CMTS Edge 16/32/32P

V4.1.0.8

CLI Manual

PRELIMINARY

SUBJECT TO CHANGE

Blonder Tongue Labs

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Statement

Information in this Manual is subject to update from time to time due to version upgrade of product or for other reasons. Unless otherwise stipulated, this Manual is only for operating guidance. All presentations, information and recommendations in this Manual shall not constitute any express or implied warranty.

Technical Support

Blonder Tongue provides customers with comprehensive technical support. Users buying products from the agents of Blonder Tongue can contact their sales agents directly

Version Control

Date	Revision	Description
2021.05	R01	First release
2022.05	R02	Field Release

Foreword

Related Manuals

CMTS Edge 16/32/32P User Manual

Content Introduction

Before installing this device and during the installation, please read this Manual carefully to avoid possible device damage and personal injury. This Manual contains the following chapters:

Chapter 1 Command-line Interfaces and Views. Mainly describes the views of CMTS device and their switch as well as the terminal interface commands.

Chapter 2 System Management. Mainly includes basic management of the system, system time, upgrade, command aliases, user information and WEB access management.

Chapter 3 CMTS Device Management and Maintenance. Mainly includes temperature monitoring parameters, channel utilization, DOCSIS service layer, optical interface and syslog management.

Chapter 4 Network Management. Mainly includes network tools and basic commands, IP, IPDR, RSH, VLAN, L2VPN, DHCP, rate limiting, multicast flows, PacketCable management and admission control.

Chapter 5 Port Management. Mainly includes uplink and Edge QAM (EQAM) management.

Chapter 6 Channel RF Management. Mainly includes management of downstream channels, management of upstream channels, channel power level management, channel signal quality management, OFDM management, spectrum management and bonding group configuration (for legacy environments), service class and RCC management.

Chapter 7 Terminal Management. Mainly includes the basic management of Cable Modem, Cable Modem QoS, Cable Modem Remote Query, Cable Access List Management, CM Upgrade and CPE management.

Chapter 8 Load Balance Management. Mainly includes basic management of modem load balancing, restricted load balance group management, and manual load balance management.

Chapter 9 ACL Configuration Management. Mainly includes basic management of access control lists (ACL), ACL matching conditions, ACL behaviors, ACL node placement, and ACL quick installation.

Chapter 10 Network Security Management. Mainly include black- and white-list management, source address verification (SAV) management, IPv6 router advertisement guard and WEB proxy.

Chapter 11 DSG management. Mainly including DSG tunnel configuration, DSG classifier, DSG tunnel group and other configuration management

Target Readers

This Manual is applicable to the following audience:

- ✓ Network administrators
- ✓ System maintenance personnel

Conventions in the Manual

1. Conventions on General Format

Format	Meaning
Calibri	All English texts except titles are prepared by use of Calibri font.

2. Conventions on Command Line Format

Format	Meaning
Bold	Keywords in the command line (the part to be typed in and remaining unchanged in the command line) shall be prepared in bold font.
Italics	Command line parameters (the part to be replaced with actual values in the command line) shall be prepared in italics.
[ ]	Those in [ ] are optional.
(x | y | ...)	Means selecting one from two or more options.
[x|y|…]	Means selecting one or none from two or more options.
<x-y>	Means selecting one from x to y.

3. Conventions on Keyboard Operation

Format	Meaning
Characters in angle brackets	Refer to the key name. For example, <Enter>, <Tab>, <Backspace>, <a>, <?> etc. refer to Enter, Tab, Backspace, lowercase letter a, and ? respectively.
<Key 1 + Key 2>	<Key 1 + Key 2> refers to pressing key 1 and key 2 on the keyboard at the same time. For example, <Ctrl+Alt+A> refers to pressing "Ctrl", "Alt" and "A" keys at the same time.
< Key 1, Key 2>	< Key 1, Key 2> refers to pressing Key 1 first on the keyboard, releasing, and then pressing Key

Format	Meaning
	2; for instance, <Alt, F> refers to pressing <Alt> key first, releasing, and then pressing <F> key.

4. Signs

This Manual also uses a variety of eye-catching signs to indicate what should be paid special attention to during the operation. The significance of such signs is as follows:

 Danger — Danger indicates that the described activity or situation may result in serious personal injury or death; for example, high voltage or electric shock hazards.

 Warning — Warning indicates that the described activity or situation may, or will, cause equipment damage or serious performance problems.

 Note — A note provides information that is, or may be, of special interest.

5. Conventions on Term

CMTS: CMTS in this Manual refers to the small CMTS and complies with C-DOCSIS standard unless otherwise specified.

6. Prompt

The input of command lines in this system is case sensitive.

NOTE: Please reach out to Blonder Tongue if you observe any content within this Manual that does not sufficiently conform with the actual product operation. Due to constant update and improvement of product and technology there may be discrepancies. For information on product updates, please refer to http://blondertongue.com.

Table of Contents

Chapter 1 Command-Line Interfaces and Views

1.1 Views and View Switching

Note:

This command line environment is divided into several “views”. The basic user level is considered the entry level view, which can be entered by entering the username and password at the console login prompt via direct console connection or telnet and/or ssh when these access modes configured on the CMTS. This user can only execute the most simple commands. The basic user view appears as follows: `BT>` . Other views are as follows.

1. The view of “enable”, hereinafter referred to as “enable” view or privileged mode, which can be entered by entering the “enable” command and password from the basic view and has permissions higher than basic view. The view appears as follows: `BT#`
2. The view of “config-terminal”, hereinafter referred to as config view or global configuration mode, which can be entered by entering “**`configure terminal`**” in enable mode. The view appears as follows: `BT(config)#`
3. The view of “cmts”, hereinafter referred to as cmts view or cmts configuration mode, which can be entered by entering “**`interface cmts 1`**” in config view. The view appears as follows: `BT(config-if-cmts-1)#`
4. The view of “bundle”, hereinafter referred to as bundle view or bundle configuration mode, which can be entered by entering ”**`interface bundle`** *`bundle-name`*” in config view. The view appears as follows: `BT(config-if-bundle1)#`
5. The view of “uplink”, hereinafter referred to as uplink view or uplink mode, which can be entered by entering “**`interface uplink 1`**” in config view. The view appears as follows: `BT(config-if-uplink1)#`
6. The view of “vlan”, hereinafter referred to as vlan view or vlan configuration mode, which can be entered by entering “**`interface vlanif`** *`vlan-id`*” in config view. The view appears as follows: `BT(config-if-vlan1)#`
7. The view of “acl”, hereinafter referred to as acl view or acl configuration mode, which can be entered by entering “**`acl`** *`acl-id`*” in config view. The view appears as follows: `BT(config-if-acl-1)#`
8. The view of “syslog”, hereinafter referred to as syslog view or syslog configuration mode, which can be entered by entering “**`syslog`**” in config view. The view appears as follows: `BT(config-syslog)#`
9. The view of “line”, hereinafter referred to as line view or line configuration mode, which can be entered by entering “**`line vty`**” in config view. The view appears as follows: `BT(config-line)#`
10. The view of “ip-dhcp-pool”, hereinafter referred to as ip-dhcp-pool view or ip-dhcp-pool mode, which can be entered by entering “**`ip dhcp-pool`**” in config view. The view appears as follows: `BT(ip-dhcp-pool)#`
11. The view of “ip-dhcpv6-pool”, hereinafter referred to as ip-dhcpv6-pool view or ip-dhcpv6-pool mode, which can be entered by entering “**`ipv6 dhcp-pool`**” in config view. The view appears as follows: `BT(ip-dhcpv6-pool)#`

12. The view of “mauth”, hereinafter referred to as mauth view or multicast authorization mode, which can be entered by entering “**cable multicast authorization profile** *profile-name*” in config view. The view appears as follows: `BT(config-mauth)#`

13. The view of “sav”, hereinafter referred to as sav view or sav mode, which can be entered by entering “**cable source verify group** *group-name*” in config view. The view appears as follows: `BT(config-sav)#`

14. The view of “bonding-group”, hereinafter referred to as bonding-group view or bonding-group mode, which can be entered by entering “**interface (us | ds) bonding-group** *bdg-id*” in config view. The view appears as follows: `BT(config-if-us-bonding-group1)#` or `BT(config-if-ds-bonding-group1)#`

    The view of “client-class”, hereinafter referred to as client-class view or client-class mode, which can be entered by entering “**client-class** *class-id*” in config view. The view appears as follows: `BT(client-class-1)#`

1.1.1 acl

[Command]

acl *acl-id*

[View]

config view

[Parameter]

acl-id: Number of ACL to be created or entered. Type: numerical value; range: 1-192.

[Description]

This command is used to enter the acl view from the config view.

[Example]

Enter the acl view from the config view:

```
BT(config)# acl 1
BT(config-if-acl-1)#
```

1.1.2 cable rcc-template

[Command]

cable rcc-template *rcc-temp-id*

[View]

config view

[Parameter]

rcc-temp-id : RCC template ID. Type: numerical value; range: 1-255

[Description]

This command is used to enter the rcc template view from the config view.

[Example]

Enter the rcc template view from the config view:

```
BT(config)# cable rcc-template 1
BT(config-rcc-template1)#
```

1.1.3 client-class

[Command]

client-class *class-id*

[View]

config view

[Parameter]

class-id: Client-class number. Type: numerical value; range: 1-32.

[Description]

This command is used to enter the client-class view from the config view.

[Example]

Enter the client-class view from the config view:

```
BT(config)# client-class 1
BT(client-class-1)#
```

1.1.4 configure terminal

[Command]

configure terminal

[View]

enable view

[Parameter]

N/A

[Description]

This command is used to enter the config view from the enable view.

[Example]

Enter the config view from the enable view:

```
BT# configure terminal
BT(config)#
```

1.1.5 disable

[Command]

disable

[View]

enable view

[Parameter]

N/A

[Description]

This command is used to exit the enable view and return to the “view” view.

[Example]

Exit the enable view and return to the “view” view:

```
BT# disable
BT>
```

1.1.6 enable

[Command]

enable *(level)*

[View]

"view" view

[Parameter]

level: The privilege which the user apply for; range: 0-15, default: 3.

[Description]

This command is used to enter the enable view from the "view" view. If the privilege which the user apply for is prior to the user's current privilege, system will ask for enable password. To know how enable password is set please refer to "**enable password**" command.

[Example]

Enter the enable view from the "view" view:

```
BT> enable
BT#
```

1.1.7 end

[Command]

end

[View]

enable view, config view, bundle view, cmts view, uplink view, vlan view, acl view, line view, syslog view, ip-dhcp-pool view, ipv6-dhcp-pool view, mauth view, sav view, client-class view, bonding-group view

[Parameter]

N/A

[Description]

This command is used to exit a view and return to the enable view.

[Example]

Exit the bundle view and return to the enable view:

```
BT(config-if-bundle1)# end
BT#
```

1.1.8 exit

[Command]

exit

[View]

All views

[Parameter]

N/A

[Description]

This command is used to exit a view and return to the parent view, for example, exit the bundle view and return to the config view, etc.. If executing the "**exit**" command in the "view" view, it will exit and return to the logon screen.

[Example]

Exit the cmts view and return to the config view:

```
BT(config-if-cmts-1)# exit
BT(config)#
```

Exit the "view" view and return to the logon screen:

```
BT> exit
username:
```

1.1.9 interface

[Command]

interface bundle *bundle-id*

interface cmts *cmts-id*

interface uplink *uplink-id*

interface vlanif *vlan-id*

interface (us | ds) bonding-group *bdg-id*

interface eqam template *eqam-id*

[View]

config view

[Parameter]

bundle-id: bundle ID. Type: numerical value; range: 1-32.

cmts-id: CMTS ID. It is fixed as 1.

uplink-id: Uplink ID. Type: numerical value; range: 1-2.

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

bdg-id: Bonding group ID. Type: numerical value; range: 1-65535

eqam-id: EQAM template ID. It is fixed as 1.

[Description]

The command "**interface bundle**" is used to enter the bundle view from the config view.

The command "**interface cmts**" is used to enter the cmts view from the config view.

The command "**interface uplink**" is used to enter the uplink view from the config view.

The command "**interface vlanif**" is used to enter the vlan view from the config view.

The command "**interface (us | ds) bonding-group**" is used to enter the bonding-group view from the config view.

The command "**interface eqam template**" is used to enter the eqam template view from the config view.

[Example]

Enter the bundle view from the config view:

```
BT(config)# interface bundle 1
BT(config-if-bundle1)#
```

Enter the cmts view from the config view:

```
BT(config)# interface cmts 1
BT(config-if-cmts-1)#
```

Enter the uplink view from the config view:

```
BT(config)# interface uplink 1
BT(config-if-uplink1)#
```

Enter the vlan view from the config view:

```
BT(config)# interface vlanif 1
BT(config-if-vlan1)#
```

Enter the downstream bonding-group view from the config view:

```
BT(config)# interface ds bonding-group 1
BT(config-if-ds-bonding-group1)#
```

Enter the upstream bonding-group view from the config view:

```
BT(config)# interface ds bonding-group 1
BT(config-if-ds-bonding-group1)#
```

Enter the eqam template view from the config view:

```
BT(config)# interface eqam template 1
BT(config-if-eqam-template-1)#
```

1.1.10 ip dhcp-pool

[Command]

ip dhcp-pool

ipv6 dhcp-pool

[View]

config view

[Parameter]

N/A

[Description]

The "**ip dhcp-pool**" command is used to enter the ip-dhcp-pool view from the config view.

