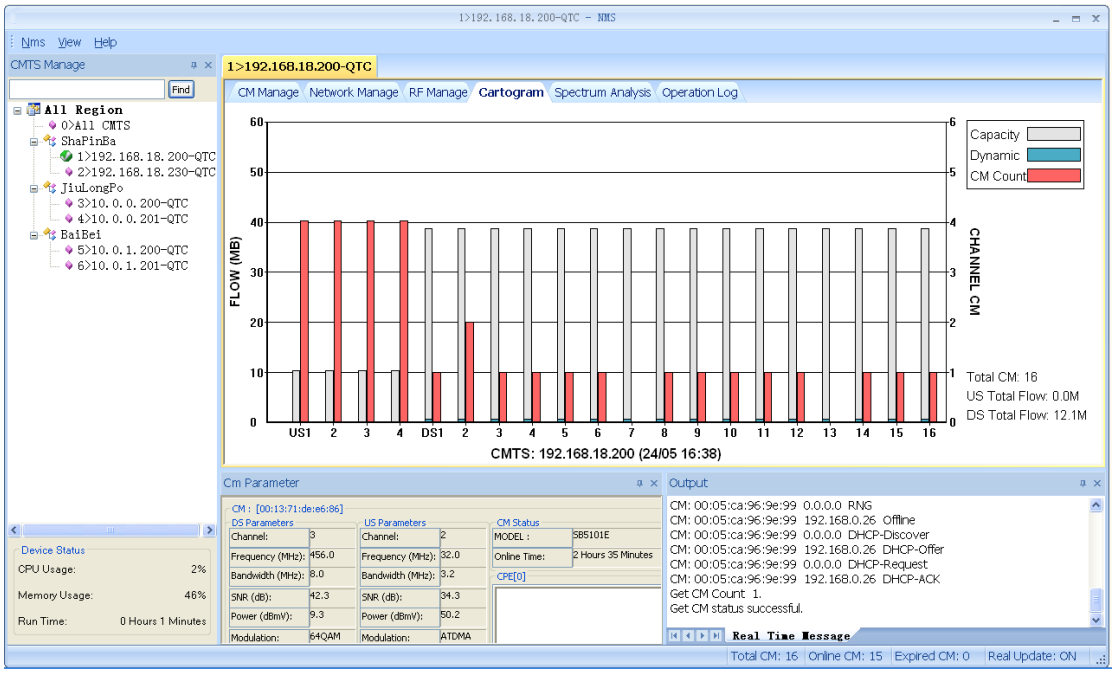
DOCSIS 3.0 compatibility mode: indicates whether the upstream channel is compatible with DOCSIS 3.0 standard;

6.3.5 Statistical Graphs

Main Features:

- Real-time traffic display
- Historic traffic data display

Right click the popped menu of the window to manage, operations are:

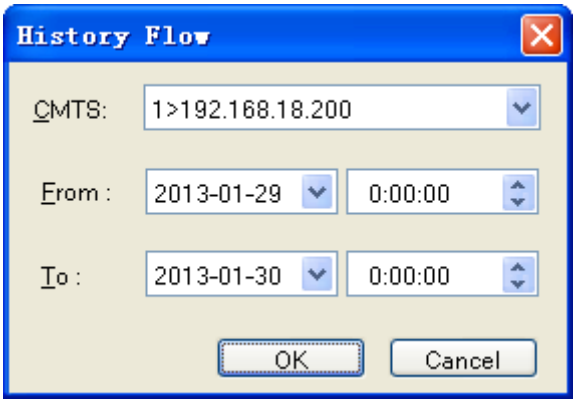


1) View the real-time traffic

Display the CMTS channel capacity, dynamic traffic and number of channel CMs based on the upstream channels US1～4 and the downstream channels DS1 ~ 16. When the mouse stays on the channel identifier "US1" or "2", it will display the corresponding channel traffic and number of channel CMs;

2) View historical traffic

Choose to view the upstream traffic, the downstream traffic and total number of CMs (the time unit is one hour) over a certain period of time for a single CMTS. When the mouse stays on the time identifier "01/01" or "0:00", it will show the upstream traffic and total number of CMs corresponding to the time;