The "**ipv6 dhcp-pool**" command is used to enter the ip-dhcpv6-pool view from the config view.

[Example]

Enter the ip-dhcp-pool view from the config view:

```
BT(config)# ip dhcp-pool
BT(ip-dhcp-pool)#
```

Enter the ip-dhcpv6-pool view from the config view:

```
BT(config)# ipv6 dhcp-pool
BT(ip-dhcpv6-pool)#
```

1.1.11 line vty

[Command]

line vty

[View]

config view

[Parameter]

N/A

[Description]

This command is used to enter the line view from the config view.

[Example]

Enter the line view from the config view:

```
BT(config)# line vty
BT(config-line)#
```

1.1.12 quit

[Command]

quit

[View]

All views

[Parameter]

N/A

[Description]

This command is used to exit a view and return to the logon screen.

[Example]

Exit the config view and return to the logon screen:

```
BT(config)# quit
username:
```

1.1.13 syslog

[Command]

syslog

[View]

config view

[Parameter]

N/A

[Description]

This command is used to enter the syslog view from the config view.

[Example]

Enter the syslog view from the config view:

```
BT(config)# syslog
BT(config-syslog)#
```

1.2 Terminal Interface Commands

1.2.1 banner motd

[Command]

banner motd default

banner motd-text *end-char*

no banner motd

[View]

config view

[Parameter]

end-char : The endchar of the log display. Type: string; range: 1 characters

[Description]

The command "**banner motd**" is used to enable logo display in case of telnet. After enabling, you can see logo after establishing the connection again. By default, logo display is enabled.

The command "**banner motd-text**" is used to configure the endchar of the log display in case of telnet.

The command "**no banner motd**" is used to disable logo display of the system in case of telnet. After disabling, logo of the company will not be printed any more.

[Example]

Enable log display in case of telnet connection:

```
**********************************************************
*                                                        *
*  BT software system.                                   *
*  Copyright 2010-2018,All rights Reserved by BT.  *
*                                                        *
**********************************************************
User Access Verification
Username: admin
Password: *****
Password: *****
BT >
Vty connection is timed out.
```

Disable log display:

```
User Access Verification
Username: admin
Password: *****
Password: *****
```

```
BT >
Vty connection is timed out.
```

1.2.2 exec-timeout

[Command]

exec-timeout *minutes-num*

no exec-timeout

[View]

line view

[Parameter]

minutes-num: Configure the timeout. Unit: minute; type: numerical value; range: 1-60; default: 10 minutes

[Description]

The command "**exec-timeout**" is used to set the VTY timeout. If no operation is taken in this period, the system will exit VTY connection automatically. The default timeout is 10 minutes;

The command "**no exec-timeout**" is used to restore the default VTY timeout.

[Example]

Set the vty timeout as 5 minutes.

```
BT(config-line)# exec-timeout 5
BT(config-line)# show vty
VTY width       :     177
VTY height      :     57
VTY timeout     :     5 min
Monitor status :      enabled
```

1.2.3 help

[Command]

help

[View]

"view" view

[Parameter]

N/A

[Description]

This command is used to display the command-line help information.

[Example]

Display the command-line help information:

```
BT> help
Zebra VTY provides advanced help feature. When you need help,
anytime at the command line please press '?'.
If nothing matches, the help list will be empty and you must backup
 until entering a '?' shows the available options.
Two styles of help are provided:
1. Full help is available when you are ready to enter a
command argument (e.g. 'show ?') and describes each possible
argument.
2. Partial help is provided when an abbreviated argument is entered
   and you want to know what arguments match the input
   (e.g. 'show me?'.)
```

1.2.4 ip rcmd remote-host

[Command]

ip rcmd remote-host *local-name ip-address remote-name* **[enable]**

no ip rcmd remote-host *local-name ip-address remote-name*

[View]

config view

[Parameter]

enable: Map to the enable view. Defaults to the “view” view without this parameter.

local-name: Local username. Type: string; range: 1-15 characters.

ip-address: IP address of remote user, dotted decimal type; range: 0.0.0.0-255.255.255.255.

remote-name: Remote username. Type: string; range: 1-15 characters.

[Description]

This command is used to configure the RSH service, the remote client user can map the local user to execute the command in a view. The command “ **ip rcmd remote-host** *local-name ip-address remote-name*” is used to map to “view” view. The command “ **ip rcmd remote-host** *local-name ip-address remote-name* **enable**” is used to map to enable view.

The command "**no ip rcmd remote-host**" is used to delete the remote user and its corresponding information.

[Example]

Allows on remote user "root" in 172.16.2.108 to use local user "admin" to operate in "view" view.

```
BT(config)# ip rcmd remote-host admin 172.16.2.108 root
BT(config)# show running-config | include rcmd
 ip rcmd remote-host admin 172.16.2.108 root
 ip rcmd rsh-enable
```

1.2.5 ip rcmd rsh-enable

[Command]

ip rcmd rsh-enable

no ip rcmd rsh-enable

[View]

config view

[Parameter]

N/A

[Description]

The command "**ip rcmd rsh-enable**" is used to enable the RSH service.

The command "**no ip rcmd remote-host**" is used to delete the RSH service.

[Example]

Enable the RSH service.

```
BT(config)# ip rcmd rsh-enable
BT(config)# show running-config | include rsh
 ip rcmd rsh-enable
```

1.2.6 kill

[Command]

kill *vty-id*

[View]

enable view

[Parameter]

vty-id: vty ID. Type: numerical value; range: 1-1000

[Description]

This command is used to kill the online users.

[Example]

Kill the online users of vty ID as 5:

```
BT# kill 5
```

Note:

If the command fails to execute, the system will be based on the reasons for the failure to provide the relevant tips:

1. The special index is not found.
2. The console vty is not allowed to be killed.
3. Killing yourself is not allowed.
4. Permission is not allowed.

1.2.7 show history

[Command]

show history

[View]

"view" view, enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the command history of the operator. The history shows up to the 19 latest entered commands. When exceeding the maximum supporting number of commands, the old records will be covered by the new ones.

[Example]

Display current input records:

```
BT(config)# show history
  show system-information
  show history
```

1.2.8 show tech

[Command]

show tech [page]

[View]

enable view, config view, cmts view

[Parameter]

page: Pagination display

[Description]

This command is used to display all system information collectively once for all, with "**show tech**" for non-pagination display, and "**show tech page**" for pagination display.

[Example]

Display the system information collectively:

```
BT(config)# show tech
----------- show sys-date -----------
System time         : 2019-01-01 01:04:12 Thu
Timezone            : GMT+00:00
-------- show system-information --------
System running-time: 0d1h4m
Startup times       : 113
CPU used            : 14%
RAM used            : 44%
Flash used          : 10%
Total running-time : 98d2h55m
```

1.2.9 show tech redirect tftp

[Command]

show tech redirect tftp *ip-address filename*

[View]

enable view, config view, cmts view

[Parameter]

ip-address: TFTP server address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

filename: File name. Type: string; range: 1-128.

[Description]

This command is used to upload the system information to the tftp server.

[Example]

Upload the information via TFTP to the tftp server with IP address as 192.168.1.100, under the file name as sys-text:

```
BT# show tech redirect tftp 192.168.1.100 sys-text
```

1.2.10 show vty

[Command]

show vty

[View]

line view, config view

[Parameter]

N/A

[Description]

This command is used to display the relevant parameters of the command line echo.

[Example]

Display the relevant parameters of the command line echot:

```
BT(config-line)# show vty
VTY width       :     177
VTY height      :     57
VTY timeout     :     5 min
Monitor status :      enabled
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
VTY width	The width of the command line display interface
VTY height	The height of the command line display interface
VTY timeout	Timeout of the VTY
Monitor status	Terminal output status

1.2.11 telnetd

[Command]

telnetd

no telnetd

[View]

config view

[Parameter]

N/A

[Description]

The command "**telnetd**" is used to enable telnetd function of the system. Since telnet protocol is not encrypted, it is not recommend using. By default, the telnet function is enabled.

The command "**no telnetd**" is used to disable the telnetd function.

[Example]

Enable the telnet function:

```
BT(config)# telnetd
```

1.2.12 terminal length

[Command]

terminal length *length*

terminal no length

[View]

"view" view, enable view

[Parameter]

length: Length of screen for display. Type: numerical value; range: 0-512; default: 57.

[Description]

The command "**terminal length**" is used to set the length of screen for a single display, which is used to display more contents gradually. Press any key to continue the display. When the parameter is set as 0, all contents will be displayed once for all.

The command "**terminal no length**" is used to restore the length of screen for a single display to the default value.

[Example]

The command for setting the length of screen capture:

```
BT> terminal length 5
BT> list
  enable
  enable <0-15>
  exit
  help
 --More--
```

1.2.13 who

[Command]

who

[View]

"view" view, enable view

[Parameter]

N/A

[Description]

This command is used to display the users currently logging on the system.

[Example]

Display the users currently logging on the system:

```
BT# who
 vty[20] connected from Console user:admin privilege:3.
*vty[26] connected from telnet:192.168.2.60 user:BT privilege:3.
```

Chapter 2 System Management

2.1 Basic Management of System

2.1.1 auto-backup config period

[Command]

auto-backup config period days *day* **hours** *hour* **minutes** *minute*

no auto-backup config period

[View]

config view

[Parameter]

day: Automatic backup period, in day. Type: numerical value; range: 0-10; default: 0

hour: Automatic backup period, in hour. Type: numerical value; range: 0-23; default: 0

minute: Automatic backup period, in minute. Type: numerical value; range: 0-59; default: 0

[Description]

The command "**auto-backup config period**" is used to set the automatic backup period of CMTS configuration file, the system automatically backs up the device configuration file once each period, to achieve the CMTS configuration file synchronization. By default, the function of automatic backup is disabled (with all parameters as 0). This command is configured simultaneously with the command "**auto-backup config server**", to set the periodic backup of CMTS configuration file.

The command "**no auto-backup config period**" is used to restore the default period for automatic backup of CMTS configuration file.

[Example]

Configure to backup the CMTS configuration file automatically every 12 hours:

```
BT(config)# auto-backup config period days 0 hours 12 minutes 0 BT(config)# show running-config verbose | include auto-backup config periodauto-backup config period days 0 hours 12 minutes 0
```

2.1.2 auto-backup config server

[Command]

auto-backup config server *ip-address* [**filename** *filename*]

no auto-backup config server

[View]

config view

[Parameter]

ip-address: IP address of the backup server, dotted decimal type, range: 0.0.0.0-255.255.255.255.

filename: File name for backup to the server. Type: string; range: 1-128 character.

[Description]

The command "**auto-backup config server**" is used to set the IP address of automatic backup server of CMTS configuration file and the file name for backup to the server. This command is configured simultaneously with the command "**auto-backup config period**", to set the periodic backup of CMTS configuration file.

The command "**no auto-backup config server**" is used to clear the automatic backup server of CMTS configuration file.

[Example]

Set the IP address of automatic backup server of CMTS configuration file and the file name for backup tothe server:

```
BT(config)# auto-backup config server 192.168.2.10 filename cmts-config
BT(config)# show running-config verbose | include cmts-config
auto-backup config server 192.168.2.10 filename cmts-config
```

2.1.3 auto-update indication wait-time

[Command]

auto-update indication wait-time *wait-time*

[View]

config view

[Parameter]

wait-time: Indication time of zero touch upgrade successful, in minutes. Type: numerical value; range: 5-1440; default: 5.

[Description]

This command is used to set the indication time of zero touch upgrade successful. When the device zero touch upgrade was successful, cable and run indicator lamp long bright.

[Example]

Set the indication time of zero touch upgrade successful as 10 minutes:

```
BT(config)# auto-update indication wait-time 10 BT(config)# show
running-config verbose | include auto-updateauto-update indication
wait-time 10
```

2.1.4 auto-update config

[Command]

auto-update config (enable | disable)

[View]

config view

[Parameter]

enable: Enable automatic update configuration of the device.

disable: Disable automatic update configuration of the device.

[Description]

This command is used to set whether the function of automatic update configuration is enabled. By default, this function is enabled. After enabling this function, you can set the periodic backup function of CMTS configuration file.

[Example]

Enable automatic update configuration:

```
BT(config)# auto-update config enable
```

2.1.5 clear startup-times

[Command]

clear startup-times

[View]

config view

[Parameter]

N/A

[Description]

This command is used to clear the record on startup times which is displayed by using the command "**show system-information**".

[Example]

Clear the startup times:

```
BT(config)# show system-information
System running-time : 0d21h53m
Startup times       : 784
CPU used            : 4%
RAM used            : 45%
Flash used          : 5%
Total running-time : 493d0h46m BT(config)#
clear startup-times BT(config)# show
system-informationSystem running-time :
0d21h54m
Startup times       : 0
CPU used            : 5%
RAM used            : 45%
Flash used          : 5%
Total running-time  : 493d0h46m
```

2.1.6 clear total-running-time

[Command]

clear total-running-time

[View]

config view

[Parameter]

N/A

[Description]

This command is used to clear total running time of the system which is displayed by using the command "**show system-information**".

[Example]

Clear total running time of the system:

```
BT(config)# show system-information
System running-time : 0d21h54m
Startup times       : 0
CPU used            : 5%
RAM used            : 45%
```

```
Flash used          : 5%
Total running-time : 493d0h46m BT(config)#
clear total-running-timeBT(config)# show
system-information System running-time :
0d21h57m
Startup times       : 0
CPU used            : 4%
RAM used            : 45%
Flash used          : 5%
Total running-time  : 0d0h0m
```

2.1.7 copy running-config startup-config

[Command]

copy running-config startup-config

[View]

enable view

[Parameter]

N/A

[Description]

This command is used to copy current configuration to the startup configuration. After entering this command, the system will prompt user to confirm. After user enters "Y" for the confirmation, the current configuration will be copied to the startup configuration. After finishing the configuration, you can view the startup configuration by using the command "**show startup-config**".

[Example]

Copy current configuration to the startup configuration in the enable view:

```
BT# copy running-config startup-config
This will save the configuration to the flash memory.
Are you sure?(y/n) [n]y
Building configuration.....
Configuration saved successfully.
```

2.1.8 erase startup-config

[Command]

erase startup-config

[View]

enable view

[Parameter]

N/A

[Description]

This command is used to clear the startup configuration. After entering this command, the system will prompt user to confirm. After user enters "Y" for the confirmation, the configuration will be cleared after the system restarts. After finishing the configuration, you can view the startup configuration by using the command "**show startup-config**".

[Example]

Erase the startup configuration information in the enable view:

```
BT# erase startup-config
Are you sure to erase the startup config file?(y/n) [n]y
BT# show startup-config
The startup configuration file /app/config is empty.
```

2.1.9 hostname

[Command]

hostname *hostname*

no hostname

[View]

config view

[Parameter]

hostname: System host name. Type: string; range: 1-64 characters (the first character must be a letter); default: BT

[Description]

The command "**hostname**" is used to configure the host name of the system.

The command "**no hostname**" is used to restore the default the host name of the system.

[Example]

Configure the system host name as test:

```
BT(config)# hostname test
test(config)#
```

Restore the system host name to BT:

```
test(config)# no hostname
BT(config)#
```

2.1.10 list

[Command]

list

[View]

all view

[Parameter]

N/A

[Description]

This command is used to display all command in the current view.

[Example]

Display all command in ip-dhcp-pool view:

```
BT(ip-dhcp-pool)# list bootfile
  cm-3.0 (enable|disable)default-
  router A.B.C.D
  dns-server A.B.C.D
  dns-server A.B.C.D A.B.C.D
  end
  exit
  lease <1-480>
……
```

2.1.11 reboot

[Command]

reboot

[View]

enable view

[Parameter]

N/A

[Description]

This command is used to restart the entire CMTS device. After entering this command, the system will prompt user to confirm. After user enters “y” for confirmation, the entire device will reboot.

[Example]

Reboot CMTS

```
BT# reboot
Are you sure to reboot?(y/n) [n]y
Resetting 3219...
System is going to reboot...
Stopping the ssh server:
Unmounting filesystems
...
```

2.1.12 show software-version

[Command]

show software-version

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display software version.

[Example]

Display the software version:

```
BT(config)# show software-version
Copyright          : Copyright 2010-2019,All rights Reserved by BT
Software Version   : V4.0.0.9
Product Model      : CC8800-C-P2
Compiled Time      : 2019-03-22 17:23:08
FPGA Version       : V1.0.15
```

2.1.13 show running-config

[Command]

show running-config

[View]

enable view, config view, cmts view, bundle view, syslog view, vlan view, uplink view, line view, mauth view, sav view, eqam template view, ip-dhcp-pool view, acl view, bonding-group view, client-class view

[Parameter]

N/A

[Description]

Display the current non-default configuration information.

[Example]

Display the non-default configuration information in current view:

```
BT(config)# show running-config
Current configuration:
!
! Modulation profile configuration:
!
ip dhcp-pool
 network 25.250.250.0 255.255.255.0
 network start-ip 25.250.250.10 end-ip 25.250.250.250
 bootfile cm-3.0
exit
ipv6 dhcp-pool
 tftp-server 3000::136
 bootfile cm-3.0
 address-prefix 3000::/64 lifetime 64000 64000
exit
…
```

2.1.14 show running-config verbose

[Command]

show running-config verbose

[View]

enable view, config view, cmts view, syslog view, ip-dhcp-pool view

[Parameter]

N/A

[Description]

Display all configuration information of current system including the default configurations.

[Example]

Display all configuration information in current view:

```
BT(config)# show running-config verbose
Current configuration:
!
banner motd default
telnetd
cable upstream signal-quality query-period 180
cable upstream signal-quality real-time snmp-data
no cable util-interval
! Modulation profile configuration:
!
cable spectrum-group disable
cable spectrum-group max-history 16
sysmoni main-cpu-utili threshold-warning 60 threshold-recovery 50
!
interface bundle 1
 cable dhcp-giaddr primary
 ip address 160.2.1.3 255.255.255.0
 cable helper-address all 1 172.16.36.16
 cable source verify enable
 cable ipv6 source verify enable
 cable source verify leasequery-filter upstream 5 10
exit
 cable dhcp-mode cm l3-relay
 cable dhcp-mode host snooping
 cable dhcp-mode mta snooping
 cable dhcp-mode stb snooping
 cable dhcpv6-mode cm snooping
 cable dhcpv6-mode host snooping
 cable dhcpv6-mode mta snooping
 cable dhcpv6-mode stb snooping
 cable vpn dhcp-transparent
…
```

2.1.15 show startup-config

[Command]

show startup-config

[View]

enable view

[Parameter]

N/A

[Description]

This command is used to display the startup configuration information.

[Example]

Display the startup configuration information in the enable view:

```
BT# show startup-config
!
!Zebra configuration saved from vty
!system configuration version: V4.0.0.9
!system datetime:2016 Nov 01  03:46:09
!
! Modulation profile configuration:
!
!
interface bundle 1
 ip address 160.2.1.3 255.255.255.0
 cable helper-address all 1 172.16.36.16
exit
 cable dhcp-mode cm l3-relay
no ipv6 dhcp-pool
! load balance configuration:
!
!
!static ip configuration:
!sav-static configuration:
cable source verify group "1"
exit
!
!
!
tacacs-server primary ip-address 1.1.1.1
radius-server primary ip-address 1.1.1.1 key 1
groupname 1 privilege 1
username admin privilege
username 1 password 0 1
username 1 groupname 1
username 1 statistical
ip address dhcp-alloc docsis_CC8800-C-P2
ipv6 address dhcp-alloc docsis_CC8800-C-P2
!
interface vlanif 1127
 ip address 160.2.1.3 255.255.255.0 primary
…
```

2.1.16 show system-information

[Command]

show system-information

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command can be used to display CPU utilization, RAM utilization, FLASH utilization, startup times, running time and overall running time of the system.

[Example]

Display the status information of the system:

```
BT(config)# show system-information
System running-time : 1d15h36m
Startup times       : 133
CPU used            : 0%
RAM used            : 44%
Flash used          : 10%
Total running-time  : 135d20h56m
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
System running-time	Running time of current system since this startup
Startup times	Startup times of current system
CPU used	CPU utilization of current CMTS device
RAM used	RAM utilization of current CMTS device
Flash used	Flash utilization of current CMTS device
Total running-time	Total running time of current system

2.2 System Time Management

2.2.1 clock set

[Command]

clock set *year-month-day hour:minute:second*

[View]

config view

[Parameter]

year: Year. Type: numerical value; range: 2019-2037;

month: Month. Type: numerical value; range: 1-12;

day: Day. Type: numerical value; range: 1-31 or 1-30 or 1-29 or 1-28, subject to year and month;

hour: Hour. Type: numerical value; range: 0-23;

minute: Minute. Type: numerical value; range: 0-59;

second: Second. Type: numerical value; range: 0-59.

[Description]

This command is used to set the system time manually. After setting, you can view the system time by using the command "**show sys-date**".

[Example]

Set the system time manually:

```
BT(config)# clock set 2012-07-26 10:50:00
BT(config)# show sys-date System
time: 2012-07-26 10:50:09 Thu
Timezone: GMT+00:00
```

Note:

Due to millennium bug defect of Linux system, the device will reboot automatically after the system time is beyond 3:14:00 of Jan. 19, 2038, which is a defect on the kernel of Linux system and exists as a device defect. Though the range for time configuration has been restricted in the command, still note not to configure the time too ahead, to avoid device reboot caused by the time across such a critical point.

2.2.2 clock timezone

[Command]

clock timezone (add | minus) *hour:minute*

clock timezone *timezone-num*

[View]

config view

[Parameter]

add *hour:minute*: Set the local timezone of device. Type: numerical value; range: -13:00~14:00, default: 08:00.

minus *hour:minute*: Set the local timezone of device. Type: numerical value; range: -13:00~14:00.

timezone-num: Local timezone of device. Type: string; range: (-13:00)-14:00, where "-" stands for west timezone, for example, -1:00 indicates West Zone 1; 8:00 indicates East Zone 8, generally speaking, the minute offset of the timezone is 0 minute, 30 minutes or 45 minutes; default: 08:00.

[Description]

This command is used to set the system timezone manually. In order to accurately configure the time zone, the command "**clock timezone (add | minus)**" is recommended. After setting, you can view the system timezone by using the command "**show sys-date**".

[Example]

Set the local timezone as Eastern Zone 5:00:

```
BT(config)# clock timezone add 05:00
BT(config)# show sys-date System
time: 2012-07-26 10:50:09 Thu
Timezone: GMT+05:00
```

2.2.3 ntpserver

[Command]

ntpserver (*ip-address* **|** *ntpserver-name***)**

[View]

config view

[Parameter]

ip-address: IPv4 address or IPv6 address of NTP server, with format as A.B.C.D or X:X::X:X.

ntpserver-name: NTP server name. Type: string; range: 1-50 characters.

[Description]s

This command is used to set NTP server of the system to ensure online synchronization of system time. After successfully executing this command, the system time will conduct time synchronization with the NTP server.

[Example]

Acquire time from the time server with IP address as 192.168.0.212:

```
BT(config)# show sys-date System
time: 2012-07-26 11:19:12 Thu
Timezone: GMT+00:00
BT(config)# ntpserver 192.168.0.212 BT(config)# show
running-config | include ntpserverntpserver 192.168.0.212
BT(config)# show sys-date System
time: 2014-10-15 19:56:23 Wed
Timezone: GMT+00:00
```

 Note:

1. If configuring the name of time server, correct DNS configurations shall be ensured.
2. After this command is executed, the system time will synchronized.

2.2.4 show sys-date

[Command]

show sys-date

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the system time. For relevant commands for time configuration, please refer to section "**clock set**"; for commands for timezone configuration, please refer to section "**clock timezone**".

[Example]

Display the system time:

```
BT(config)# show sys-date System
time: 2012-07-26 10:50:09 Thu
Timezone: GMT+00:00
```

 Note:

System time will be reset to 2019-01-01 00:00:00 after system reboot.

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
System time	System time, format: Hour-Minute-Second, YY-MM-DD, Week
Timezone	Local timezone of system, range: (-13)-14, with west timezone indicated by a negative number and east timezone indicated by a positive number.

2.3 Upgrade Management

2.3.1 load config

[Command]

load config ftp *ip-address username password filename*

load config tftp *ip-address filename*

[View]

enable view

[Parameter]

ip-address: FTP/TFTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

filename: Configuration file name acquired from FTP/TFTP server. Type: string; range: no limit.

username: FTP username. Type: string; range: no limit.

password: FTP password. Type: string; range: no limit.

[Description]

The command "**load config ftp**" is used to configure the address, username and password of FTP server, and the name of configuration file to be acquired from the server, enabling the device to acquire configurations from FTP server.

The command "**load config tftp**" is used to configure the address of TFTP server, and the name of configuration file to be acquired from the server, enabling the device to acquire configurations from TFTP server.

[Example]

Import the configuration file "config-file" to the device from the TFTP server with IP address as 192.168.1.100:

```
BT# load config tftp 192.168.1.100 config-file
```

Download images from the FTP server with IP address as 192.168.1.100 and achieve upgrade:

```
BT# load image ftp 192.168.1.100 username1 password1 image
```

Note:

1. Before using this command, make sure that the device is connected to the FTP/TFTP server network, and open the FTP/TFTP software.
2. In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure;
3. In case of successful execution of the command, the system will prompt the process of the execution.

2.3.2 load image

[Command]

load image ftp *ip-address username password filename*

load image curl-ftp *ip-address username password filename*

load image tftp *ip-address filename*

[View]

enable view

[Parameter]

ip-address: FTP/TFTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

username: FTP username. Type: string; range: no limit.

password: FTP password. Type: string; range: no limit.

filename: name of image acquired from FTP/TFTP server. Type: string; range: no limit.

[Description]

The command "**load image ftp**" is used to configure address, username and password of FTP server, and name of image to be acquired from the server, enabling the image acquisition from FTP server and upgrade of the device.

The command "**load image curl-ftp**" is used to configure the address, user name, password of the FTP server and the name of the image that needs to be obtained from the server, so as to obtain the image from the FTP server and upgrade the device through libcurl technology.

The command "**load image tftp**" is used to configure address of TFTP server, and name of image to be acquired from the server, enabling the image acquisition from TFTP server and upgrade of the device.