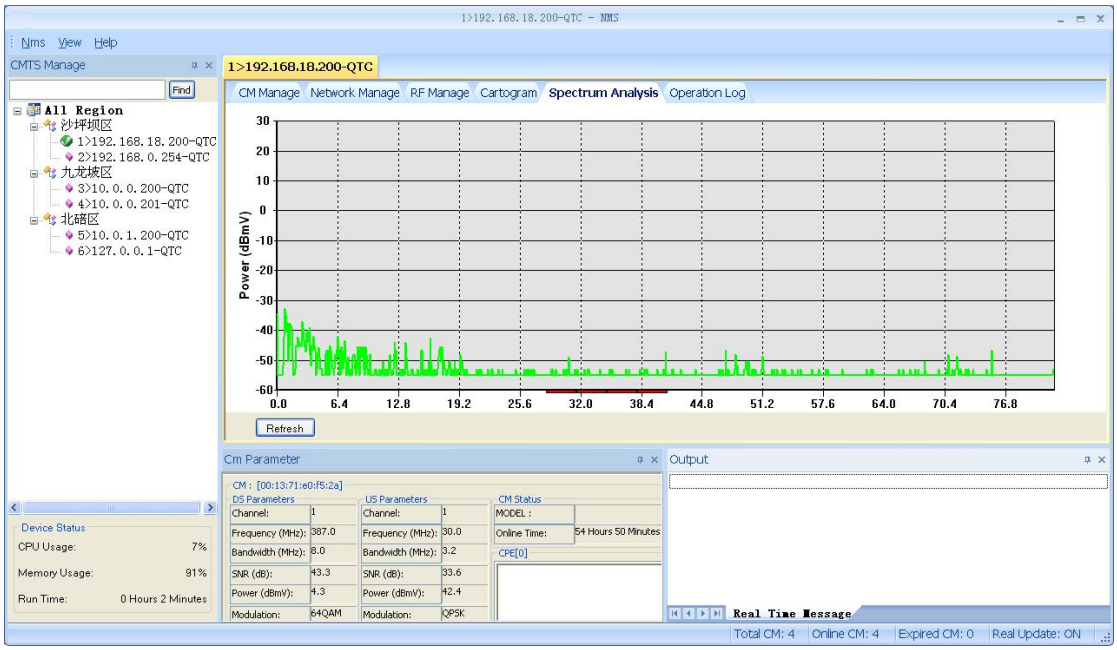


The "√" on the left side of the menu indicates the current flow display mode;

6.3.6 Spectrum Analysis

The features realized by the spectrum analysis includes: obtaining the real-time spectrum of the upstream channels. User can obtain all real time US channel spectrum analysis by refreshing.

We have red the US channel frequency range:

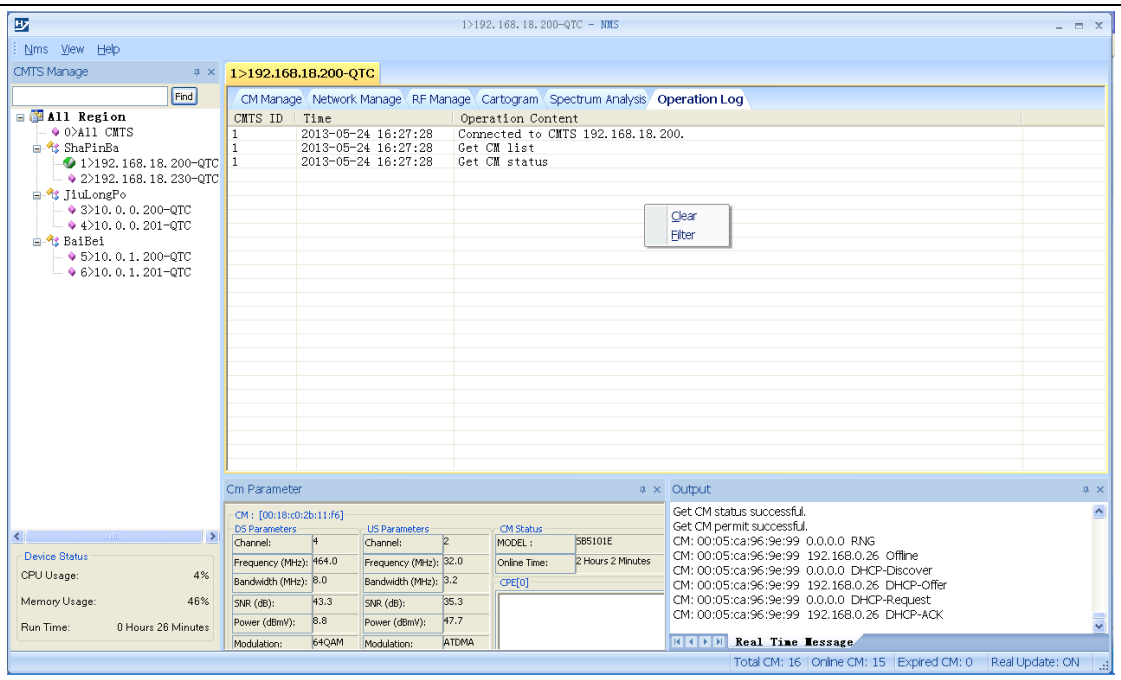


6.3.7 Operation Log

The features realized by log management include:

- Recording the administrator's operation
- Operating results
- CMTS alarm information, displaying different levels of logs with different colors.