[Example]

Download images from the FTP server with IP address as 192.168.1.100 and achieve upgrade:

```
BT# load image ftp 192.168.1.100 username1 password1 image
```

Download Image from FTP server 192.168.1.100 through libcurl and upgrade:

```
BT# load image curl-ftp 192.168.1.100 username1 password1 image
```

Download images from the TFTP server with IP address as 192.168.1.100 and achieve upgrade:

```
BT# load image tftp 192.168.1.100 image
```

Note:

1. Before using this command, make sure that the device is connected to the FTP/TFTP server network, and open the FTP/TFTP software.
2. In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure;
3. In case of successful execution of the command, the system will prompt the process of the execution.

2.3.3 upload config

[Command]

upload config ftp *ip-address username password filename*

[View]

enable view

[Parameter]

ip-address: FTP/TFTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

filename: Name of configuration file to be uploaded to the FTP/TFTP server. Type: string; range: no limit.

username: FTP username. Type: string; range: no limit.

password: FTP password. Type: string; range: no limit.

[Description]

The command "**load config ftp**" is used to Upload the configurations on CMTS to the FTP server.

The command "**upload config tftp**" is used to upload the configurations on CMTS to the TFTP server.

[Example]

Upload the configurations on the device to the FTP server with IP address as 192.168.1.100:

```
BT# upload config ftp 192.168.1.100 username1 password1 config-file
```

Upload the configurations on the device to the TFTP server with IP address as 192.168.1.100:

```
BT# upload config tftp 192.168.1.100 config-file
```

Note:

1. Before using this command, make sure that the device is connected to the FTP/TFTP server network, and open the FTP/TFTP software.
2. In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure;
3. In case of successful execution of the command, the system will prompt the process of the execution.

2.4 Command Alias Management

2.4.1 alias

[Command]

alias *alias command*

no alias (all | *alias***)**

[View]

config view

[Parameter]

all: All command aliases

alias: Command alias. Type: string; range: 1-31 characters, in letter/number/"_"/"-"

command: Command for setting the alias. Type: string; range: 1-31 characters.

[Description]

The command "**alias**" is used to add the alias of a command. The alias shall not be the system keyword, and the content of command alias shall be set in double quotes "".

The command "**no alias**" is used to delete the alias of one or all commands.

[Example]

Add command alias:

```
BT(config)# alias scm "show cable modem"
BT(config)# show alias
Sequence        Alias                Command
--------------- ------------------------------------ ------------------------------------------------------------
1               scm                  show cable modem
--------------- ------------------------------------ ------------------------------------------------------------
Total:   1     alias-name(s)
```

```
BT(config)# scm
MAC Address     IP Address     I/F   MAC     Primary RxPwr Timing  Number BPI     Online
                                     State   Sid     dB    Offset  CPE    Enabled Time
a4a8.0fa9.607c 192.168.2.102 C1/U4 online 2       6.0   318     0      no      0d2h36m
Total CM:1
```

Note:

1. After alias configuration, it requires that it can be queried by using the command "**list**".
2. In case of incomplete input of alias, it can be completed automatically by pressing TAB key; entering "?" can display the corresponding relationship.
3. The system can configure up to 100 aliases.

2.4.2 show alias

[Command]

show alias

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display alias information of the command.

[Example]

Add command alias:

```
BT(config)# show alias
Sequence       Alias          Command
---------------- ----------------------------------------------------------------------------------------------
1              scm            show cable modem
-------------- ------------------------------------------------------------------------------
Total:     1      alias-name(s)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Sequence	Sequence of command alias
Alias	Command alias
Command	Command for configuring alias

2.5 User Information Management

2.5.1 aaa authentication enable default group

[Command]

aaa authentication enable default group (tacacs+ | local | none) [(tacacs+ | local | none) [(tacacs+ | local | none)]]

no aaa authentication enable default group

[View]

config view

[Parameter]

tacacs+: Use the tacacs+ authentication mode.

local: Use the local authentication mode.

none: Use the none authentication mode.

[Description]

The command "**aaa authentication enable default group**" is used to configure the default authentication mode for the administrator to enter the enable view. The authentication modes include tacacs+, local and none. Configuration of one of them or a combination of them is acceptable.

When a variety of authentication modes are configured, in case of no response by some an authentication mode, invoke the next authentication mode to continue the authentication. When configuring the none authentication mode, the none authentication must be regarded as the last authentication mode.

The command "**no aaa authentication enable default group**" is used to restore the default authentication mode for the administrator to enter the enable view.

[Example]

Configure the default authentication mode for the administrator to enter the enable view as tacacs+ authentication first and none authentication following:

```
BT(config)# aaa authentication enable default group tacacs+ none
BT(config)# show running-config | include authentication enable aaa
authentication enable default group tacacs+ none
```

2.5.2 aaa authentication local-override

[Command]

aaa authentication local-override

no aaa authentication local-override

[View]

config view

[Parameter]

N/A

[Description]

The command "**aaa authentication local-override**" is used to enable the forced local authentication and authorization, to force all users logging on the device to use local authentication mode and local authorization mode.

The command "**no aaa authentication local-override**" is used to disable the forced local authentication and authorization.

[Example]

Enable the forced local authentication and authorization:

```
BT(config)# aaa authentication local-override BT(config)# show
running-config | include local-overrideaaa authentication
local-override
```

2.5.3 aaa authentication login default group

[Command]

aaa authentication login default group (tacacs+ | radius | local | enable | none) [(tacacs+ | radius | local | enable | none) [(tacacs+ | radius | local | enable | none) [(tacacs+ | radius | local | enable | none) [(tacacs+ | radius | local | enable | none)]]]]

no aaa authentication login default group

[View]

config view

[Parameter]

tacacs+: Use the tacacs+ authentication mode.

radius: Use the radius authentication mode.

enable: Use the enable authentication mode.

local: Use the local authentication mode.

none: Use the none authentication mode.

[Description]

The command "**aaa authentication login default group**" is used to configure the default authentication mode for the administrator to log in. The authentication modes include tacacs+, radius, enable, local and none. Configuration of one of them or a combination of them is acceptable.

When configuring multiple authentication methods, in case some authentication unresponsive, calls proceed under an authentication certificate. When configuring none authentication mode, none authentication must be used as the last authentication.

The command "**no aaa authentication login default group**" is used to restore the default authentication mode for the administrator to log in.

[Example]

Configure the default authentication mode for the administrator to log in as tacacs+ authentication first and local authentication following:

```
BT(config)# aaa authentication login default group tacacs+ local BT(config)#
show running-config | include authentication login defaultaaa authentication
login default group tacacs+ local
```

2.5.4 aaa authorization commands

[Command]

aaa authorization commands *level* **default group (tacacs+ | local | none) [(tacacs+ | local | none) [(tacacs+ | local | none)]]**

no aaa authorization commands *level* **default group**

[View]

config view

[Parameter]

tacacs+: Use the tacacs+ authorization mode.

local: Use the local authorization mode.

none: Use the non-authorization mode.

level: Configure the level of administrator. Type: numerical value; range: 0-15.

[Description]

The command "**aaa authorization commands default group**" is used to configure the command-line authorization mode for the administrator with specified level. The authorization modes include tacacs+, local and none. Configuration of one of them or a combination of them is acceptable.

When a variety of authentication modes are configured, in case of no response by some an authentication mode, invoke the next authentication mode to continue the authentication. When configuring the none authentication mode, the none authentication must be regarded as the last authentication mode.

The command "**no aaa authorization commands default group**" is used to disable the default command-line authorization mode of the administrator.

[Example]

Configure the default authorization mode for the administrator of Level 10 as tacacs+ authorization first and none authorization following:

```
BT(config)# aaa authorization commands 10 default group tacacs+ local
BT(config)# show running-config verbose | include authorization commandsaaa
authorization commands 10 default group tacacs+ local
```

2.5.5 aaa authorization login default group

[Command]

aaa authorization login default group (tacacs+ | local | none) [(tacacs+ | local | none) [(tacacs+ | local | none)]]

no aaa authorization login default group

[View]

config view

[Parameter]

tacacs+: Use the tacacs+ authorization mode.

local: Use the local authorization mode.

none: Use the non-authorization mode.

[Description]

The command "**aaa authorization login default group**" is used to configure the default authorization mode for the administrator to log in. The authorization modes include tacacs+, local and none. Configuration of one of them or a combination of them is acceptable.

When a variety of authorization modes are configured, in case of no response by some an authorization mode, invoke the next authorization mode to continue the authorization. When configuring the none authorization mode, the none authorization must be regarded as the last authorization mode.

The command "**no aaa authorization login default group**" is used to disable the default authorization mode for the administrator to log in.

[Example]

Configure the default authorization mode for the administrator to log in as tacacs+ authentication firstand none authorization following:

```
BT(config)# aaa authorization login default group tacacs+ local BT(config)# show running-config verbose | include authorization login defaultaaa authorization login default group tacacs+ local
```

2.5.6 aaa new-model

[Command]

aaa new-model

no aaa new-model

[View]

config view

[Parameter]

N/A

[Description]

The command "**aaa new-model**" is used to enable AAA module. By default, this function is disabled.

The command "**no aaa new-model**" is used to disable AAA module.

[Example]

Enable the AAA module on the device:

```
BT(config)# aaa new-model
BT(config)# show running-config | include new-model
aaa new-model
```

2.5.7 enable password level

[Command]

enable password *password* **[level** *level***]**

no enable password [level *level***]**

[View]

config view

[Parameter]

password: password for entering the enable view. Type: string; range: 1-50 characters (number and letter).

level: Level of permission. Type: numerical value; range: 1-15, default:3.

[Description]

The command "**enable password**" is used to set the password for entering the enable view. By default, the default password is null and the system will not inquire. All users will share a password. Only users with super privilege can modify the password.

The command "**no enable password**" is used to clear the password for entering the enable view. After clearing, the system will not inquire about the password any more.

[Example]

Set the user with relevant level of permission to enter the privilege as 12345:

```
BT(config)# enable password 12345 level 15
BT(config)# exitBT#
exit BT> enable 15
Password:
```

2.5.8 groupname

[Command]

groupname *groupname* **privilege** *level*

no groupname *groupname*

[View]

config view

[Parameter]

groupname : name of user group. Type: string; range: 1-50 characters (number, letter and underline "_").

level : Level of privilege. Type: numerical value; range: 0-15 (Level 0 has the lowest level of permission, while Level 15 has the highest level of permission).

[Description]

The command "**groupname**" is used to set corresponding level of privilege for user group. Before using the command, do ensure AAA configuration is enabled. For the command for enabling or disabling the AAA configuration, refer to section "aaa new-model".

The command "**no groupname**" is used to delete a user group. When the user group is deleted, all users in the group will be deleted as well.

[Example]

Set the privilege level for user group 123 as 5:

```
BT(config)# groupname 123 privilege 5
BT(config)# show groups
group index     : 0
group name      : administrators
group privilege : 15
group index     : 1
group name      : default
group privilege : 3
group index     : 2
group name      : 123
group privilege : 5
show local groups: a total of 3 groups
```

2.5.9 privilege exec

[Command]

privilege exec level *level command1* **[***command2* **[***command3* **[***command4* **[***command5***]]]]**

no privilege exec *command1* [*command2* [*command3* [*command4* [*command5*]]]]

[View]

config view

[Parameter]

level: Level of command line. Type: numerical value; range: 0-15 (Level 0 has the lowest level of permission, while Level 15 has the highest level of permission)

command1: Command-line keyword 1. Type: string; range: 1-30 characters.

command2: Command-line keyword 2. Type: string; range: 1-30 characters.

command3: Command-line keyword 3. Type: string; range: 1-30 characters.

command4: Command-line keyword 4. Type: string; range: 1-30 characters.

command5: Command-line keyword 5. Type: string; range: 1-30 characters.

[Description]

The command "**privilege exec**" is used to configure the level of local command line for use at the time of authorization of local command line. It supports the configuration of the maximum five keywords and the configuration of level of the maximum 100 local command lines. The registered command must be a local command keyword. For viewing the configured level of local command line, refer to the section for command "**show privilege exec**".

The command "**no privilege exec**" is used to delete the level of command line.

[Example]

Configure the level of command "enable" as Level 9:

```
BT(config)# privilege exec level 9 enable
BT(config)# show running-config verbose | include exec level
privilege exec level 9 enable
```

2.5.10 radius-server

[Command]

radius-server (primary | secondary) ip-address *ip-address* **key** *key* **[port** *port***] [retry** *retry***] [timeout** *timeout***]**

no radius-server (primary | secondary)

[View]

config view

[Parameter]

primary: Configure the radius master server.

secondary: Configure the radius standby server.

ip-address: IPv4 address or IPv6 address of radius server, with format as A.B.C.D or X:X::X:X.

key: Configure the encryption key of radius server. Type: string; range: 1-32 characters.

port: Configure the port number of radius server. Type: numerical value; range: 1-65535; default: 1812.

retry: Configure the retransmission times of radius server. Type: numerical value; range: 0-5; default: 1.

timeout: Configure the wait timeout of radius. Type: numerical value; range: 3-10; default: 3.

[Description]

The command "**radius-server**" is used to configure IP address, encryption key, port number, retransmission times and wait timeout of radius server.

The command "**no radius-server**" is used to delete the configurations of radius server.

[Example]

Add IP address 192.168.1.15 and key secret-key to the radius master server, with others taking thedefault configurations:

```
BT(config)# radius-server primary ip-address 192.168.1.15 key secret-key
BT(config)# show running-config verbose | include radius-server
radius-server primary ip-address 192.168.1.15 key secret-key port 1812 retry 1
timeout 3
BT(config)# show radius-server
------------------------------------------------------------------------------------------------------------------------
Type          Port     Retry    Timeout    Ip_address       Key
------------------------------------------------------------------------------------------------------------------------
primary       1812     1        3          192.168.1.15     secret-key
secondary     --       --       --         --               --
------------------------------------------------------------------------------------------------------------------------
```

2.5.11 show aaa-configuration

[Command]

show aaa-configuration

[View]

enable view, config view

[Parameter]

N/A

[Description]

Display the configurations of AAA module, including status of AAA functions (Refer to **aaa new-model** for the command for configuration), status of local mandatory authentication (refer to **aaa authentication local-override** for the command for configuration), Login authentication mode (refer to **aaa authentication login default group** for the command for configuration), Login authorization mode (refer to **aaa authorization login default group** for the command for configuration), Enable authentication mode (refer to **aaa authentication enable default group** for the command for configuration), and command-line authorization mode (refer to **aaa authorization commands** for the command for configuration).

[Example]

Display the configurations of AAA module:

```
BT(config)# show aaa-configuration
show aaa configuration:
------------------------------------------------------------------------------------
aaa new-model                  : enable
```

```
authentication local-override : enable
authentication login method   : tacacs+ local
authorization login method    : tacacs+ local
authentication enable method  : tacacs+ none
authorization commands method : (level 10)tacacs+ local
-------------------------------------------------------------------------------
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
aaa new-model	Whether AAA function is enabled
authentication local-override	Whether local mandatory authentication is enabled.
authentication login method	Login authentication mode
authorization login method	Login authorization mode
authentication enable method	Enable authentication mode
authorization commands method	Command-line authorization mode

2.5.12 show groups

[Command]

show groups

[View]

config view

[Parameter]

N/A

[Description]

This command is used to view the information of current user group.

[Example]

View the information of a user group:

```
BT(config)# show groups
group index       : 0
group name        : administrators
group privilege   : 15
group index       : 1
group name        : default
group privilege   : 3
show local groups: a total of 2 groups
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
group index	User group index
group name	Name of user group
group privilege	Level of user group

2.5.13 show privilege exec

[Command]

show privilege exec

[View]

enable view, config view

[Parameter]

N/A

[Description]

Display the added level of command line on the device. For configuring the level of command line, refer to the section for command "**privilege exec**".

[Example]

Display the added level of command line on the device:

```
BT(config)# show privilege exec
-------------------------------------------------------------------------------------------
Index     Level    Commands
-------------------------------------------------------------------------------------------
1         15       system reboot
2         10       configuration terminal
3         11       enable
4         12       aaa authentication login
-------------------------------------------------------------------------------------------
show privilege exec: a total of 4 command(s)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Index	Index of command line
Level	Level of command line
Commands	Command lines with level configured

2.5.14 show radius-server

[Command]

show radius-server

[View]

enable view, config view

[Parameter]

N/A

[Description]

Display the information of radius server, including IP address, encryption key, port number, retry times and wait timeout of the master server and the standby server. For configuring the radius server, refer to the section for command "**radius-server**".

[Example]

Display the information of radius server:

```
BT(config)# show radius-server
-------------------------------------------------------------------------------------------------------------------
Type         Port    Retry    Timeout    Ip_address       Key
-------------------------------------------------------------------------------------------------------------------
primary      1812    1        3          192.168.1.15     secret-key
secondary    --      --       --         --               --
-------------------------------------------------------------------------------------------------------------------
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Type	Type of server, including master server and standby server
Port	Port number of server
Retry	Retry times of server
Timeout	Wait timeout of server
Ip_address	IP address of server
Key	Encryption key of server

2.5.15 show terminal user login failure

[Command]

show terminal user login failure

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the records that failed to log terminal.

[Example]

Display the records that failed to log terminal:

```
BT# show terminal user login failure
-------------------------------------------------------------------------------------------------------------------
User fail login information:
-------------------------------------------------------------------------------------------------------------------
Access Type   IP Address   Failure Count   Latest Entered User Name   Time
console       Console      2               ex                         2019-01-01,01:39:30
-------------------------------------------------------------------------------------------------------------------
Total record(s) number: 1
```

- **Description of this command output:**

Parameter	Description
Access Type	Access type of the user
IP Address	IP address of the user
Failure Count	Failure count of the user
Latest Entered User Name	Latest entered user name
Time	Access time

2.5.16 show tacacs-server

[Command]

show tacacs-server

[View]

enable view, config view

[Parameter]

N/A

[Description]

Display the information of tacacs+ server, including IP address, encryption key, port number, retry times and wait timeout of the master server and the standby server. For configuring the tacacs+ server, refer to the section for command "**tacacs-server**".

[Example]

Display the information of tacacs+ server:

```
BT(config)# show tacacs-server
-------------------------------------------------------------------------------------------------------------------------
Type         Port    Retry    Timeout   Ip_address       Key
-------------------------------------------------------------------------------------------------------------------------
primary      49      2        5         192.168.1.1      secret-key
secondary    49      1        3         192.168.1.2      secret-key
-------------------------------------------------------------------------------------------------------------------------
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Type	Type of server, including master server and standby server
Port	Port number of server
Retry	Retry times of server
Timeout	Wait timeout of server
Ip_address	IP address of server
Key	Encryption key of server

2.5.17 show users

[Command]

show users

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the information of users in the system.

[Example]

Display the information of users:

```
BT(config)# show users
user index: 0
user name : admin
user group: administrators
user mode : super
show local users: a total of 1 user
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
user index	Sequence of user name

Parameter	Description
user name	User name
user group	User group
user mode	User mode, mainly divided into super users, statistical users and installation users.

2.5.18 tacacs-server

[Command]

tacacs-server (primary | secondary) ip-address *ip-address* **[key** *key***] [port** *port***] [retry** *retry***] [timeout** *timeout***]**

no tacacs-server (primary | secondary)

[View]

config view

[Parameter]

primary: Configure the tacacs+ master server.

secondary: Configure the tacacs+ standby server.

ip-address: IPv4 address or IPv6 address of tacacs+ server, with format as A.B.C.D or X:X::X:X.

key: Configure the encryption key of tacacs+ server. Type: string; range: 1-32 characters.

port: Configure the port number of tacacs+ server. Type: numerical value; range: 1-65535; default: 49.

retry: Configure the retransmission times of tacacs+ server. Type: numerical value; range: 0-5; default: 1.

timeout: Configure the wait timeout of tacacs+ server. Type: numerical value; range: 3-10; default: 3.

[Description]

The command "**tacacs-server**" is used to configure IP address, encryption key, port number, retransmission times and wait timeout of tacacs+ server. For viewing the tacacs+ server, refer to the section for command "**show tacacs-server**".

The command "**no tacacs-server**" is used to delete the configurations of tacacs+ server.

[Example]

Add the primary tacacs+ server with IP address 192.168.1.1, the secondary tacacs+ server with IP address "10.10.29.211" and key "secret-key" with others taking the default configurations:

```
BT(config)# tacacs-server primary ip-address 192.168.1.1
BT(config)# tacacs-server secondary ip-address 10.10.29.211 key secret-key
BT(config)# show tacacs-server
-------------------------------------------------------------------------------------------------------------------
Type         Port    Retry    Timeout  Ip_address       Key
```

```
-------------------------------------------------------------------------------------------------------------------
primary     49      1       3       192.168.1.1     --
secondary   49      1       3       10.10.29.211    secret-key
-------------------------------------------------------------------------------------------------------------------
```

2.5.19 username password

[Command]

username *username* **password [(0 | 7)]** *password*

no username *username*

[View]

config view

[Parameter]

username: User name. Type: string; range: 1-50 characters (Numbers, uppercase and lowercase letters, and underlines)

password: Password. Type: string; range: 1-50 characters (Numbers, uppercase and lowercase letters, underlines, and special characters)

0 | 7: Option. If it is configured as 0, the password will be displayed in plain text in case of **show running-config**; if it is configured as 7, the password will be displayed in cipher text in case of **show running-config**; if no parameter is configured, the password will be displayed in the default plain text.

[Description]

The command "**username password [(0 | 7)]**" is used to create a new user account and password. The new user's permission is statistical permission, and is not allowed to enter the config view and make configurations on the device. The permission of the user can be modify by using a command. If the entered username has already existed in current system, just modify the password of the user.

The command "**no username**" is used to delete the added users.

[Example]

Add the password for user with name of username1 as password1:

```
BT(config)# username username1 password password1
BT(config)# username username2 password 7 password2
BT(config)# show running-config | include username
username username1 password 0 password1
username username1 statistical
BT(config)# show users user
index: 0
user name : admin
```

```
user group: administrators
user mode : super
user index: 1
user name : username1
user group: default
user mode : normal
user index: 2
user name : username2
user group: default
user mode : statistical
show local users: a total of 2 users
```

Note:

The user name shall not be a local provisioning user of the system, such as root.

2.5.20 username

[Command]

username *username* **(statistical|installer|privilege)**

[View]

config view

[Parameter]

username: name of user with permission promoted. Type: string; range: 1-50 characters (number, letter and underline "_")

statistical: Set user privileges to statistical user privileges.

installer: Set user privileges to install user privileges. Users with installation privileges can view all the page information in the current WEB, and can perform all the operations in the four pages of US Channels Configuration, DS Channels Configuration, CM/CPE List and CM List (such as restarting cm, channel opening or closing, etc.).

[Description]

The "**username privilege**" command is used to promote the permission of user to super user level. The user with promoted permission can enter the config view and other views, and can modify the device configurations on a real-time basis. Before using the command, do ensure AAA configuration is disabled. For the command for enabling or disabling the AAA configuration, refer to section "**aaa new-model**".

The "**username statistics**" command is used to set user privileges to statistical user privileges. The user can only enter the enable view to view device information, but can not enter other views.

The "**username installer**" command is used to set user privileges to install user privileges. The user can only enter the enable view to view device information, but can not enter other views.

[Example]

Promote the username1 user as administrator:

```
BT(config)# show users
user index: 0
user name : admin
user group: administrators
user mode : super
user index: 1
user name : username1
user group: default
user mode : statistical
show local users: a total of 2 users
BT(config)# username username1 privilege
BT(config)# show users
user index: 0
user name : admin
user group: administrators
user mode : super
user index: 1
user name : username1
user group: default
user mode : super
show local users: a total of 2 users
```

Note:

The user name shall not be a local provisioning user of the system, such as root.

2.5.21 username groupname

[Command]

username *username* **groupname** *groupname*

no username *username* **groupname**

[View]

config view

[Parameter]

username: User name. Type: string; range: 1-50 characters (number, letter and underline "_")

groupname: Name of user group. Type: string; range: 1-50 characters (number, letter and underline "_")

[Description]

Bind a user to an existing user group. If the user has already been bound to the user group, modify the user in the user group to a new corresponding user group.

[Example]

Bind user username1 to the user groupname1:

```
BT(config)# username username1 groupname groupname1
BT(config)# show running-config verbose | include groupname groupname1
groupname groupname1 privilege 5
username username1 groupname groupname1
```

2.5.22 user try-num

[Command]

user try-num *try-number*

[View]

config view

[Parameter]

try-number: Number of retries of user login. Type: numerical value; range: 1-20; default: 10.

[Description]

This command is used to set the number of retries of user login. When the user enters the password number reaches the set value, the login user will be locked. When the login is locked, regardless of whether or not enter the correct password will not login in order to prevent brute force password.

[Example]

Set the number of retries of user login as 5:

```
BT(config)# user try-num 5
BT(config)# show running-config verbose | include try-num
user try-num 5
```

2.5.23 user lock-time

[Command]

user lock-time *lock-time*

[View]

config view

[Parameter]

lock-time: User lock time, in minutes. Type: numerical value; range: 5-60; default: 5.

[Description]

This command is used to set the device lock time. It does not allow the user to login the device in the locked time.

[Example]

Set the user lock time as 10 minutes:

```
BT(config)# user lock-time 10
BT(config)# show running-config verbose | include lock-time
user lock-time 10
user ext-lock-time 5
```

2.5.24 user ext-lock-time

[Command]

user ext-lock-time *ext-lock-time*

[View]

config view

[Parameter]

ext-lock-time: Extended lock time, in minutes. Type: numerical value; range: 5-60; default: 5.

[Description]

This command is used to set the device extended lock time. When the user is within the lock time, enter again will extend the lock time. The all lock time= lock-time + (times of enter again in lock time / try-number -1) * ext-lock-time.

[Example]

Set the user extended lock time as 10 minutes:

```
BT(config)# user ext-lock-time 10
BT(config)# show running-config verbose | include lock-time
user lock-time 10
user ext-lock-time 10
```

2.6 WEB Access Management

2.6.1 webgui http-access

[Command]

webgui http-access

no webgui http-access

[View]

config view

[Parameters]

N/A

[Description]

The **webgui http-access** command is used to enable the system's HTTP access function. Enable this function to use the HTTP protocol to access WEBGUI. As the HTTP protocol is not encrypted, this function is not recommended. By default, HTTP access is enabled.

The **no webgui http-access** command is used to disable the system's HTTP access function.

[Example]

Disable system HTTP access:

```
BT(config)# no webgui http-access BT(config)# show
running-config | include webguino webgui http-access
```

2.6.2 load https-ssl-cer

[Command]

load https-ssl-cer ftp *ip-address username password filename*

load https-ssl-cer tftp *ip-address filename*

[View]

enable view

[Parameter]

ip-address: IP address of FTP/TFTP server, it can be configured by IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

username: Username of FTP server. Type: string; range: 1-50 characters.

password: Password of FTP server. Type: string; range: 1-50 characters.

filename: The name of the certificate file load from the FTP / TFTP server. Type: string; range: 1-128 characters.

[Description]

The command "**load https-ssl-cer ftp**" is used to configure the FTP server address, user name, password, and the name of the certificate file from the server to load the certificate from the FTP server.

The command "**load https-ssl-cer tftp**" is used to configure the TFTP server address and the name of the certificate file from the server to load the certificate from the TFTP server.

[Example]

Load the certificate from the FTP server 192.168.1.100:

```
BT# load https-ssl-cer ftp 192.168.1.100 username1 password1 test.pem
The certificate file has been saved successfully
```

Note:

Import the HTTPS SSL certificate need to re-initialize the web management, please save the web configuration before this operation.

If the command fails to execute, the system will be based on the reasons for the failure to provide the relevant tips:

1. Unable to read certificate!
2. Unable to create ctx!
3. Unable to parse certificate!
4. Unable to parse key!
5. Unable to use certificate!
6. The certificate and key do not match!
7. The certificate expired!

If the command is successful, the system will prompt the implementation process.

2.6.3 upload https-ssl-cer

[Command]

upload https-ssl-cer ftp *ip-address username password filename*

upload https-ssl-cer tftp *ip-address filename*

[View]

enable view

[Parameter]

ip-address: IP address of FTP/TFTP server, it can be configured by IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

username: Username of FTP server. Type: string; range: 1-50 characters.

password: Password of FTP server. Type: string; range: 1-50 characters.

filename: The name of the certificate file obtained from the FTP / TFTP server. Type: string; range: 1-128 characters.

[Description]

The command "**load https-ssl-cer ftp**" is used to configure the FTP server address, user name, password, and the name of the certificate file from the server to upload the certificate to the FTP server.

The command "**load https-ssl-cer tftp**" is used to configure the TFTP server address and the name of the certificate file from the server to upload the certificate to the TFTP server.

[Example]

Upload the certificate to the FTP server 192.168.1.100:

```
BT# upload https-ssl-cer ftp 192.168.1.100 username1 password1 test.pem
```

Note:

If the command fails to execute, the system will be based on the reasons for the failure to provide the relevant tips:

1. Unable to read certificate!
2. Unable to create ctx!
3. Unable to parse certificate!
4. Unable to parse key!
5. Unable to use certificate!
6. The certificate and key do not match!
7. The certificate expired!

If the command is successful, the system will prompt the implementation process.

Chapter 3 CMTS Management and Maintenance

3.1 CMTS Basic Management

3.1.1 auto-update repeat

[Command]

auto-update repeat

no auto-update repeat

[View]

config view

[Parameters]

N/A

[Description]

The **auto-update repeat** command is used to enable the switch for repeated zero configuration. Enable this function to repeat zero configuration as many times as desired. When this function is disabled, zero configuration can only be carried out once when the device is started. This function is disabled by default.

The **no auto-update repeat** command is used to disable the function for repeated zero configuration.

[Example]

Enable the switch for repeated zero configuration:

```
BT(config)# auto-update repeat BT(config)# show
running-config | include updateauto-update repeat
```

3.1.2 cable memory-alarm enable

[Command]

cable memory-alarm enable

no cable memory-alarm enable

[View]

cmts view

[Parameter]

N/A.

[Description]

The command "**cable memory-alarm enable**" is used to enable the alarm function of memory utilization. This function is enabled by default.

The command "**no cable memory-alarm enable**" is used to disable the alarm function of memory utilization.

[Example]

Enable or disable the alarm function of memory utilization:

```
BT(config-if-cmts-1)# cable memory-alarm enable
BT(config-if-cmts-1)# show running-config verbose | include memory
 cable memory-alarm enable
 cable memory-alarm threshold warning 85 recovery 75
```

3.1.3 cable memory-alarm threshold

[Command]

cable memory-alarm threshold warning *warning* **recovery** *recovery*

no cable memory-alarm threshold

[View]

cmts view

[Parameter]

warning: Alarm threshold. Type: numerical value; in percentage, range: 2-96; default: 85.

recovery: Recovery threshold. Type: numerical value; in percentage, range: 1-95; default: 75.

[Description]

The command "**cable memory-alarm threshold**" is used to configure the alarm thresholds and recovery threshold of memory utilization. When the memory utilization exceeds the alarm threshold, the device alarms occur; When memory utilization is less than recovery threshold, the device alarms returned to normal.

The command "**no cable memory-alarm threshold**" is used to restore the default alarm thresholds and recovery threshold of memory utilization.

[Example]

Configure the alarm thresholds as 80% and recovery threshold as 60%:

```
BT(config-if-cmts-1)# cable memory-alarm threshold warning 80 recovery 60
BT(config-if-cmts-1)# show running-config verbose | include memory
 cable memory-alarm enable
 cable memory-alarm threshold warning 80 recovery 60
```

3.1.4 reconfig

[Command]

reconfig

reconfig interface cmts *cmts-id*

[View]

reconfig: cmts view

reconfig interface cmts: config view

[Parameter]

cmts-id: CMTS ID. It is fixed as 1.

[Description]

This command is used to restart the configuration delivery process to ensure consistent operation data. In the process of configuration delivery, the status of CMTS is InConfig(i), when relevant services of the device are not for normal application; after finishing the configuration delivery, the status of CMTS becomes online, and the device will be online automatically and relevant services will restart. For running status of the device, refer to the descriptions of "State" parameter of command "**show cmts**".

[Example]

Restart the configuration delivery of CMTS device in the config view:

```
BT(config)# reconfig interface cmts 1
BT(config)# show cmts
I/F  MAC            State        Product  Version   Firmware Hardware OnlineTime
Description
C1   0024.6851.0007 InConfig(i)  CC8800E  V2.1.1.6  BCM3227   V2.0      0d0h0m
CMTS_1
Total CMTS:1
BT(config)# show cable modem
MAC Address    IP Address I/F  MAC     Primary RxPwr  Timing  Number BPI      Online
                                State   Sid     (dBmV) Offset  CPE    Enabled Time
2476.7d06.d0ac --         C1/U3 offline 1         6.0   0       0      no      0d0h0m
2476.7d06.d532 --         C1/U1 offline 2         6.0   0       0      no      0d0h0m
Total CM:2
BT(config)# show cmts
I/F MAC            State  Product Version  Firmware Hardware OnlineTime Description
```

```
C1  0024.6851.0007 online CC8800E V2.1.1.6 BCM3227  V2.0      0d0h24m    CMTS_1
Total CMTS:1
BT(config)# show cable modem
MAC Address    IP Address    I/F   MAC     Primary RxPwr Timing Number BPI    Online
                                   State   Sid     dB    Offset CPE    Enabled Time
2476.7d06.d0ac 192.168.2.155 C1/U3 online  1       6.0   666    0      no      0d0h8m
2476.7d06.d532 192.168.2.158 C1/U1 online  2       6.0   667    0      no      0d0h8m
Total CM:2
```

3.1.5 show cmts

[Command]

show cmts

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

Display the status information of CMTS, including number of CMTS device, MAC address, current status of device, product type, software version, firmware version, hardware version and online time.

[Example]

Display the status of CMTS:

```
BT(config)# show cmts
I/F MAC            State  Device type  Version   Chip type Hardware OnlineTime
Description
C1  0024.6855.b2d2 online CC8800-C-P2  V4.0.0.9  DX8800    V1.1     0d20h52m
SystemName1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
I/F	Number of current CMTS device: slot number/interface number/CMTS ID. It is constantly C1.
MAC	MAC address of current CMTS device.
State	Current status of current CMTS device, mainly including the following: 1. unbind: the device is not bound MAC address. The system can bind it automatically; 2. offline: the device is offline; 3. WaitReady: the device is waiting, and will come to the next status after the system is ready.

Parameter	Description
	4. InConfig: the device is in a state of configuration delivery; 5. online: the device is online. Only in the online state, can the services work normally; 6. ConfigFail: the device fails to deliver the configurations or is informed of unsuccessful delivery at the time of configuration delivery, and the system prompts the status “ConfigFail”; 7. ConfigTimeOut: no response is received within a certain period of time after the configuration delivery, and the system prompts the status “ConfigTimeOut”.
Device type	Product type of current CMTS device
Version	Software version of current CMTS device
Chip type	The DOCSIS module of the current CMTS device
Hardware	Hardware version of current CMTS device
OnlineTime	Online duration of current CMTS device
Description	Name of current CMTS device, It can be set through the command “system name”.

3.1.6 show cmts verbose

[Command]

show cmts verbose

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

Display the details of CMTS, including hardware/software version, user-defined identity and resource occupation.

[Example]

Display the details of the device:

```
BT(config)# show cmts verbose
MAC                 : 0024.6855.b2d2
Device type         : CC8800-C-P2
Chip type           : DX8800
Hard version        : V1.1
Uplink type         : GE|10GE|EPON|10G EPON|GPON|XG(S)-PON
Hard RF I/O         : (N/A)(4Mix)
Optical type        : CFE
```

```
UpTime                : 2014-10-10 14:56:46 Fri
RunningTime           : 0d21h00m42s
Contact information   : --
System name           : SystemName1
Location              : --
Serial number         : 1708CDMB100360231
CPU used              : 15%
RAM used              : 51%
LinkStatus            : unbind
LinkTime              : --
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC	MAC address of current CMTS device
Device type	Product type of current CMTS device
Chip type	The DOCSIS module of the current CMTS device
Hard version	Hardware version of current CMTS device
Hard RF I/O	RF interface information of current CMTS device
Optical type	Optical type of current CMTS device
UpTime	Online duration of current CMTS device
RunningTime	Running time of current CMTS device
System name	System name of current CMTS device
Location	Address information of current CMTS device
Serial number	Ex-factory serial number of current CMTS device
CPU used	CPU utilization of DOCSIS module on current CMTS device
RAM used	Memory utilization of current CMTS device

3.1.7 show management-mode

[Command]

show management-mode

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display operational mode of the device.

[Example]

Display operational mode of the device:

```
BT(config)# show management-mode
Cmts is working in enhanced-centralized mode.
```

3.1.8 system

[Command]

system name *name*

system (location | contact) *text*

no system (name | location | contact)

[View]

cmts view

[Parameter]

name: The name of CMTS device

location: Address information of CMTS device

contact: The contact information of CMTS device

neme: Device name of CMTS device. Type: string; range: 1-64 characters

text: For different parameters, it indicates address and contact information of CMTS device. Type: string; range: 1-255 characters

[Description]

The command "**system**" is used to add or modify the name, location and contact information of the device.

The command "**no system**" is used to delete the name, location and contact information of the device.

[Example]

Set the location of CMTS device to Beijing:

```
BT(config-if-cmts-1)# system location Beijing
BT(config-if-cmts-1)# show running-config | include location
 system location Beijing
```

3.1.9 management

[Command]

management (vendorId *vendorId* **| equipmentId** *equipmentId***)**

no management (vendorId | equipmentId)

show management config

[View]

config view

[Parameter]

vendorId: The vendor ID reported to OLT when CMTS equipment is connected to OLT management.

equipmentId: The type of equipment reported to OLT when CMTS equipment is connected to OLT management.

vendorId: Configure the vendor ID of the CMTS device. Type: string; range: 4 characters.

equipmentId: Configure device type information. Type: string; range: 4 characters.

[Description]

The command "**management (vendorId** *vendorId* **| equipmentId** *equipmentId***)**" is used to configure the vendor ID or device type information reported when the device is connected to OLT.

The command "**no management (vendorId | equipmentId)**" is used to delete the vendor ID or device type information specified by the device user, and report it with the default configuration instead.

The command "**show management config**" is used to view the vendor ID or device type configured by the user. If there is no user configuration, it will be reported by default.

[Example]

Config the vendor ID of the CMTS device to TOPV and the device type to 88FX:

```
BT(config)# management vendorId TOPV
BT(config)# management equipmentId 88FX
BT(config)# show management config
vendorId=TOPV
equipmentId=88FX
BT(config)# show running-config | include management
!management config cofiguration:
management vendorId "TOPV"
management equipmentId "88FX"
```

3.2 Temperature Management

3.2.1 cable temperature alarm threshold

[Command]

cable temperature alarm threshold red *red-threshold* **yellow** *yellow-threshold*

[View]

config view, cmts view

[Parameter]

red-threshold: Warning threshold of red alarm. Type: numerical value; range: (-128)-127; default: 75.

yellow-threshold: Warning threshold of yellow alarm. Type: numerical value; range: (-128)-127; default: 70.

[Description]

This command is used to set the red and yellow warning threshold for temperature monitoring of components other than DOCSIS chip, that is, the red and yellow warning threshold for temperature monitoring of the system . In order to avoid the error of configuration threshold, the command "**cable temperature alarm threshold red** *red-threshold* **yellow** *yellow-threshold*" is recommended. The command "**show cmts temperature threshold**" can be used to view the monitoring thresholds of the components of CMTS device.

[Example]

Configure the red warning threshold of system temperature monitoring:

```
BT(config-if-cmts-1)# cable temperature alarm threshold red 70 yellow 60
BT(config-if-cmts-1)# show running-config | include general alarm
cable temperature alarm threshold red 70 yellow 60 BT(config-
if-cmts-1)# show cmts temperature threshold
        MAC                                 : 0024.6850.128c
        Temperature RED ALARM Threshold     : 70 degC (158 degF)
        Temperature YELLOW ALARM Threshold  : 60 degC (140 degF)
```

3.2.2 show cmts temperature

[Command]

show cmts temperature

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

Display CMTS temperature information.

[Example]

Display CMTS temperature information:

```
BT(config)# show cmts temperature
  MAC                          : 0024.68f1.e2d3
  Device Temperature           : 47 degC (116 degF)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC	MAC address of CMTS device
Device Temperature	Temperature of device

3.2.3 show cmts temperature threshold

[Command]

show cmts temperature threshold

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the warning threshold for CMTS temperature monitoring.