Right click the popped menu from the window, operations are as follows:



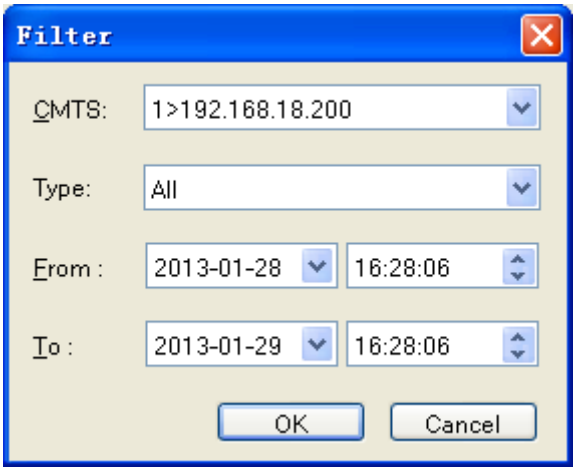
Clear: clear the displayed log, but it will not delete the log record in the database;

Screening: display the contents of the log by specifying the CMTS, type and time range to be viewed;

CMTS: "all the equipment" indicates all CMTS, and others indicate one single CMTS;

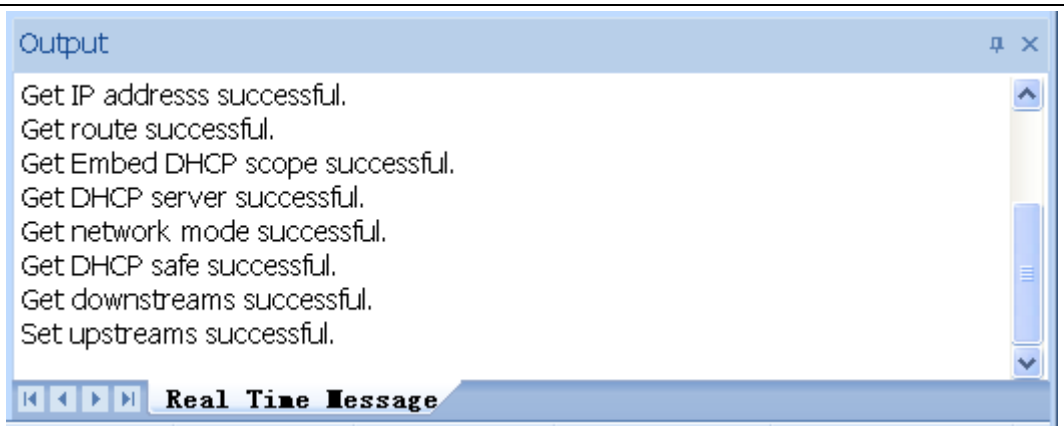
Types include: "all", "operation log" and "alarm log";

Time range: record the starting time and ending time of the log;



6.3.8 Information Output

- Display the running status of CMTS;
- Display the operation status for CMTS;
- Display the real-time updated content of CMTS;


Output
Get IP addresss successful.
Get route successful.
Get Embed DHCP scope successful.
Get DHCP server successful.
Get network mode successful.
Get DHCP safe successful.
Get downstreams successful.
Set upstreams successful.
Real Time Message

Ascent Communication Technology Ltd

AUSTRALIA
961 Mountain Highway, Boronia, Victoria 3155, Australia

Phone:+61-488 293 682
Email: sales@ascentcomtec.com

CHINA
11/F Tower B, Central Towers
567 Langao Road, Shanghai 200333
China
Phone: + 86-21 2221 8268
Email: sales@ascentcomtec.com

EUROPE
Pfarrer-Bensheimer-Strasse 7a, 55129 Mainz, Germany
Phone:+49 (0) 6136 926 3246
Email: sales@ascentcomtec.com

USA
2710 Thomes Ave, Cheyenne, WY 82001
USA
Phone:+1-203 816 5188
Email: sales@ascentcomtec.com