[Example]

Displays CMTS temperature information:

```
BT(config-if-cmts-1)# show cmts temperature threshold
        MAC                                 : 0024.6800.0011
        Temperature RED ALARM Threshold     : 75 degC (167 degF)
        Temperature YELLOW ALARM Threshold  : 70 degC (158 degF)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC	MAC address of CMTS device
Temperature RED ALARM Threshold	Threshold of temperature red alarm
Temperature YELLOW ALARM Threshold	Threshold of temperature yellow alarm

3.3 Channel Utilization Management

3.3.1 cable util-interval

[Command]

cable util-interval *interval*

no cable util-interval

[View]

config view

[Parameter]

interval: statistics interval of CMTS channel utilization, in second, range: 0, 60-86400; default: 180

[Description]

The command "**cable util-interval**" is used to set the statistics interval of CMTS channel utilization. When the interval is configured as 0, the function of channel utilization calculation is disabled.

When configuring the interval, there will be the following prompt:

If the interval is too small, it would cause system performance impact.

A value between 180 to 300 seconds or greater is recommended.

We can view the statistics interval of CMTS channel utilization through the command "**show cable util-interval**".

The command "**no cable util-interval**" is used to restore the default statistics interval of channel utilization.

[Example]

Enable and set the interval of channel utilization calculation as 200s:

```
BT(config)# cable util-interval 200
If the interval is too small, it would cause system performance impact.
A value between 180 to 300 seconds or greater is recommended.
BT(config)# show cable util-interval
cable utilization interval: 200 s
```

3.3.2 cable util threshold

[Command]

cable (upstream | downstream) util threshold-warning *warning-minor warning-major warning-critical* **threshold-recovery** *recovery-minor recovery-major recovery-critical*

no cable (upstream | downstream) util threshold

[View]

config view

[Parameter]

upstream: Upstream channel

downstream: Downstream channel

warning-minor: Warning threshold for minor level. Type: numerical value; range: 0-100; default: 0

warning-major: Warning threshold for major level. Type: numerical value; range: 0-100; default: 70

warning-critical: Warning threshold for critical level. Type: numerical value; range: 0-100; default: 90

recovery-minor: Recovery threshold for minor level. Type: numerical value; range: 0-100; default: 0

recovery-major: Recovery threshold for major level. Type: numerical value; range: 0-100; default: 65

recovery-critical: Recovery threshold for critical level. Type: numerical value; range: 0-100; default: 85

Requirements on threshold configuration: If the threshold is set as 0, the warning function is disabled. Otherwise, the threshold setting must satisfy the requirement as follows: the warning threshold for minor level<that for major level<that for critical level; the recovery threshold<the warning threshold of corresponding level respectively.

[Description]

The command "**cable util-interval**" is used to configure the warning threshold and recovery threshold of upstream channel and downstream channel, including the warning threshold for 3 levels and recovery threshold for 3 levels. After the configuration implementation success and the utilization reach the threshold, it will detonate by contact corresponding warning.

[Example]

Set the warning thresholds and the recovery thresholds for three levels at upstream channel as 50, 60,70, and 45, 55, 65 respectively; the warning thresholds and the recovery thresholds for three levels at downstream channel as 70, 80, 90 and 65, 75, 85 respectively:

```
BT(config-if-cmts-1)# cable upstream util threshold-warning 50 60 70
threshold-recovery 45 55 65
BT(config-if-cmts-1)# cable downstream util threshold-warning 70 80 90
threshold-recovery 65 75 85
BT(config-if-cmts-1)# show running-config verbose | include util
```

```
                    cable upstream util threshold-warning 50 60 70 threshold-recovery 45
55 65
cable downstream util threshold-warning 70 80 90 threshold-recovery 65 75 85
```

3.3.3 show cable util

[Command]

show cable util

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to display the utilization of upstream channel and downstream channel, the interval of utilization and warning threshold.

[Example]

Display the utilization and the threshold:

```
BT(config-if-cmts-1)# show cable util
Channel utilization interval:0s
Upstream:
Level       Threshold-warning  Threshold-recovery
Minor       0                  0
Major       70                 65
Critical    90                 85
Channel     Utilization(%)
1           25
2           0
3           0
4           0
Downstream:
Level       Threshold-warning  Threshold-recovery
Minor       0                  0
Major       70                 65
Critical    90                 85
Channel     Utilization(%)
1           1
2           21
3           1
4           1
5           1
```

```
6
7
8
9
10
11
12
13
14
15
16
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Upstream	Upstream channel
Downstream	Downstream channel
Level	The level of threshold, include Minor level, Major level and Critical level
Minor	The level of threshold is minor level
Major	The level of threshold is major level
Critical	The level of threshold is critical level
Threshold-warning	Warning threshold
Threshold-recovery	Recovery threshold
Channel	The channel of cmts
Utilization(%)	The utilization of channel. Range: 0-100

3.3.4 show cable util-interval

[Command]

`show cable util-interval`

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

Display the statistics interval of CMTS channel utilization. The command "**`cable util-interval`**" can be used to set the statistics interval of CMTS channel utilization.

[Example]

Display the channel utilization interval:

```
BT# show cable util-interval
cable utilization interval: 180 s
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
cable utilization interval	Channel utilization interval

3.3.5 show sysmoni

[Command]

show sysmoni

[View]

enable view, config view

[Parameter]

N/A

[Description]

Display the threshold parameter configurations of CPU utilization monitoring functions.

[Example]

Display the system information collectively:

```
BT# show sysmoni
sysmoni main-cpu-utili threshold-warning 60 threshold-recovery 50
```

3.3.6 sysmoni main-cpu-utili

[Command]

sysmoni main-cpu-utili threshold-warning *threshold-warning* **threshold-recovery** *threshold-recovery*

[View]

config view

[Parameter]

threshold-warning: utilization alarm value, When the master CPU utilization of the device is higher than the warning threshold for the first time, the system will record the alarm once. Type: numerical value; range: 0-99; default: 60.

threshold-recovery: utilization recovery value, when the utilization is lower than the recovery threshold and then higher than the warning threshold again, the system will record the alarm once again. Type: numerical value; range: 0-99; default: 50.

Requirements on parameter configuration: when configuring, the value of recovery shall be less than that of warning.

[Description]

Set the master CPU utilization warning threshold and recovery threshold of CMTS device. When the master CPU utilization of the device is higher than the warning threshold for the first time, the system will record the alarm once; when the utilization is lower than the recovery threshold and then higher than the warning threshold again, the system will record the alarm once again. The command "**show sysmoni**" can be used to query the master CPU utilization threshold.

[Example]

Set the master CPU utilization warning threshold as 80 and the recovery threshold as 70:

```
BT(config)# sysmoni main-cpu-utili threshold-warning 80 threshold-recovery 70
BT(config)# show sysmoni
sysmoni main-cpu-utili threshold-warning 80 threshold-recovery 70
```

3.4 CMTS DOCSIS Service Management

3.4.1 cable insertion-interval

[Command]

cable insertion-interval *interval*

no cable insertion-interval

[View]

cmts view

[Parameter]

Interval: Setting value of initial-maintenance time, the scope of the configuration is 100-2000, the default value is 100, the unit is millisecond

[Description]

The **cable insertion-interval** command is used to configure the initial-maintenance interval.

The **no cable insertion-interval** command is used to restore the default value of the initial-maintenance interval.

[Example]

Configure the value of initial-maintenance time

```
BT(config)# interface cmts 1
BT(config-if-cmts-1)# cable insertion-interval 123
BT(config-if-cmts-1)# no cable insertion-interval
```

3.4.2 cable ip-init

[Command]

cable ip-init (ipv4 | ipv6 | alternate | dual-stack)

[View]

config view

[Parameter]

ipv4: CM only send DHCPv4 request to IPv4 mode online

ipv6: CM only send DHCPv6 request to IPv4 mode online

alternate: CM support DHCPv4 or DHCPv6 request , give exclusive priority to DHCPv6 request. And CM can online with one of IPv4 and IPv6 address.

dual-stack: CM support DHCPv4 and DHCPv6 request with no priority. CM could online with IPv4 and IPv6 address at the same time.

[Description]

This command is used to configure the ip-init mode of CM.

[Example]

Configure the ip-init mode of CM as IPv6:

```
BT(config-if-cmts-1)# cable ip-init ipv6
Please reset CM to take effect!
```

3.4.3 cable mdd-interval

[Command]

cable mdd-interval *millisecond*

[View]

cmts view

[Parameter]

millisecond: MDD message interval, in ms (millisecond). Type: numerical value; range: 0-2000; default: 1500; 0 indicates MDD message is prohibited.

[Description]

Configure the interval for CMTS device to send MDD (MAC Domain Descriptor) message. The device will send MDD message by each message interval, to ensure normal registration of 3.0 CM. After MDD message is prohibited, 3.0 CM will be registered as 2.0 mode.

[Example]

Configure the MDD message interval of CMTS device as 100 ms:

```
BT(config-if-cmts-1)# cable mdd-interval 100
```

Note:

When MDD function shutdown, it will take effect after reset the CM.

3.4.4 cable mrc-mode

[Command]

cable mrc-mode

no cable mrc-mode

[View]

cmts view

[Parameter]

N/A

[Description]

The command "**cable mrc-mode**" is used to enable MRC (Multiple Receive Channel) function. After this function is enabled, 3.0 CM is allowed to bind multiple downstream channels for data transmission; By default, MRC function is enabled.

The command "**no cable mrc-mode**" is used to disable MRC (Multiple Receive Channel) function. After this function is disabled, 3.0 CM can transmit the data only on a downstream channel.

[Example]

Enable MRC function:

```
BT(config-if-cmts-1)# cable mrc-mode
BT(config-if-cmts-1)# show cable modem primary-channel
BT(config-if-cmts-1)# show cable modem primary-channel
```

```
MAC Address     IP Address      I/F    MAC        Primary Num Upstream
Downstream
                                       State      Sid       CPE  Primary(list)
Primary(list)
0026.5ba6.4779  192.168.2.167   C1/U1  w-online   7         0     1(2,3,4)
4(1,2,3,5,6,7,8)
```

Disable MRC function:

```
BT(config-if-cmts-1)# no cable mrc-mode
BT(config-if-cmts-1)# show cable modem primary-channel
MAC Address     IP Address      I/F    MAC        Primary Num Upstream
Downstream
                                       State      Sid       CPE  Primary(list)
Primary(list)
0026.5ba6.4779  192.168.2.167   C1/U1  w-online   7         0    1(2,3,4)
4
```

Note:

When change the function, it will take effect after reset the CM.

3.4.5 cable mtc-mode

[Command]

cable mtc-mode

no cable mtc-mode

[View]

cmts view

[Parameter]

N/A

[Description]

The command "**cable mtc-mode**" is used to enable MTC (Multiple Transmit Channel) function. After this function is enabled, 3.0 CM is allowed to bind multiple upstream channels for data transmission; By default, MTC function is enabled.

The command "**no cable mtc-mode**" is used to disable MTC (Multiple Transmit Channel) function. After this function is disabled, 3.0 CM can transmit the data only on an upstream channel.

[Example]

Enable MTC function:

```
BT(config-if-cmts-1)# cable mtc-mode
BT(config-if-cmts-1)# show cable modem primary-channel
MAC Address      IP Address     I/F   MAC      Primary Num  Upstream       Downstream
                                      State    Sid      CPE Primary(list) Primary(list)
0026.5ba6.4779 192.168.2.167 C1/U1 w-online 7        0    1(2,3,4)     4(1,2,3,5,6,7,8)
```

Disable MTC function:

```
BT(config-if-cmts-1)# no cable mtc-mode
BT(config-if-cmts-1)# show cable modem primary-channel
MAC Address     IP Address     I/F   MAC      Primary Num  Upstream       Downstream
                                     State    Sid      CPE Primary(list) Primary(list)
0026.5ba6.4779 192.168.2.167 C1/U1 w-online 7        0   1            4(1,2,3,5,6,7,8)
```

Note:

When change the function, it will take effect after reset the CM.

3.4.6 cable multicast mdf

[Command]

cable multicast mdf (enable | disable)

[View]

cmts view

[Parameter]

enable: Enable MDF function of CMTS device.

disable: Disable MDF function of CMTS device.

[Description]

Configure the MDF (Multicast DSID Forwarding) function of CMTS device. After it is disabled, 3.0 CM will use 2.0 multicast forwarding, i.e., IGMP Snooping. By default, the MDF function is enabled.

[Example]

Disable MDF function of CMTS in the cmts view:

```
BT(config-if-cmts-1)# cable multicast mdf disable BT(config-if-
cmts-1)# show running-config | include mdfcable multicast mdf
disable
```

Note:

1. To enable MDF function, you're required to set enabling MDD function first, i.e., set the MDD interval as a number other than 0. For specific configurations, refer to the section "cable mdd-interval Command Configuration".
2. When change the function, it will take effect after reset the CM.

3.4.7 cable piggyback

[Command]

cable piggyback-allowed

no cable piggyback-allowed

[View]

cmts view

[Parameter]

N/A

[Description]

The command "**cable piggyback-allowed**" is used to enable the piggyback function of CMTS device. by default, it is enabled.

The command "**no cable piggyback-allowed**" is used to disable the piggyback function of CMTS device. Disable the piggyback mechanism, to ensure multiple 3.0 CMs have equational bandwidth in case of upstream bandwidth saturation.

[Example]

Enable the piggyback function:

```
BT(config-if-cmts-1)# cable piggyback-allowed
BT(config-if-cmts-1)# show running-config verbose | include piggyback
 cable piggyback-allowed
```

Note:

When change the function, it will take effect after reset the CM.

3.4.8 cable rcp-control verbose

[Command]

cable rcp-control verbose

no cable rcp-control verbose

[View]

cmts view

[Parameter]

N/A

[Description]

The "**cable rcp-control verbose**" command is used to set up CMTS to request CM to report detailed RCP information when registering through MDD message, which will include complete description information of receiving channel and module.

The "**no cable rcp-control verbose**" command is used to cancel the requirement for CM to report detailed RCP information at registration time, when CM will only report RCP ID information.

[Example]

Configure rcp-control verbose to open:

```
BT(config-if-cmts-1)# cable rcp-control verbose
Please reset CM to take effect!
BT(config-if-cmts-1)# show cable mac-domain | include rcp
cable rcp-control verbose
```

3.4.9 cable shared-secret

[Command]

cable shared-secret [(0 | 7)] *text*

no cable shared-secret

[View]

cmts view

[Parameter]

0: indicate not having WORD encrypted; the configuration information displayed by using the command "**show running-config**" will be displayed in plain text.

7: indicate having WORD encrypted; the configuration information displayed by using the command "**show running-config**" will be displayed in cipher text.

text: Option 0 or no option indicates the shared key, with range of length as 1-16; option 7 indicates cipher text, which must be hexadecimal, with length as 32.

In case of Option 0 or 7 unavailable, by default, it is equivalent to using Option 0.

[Description]

The command "**cable shared-secret**" is used to configure the shared key of CMTS MIC. If the CM is online, CMTS will check MIC shared key of CM configuration file. The configured key must be identical to the MIC shared key in CM configuration file. Otherwise, CMTS will refuse CM to be online. After the configuration is modified, the modification will have no effect on the CM already online. By default, MIC check is disabled.

The command "**no cable shared-secret**" is used to restore the default MIC check function of CMTS device.

[Example]

Enable the MIC check function and set the shared key as secret-key without encryption in the cmts view:

```
BT(config-if-cmts-1)# cable shared-secret secret-key
BT(config-if-cmts-1)# show running-config | include shared
 cable shared-secret 0 secret-key
BT(config-if-cmts-1)# show cable shared-secretThe
shared-secret is unencrypted,information is:
Plaintext : secret-key
  Cipher  : 358999450728a1cf672fc7d83485a6cb
```

Note:

When change the function, it will take effect after reset the CM.

3.4.10 cable udc

[Command]

cable udc (enable | disable)

[View]

cmts view

[Parameter]

enable: enable UDC function

disable: disable UDC function

[Description]

This command is used to enable or disable UDC (Upstream Drop Classifier) function of CMTS device. By default, this function is disabled.

This function is applicable to 3.0 CM, and has conflict with the traditional IP_Filter function. To use IP_Filter function, disable UDC function. After the configuration is modified, the modification has no effect on the CM already online.

[Example]

Enable the UDC function in the cmts view:

```
BT(config-if-cmts-1)# cable udc enable
Please reset CM to take effect!
BT(config-if-cmts-1)# show running-config | include udc
 cable udc enable
```

Note:

When change the function, it will take effect after reset the CM.

3.4.11 cable freq-range

[Command]

cable freq-range (standard | extended)

[View]

cmts view

[Parameter]

standard: DOCSIS 3.0 standard upstream frequency range (5-42 MHz).

extended: DOCSIS 3.0 extends the upstream frequency range (5-85 MHz).

[Description]

This command is used to configure the value of Upstream Frequency Range TLV in MDD messages.

[Example]

Configure the value of the upstream frequency range TLV in the MDD message to extend the upstream frequency range:

```
BT(config-if-cmts-1)# cable freq-range extended
Please reset CM to take effect!
```

3.4.12 cable upstream upper-edge

[Command]

cable upstream upper-edge frequency

[View]

cmts view

[Parameter]

frequency: Upper boundary of duplex upstream frequency range.

[Description]

This command is used to configure the value of the "Diplexer Upstream Upper Band Edge TLV" in the MDD message.

[Example]

Configure the value of "Diplexer Upstream Upper Band Edge TLV" in MDD message to 85MHz:

```
BT(config-if-cmts-1)# cable upstream upper-edge 85MHz
Please reset CM to take effect!
```

3.4.13 cable downstream lower-edge

[Command]

cable downstream lower-edge frequency

[View]

cmts view

[Parameter]

frequency: Lower boundary of duplex downstream frequency range.

[Description]

This command is used to configure the value of the "Diplexer Downstream Lower Band Edge TLV" in the MDD message.

[Example]

The value of "Diplexer Downstream Lower Band Edge TLV" in the configuration MDD message is 258 MHz

```
BT(config-if-cmts-1)# cable downstream lower-edge 258MHz
Please reset CM to take effect!
```

3.4.14 cable downstream upper-edge

[Command]

cable downstream upper-edge frequency

[View]

cmts view

[Parameter]

frequency: Upper boundary of duplex downstream frequency range.

[Description]

This command is used to configure the value of “Diplexer Downstream Upper Band Edge TLV” in MDD messages.

[Example]

Configures the value of the “Diplexer Downstream Upper Band Edge TLV” in the MDD message to 1218 MHz.

```
BT(config-if-cmts-1)# cable downstream upper-edge 1218MHz
Please reset CM to take effect!
```

3.4.15 show cable mac-domain

[Command]

show cable mac-domain

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the configuration information of MAC domain.

[Example]

Display the configuration information of MAC domain:

```
BT(config)# show cable mac-domain
cable mdd-interval 1500
 cable multicast mdf enable
 cable udc enable
 cable mtc-mode
 cable mrc-mode
 cable rcp-control verbose
 cable ip-init ipv6
 cable service flow activity-timeout 0
```

3.4.16 show cable privacy

[Command]

show cable privacy [(eae-policy | bpi-plus-policy | tek-life-time | ak-life-time | eae-exclude-list | bpi-plus-exclude-list)]

[View]

show cable privacy [(eae-policy | bpi-plus-policy | tek-life-time| ak-life-time)]: cmts view

show cable privacy (eae-exclude-list | bpi-plus-exclude-list): config view

[Parameter]

eae-policy: Configuration of EAE policy

bpi-plus-policy: Configuration of BPI+ policy

tek-life-time: TEK life time

ak-life-time: AK life time

eae-exclude-list: EAE exclude list

bpi-plus-exclude-list: BPI+ exclude list

[Description]

This command is used to display the security encryption mechanism information. If you fill in the parameters, you can view all types of security encryption mechanism information.

[Example]

Display the TEK life time:

```
BT(config-if-cmts-1)# show cable privacy tek-life-time
 cable privacy tek-life-time 43200
```

3.4.17 show cable shared-secret

[Command]

show cable shared-secret

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to display the configurations of the shared key in current CMTS.

[Example]

Display the function of MIC configuration of CMTS in the cmts view:

```
BT(config-if-cmts-1)# show cable shared-secret
The shared-secret is unencrypted information is:
Plaintext : secret-key
  Cipher  : 358999450728a1cf672fc7d83485a6cb
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Plaintext	Public key
Cipher	Encryptor

3.4.18 show mac-statistic

[Command]

show mac-statistic

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the MAC domain statistics information.

[Example]

Display the MAC domain statistics information of CMTS device:

```
BT(config-if-cmts-1)# show mac-statistic
Index InvalidRNGREQCount RangAbortCount InvalidRtREQCount InvalidDataREQCount
FailedREGREQCount  T5TimeoutCount
1      0                   0               0                   0
0                  0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Index	Display the information ID
InvalidRNGREQCount	Invalid ranging request count
RangAbortCount	Ranging abort count
InvalidRtREQCount	Invalid registration request count
InvalidDataREQCount	Invalid data request count
FailedREGREQCount	Unsuccessful registration request count

Parameter	Description
T5TimeoutCount	T5 timeout count

3.5 Optical Receiver Management

3.5.1 catv optical-node input-power threshold

[Command]

catv optical-node input-power (low|high) threshold *ALARM-THRES RECOVERY-THRES*

[View]

cmts view

[Parameter]

low: Alarm for low input power of optical receiver

high: Warning for excessive input power of optical receiver

ALARM-THRES: Warning threshold, Type: numerical value; range: -15.0~2.0, unit: dBm. The default threshold of too low is - 7, and the default of too high is 2.

RECOVERY-THRES: Recovery threshold, Type: numerical value; range: -15.0~2.0, unit: dBm。The default threshold of too low is - 6, and the default of too high is 1.

[Description]

This command is used to configure alarm and recovery thresholds for low or high input optical power.

[Example]

The alarm and recovery thresholds for too low input optical power of the optical receiver are configured:

```
BT(config-if-cmts-1)# catv optical-node input-power low threshold -6.5 -6.2
BT(config-if-cmts-1)# show running | include catv
catv optical-node input-power low threshold -6.5 -6.2
```

3.5.2 catv optical-node restore factory-configuration

[Command]

catv optical-node restore factory-configuration

[View]

cmts view

[Parameters]

N/A

[Description]

This command is used to set to restore the factory settings of the optical node on the specified CMTS device.

[Example]

Restore the factory settings of the optical node:

```
BT(config-if-cmts-1)# catv optical-node restore factory-configuration
Are you sure to restore factory-configuration?(y/n) [n]y
Please confirm your restore operation!(y/n) [n]y
Optical node restore factory-configuration successfully!
```

3.5.3 catv optical-node upgrade

[Command]

catv optical-node upgrade ftp *ip-address username password filename*

catv optical-node upgrade tftp *ip-address filename*

[View]

cmts view

[Parameters]

ip-address: IP address of the FTP or TFTP server, either IPv4 or IPv6 address can be configured. Format is A.B.C.D or X:X::X:X

username: FTP username, string type, range: 1-50 characters

password: FTP password, string type, range: 1-50 characters

filename: Name of the firmware of the optical node obtained from the FTP or TFTP server, string type, range: 1-50 characters

[Description]

The command "**catv optical-node upgrade ftp**" is used to configure the FTP server address, username, password and filename of the firmware obtained from the server, so as to obtain the firmware from the FTP server and upgrade the optical server of the specified CMTS device.

The command "**catv optical-node upgrade tftp**" is used to configure the TFTP server address and filename of the firmware obtained from the server, so as to obtain the firmware from the TFTP server and upgrade the optical server of the specified CMTS device.

[Example]

Download the firmware of the optical node and upgrade from the FTP server 192.168.1.100:

```
BT(config-if-cmts-1)# catv optical-node upgrade ftp 192.168.1.100 username1
password1 firmware
```

3.5.4 show catv optical-node verbose

[Command]

show catv optical-node verbose

[View]

enable view, config view, cmts view

[Parameters]

N/A

[Description]

This command is used to view the detailed parameters of the optical nodes on all or specified CMTS devices.

[Example]

View the command line display of the optical node:

```
BT(config-if-cmts-1)# show catv optical-node verbose
DorType                  : CFE
Serial_Plat              : 1911CFE1800340824
FRX_OPT_Pwr(dBm)         : no
DCpwrV1/V2(V)            : 11.6/23.9
OptNode_Temp(degC)       : 29.1
```

- **In the example, for the parameters displayed by the command, the explanation is shown in the table below:**

Parameter	Description
DorType	Optical machine type
Serial_Plat	Optical-Mechanical platform serial number
FRX_OPT_Pwr(dBm)	Forward optical receiving A-way optical power, unit: dBm, range: -15-2dBm
DCpwrV1/V2	DC power supply acquisition voltage, unit V: DPowV1: 12V voltage acquisition value DPowV2: 24V voltage acquisition value.
OptNode_Temp	Optical platform temperature, unit: degC.

3.6 Syslog Management

3.6.1 clear log after-time

[Command]

clear log (localnonvol | localvolatile) after-time *time*

[View]

syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

time: time format, string type, in MM/DD/YY, Hour:Minute:Second

[Description]

Delete syslog after the specified time (inclusive).

[Example]

Delete logs in the flash after 4/10/2017, 15:00:00:

```
BT(config-syslog)# show log localnonvol after-time 1/4/2019 16:00:00
<EMERG>Jan 04 2019 16:01:00 BT CMTS[BT]:<cli><4263322369> This
event has happened 6 times from 2019-01-04,16:20:55 to 2019-01-04,16:21:00
<EMERG>Jan 04 2019 16:34:59 BT CMTS[BT]:<user><4263320578> admin@Console
login successfully.
total log amount 5,match log amount 2
BT(config-syslog)# clear log localnonvol after-time 1/4/2019 16:00:00
BT(config-syslog)# show log localnonvol after-time 1/4/2019 16:00:00 total
log amount 3,but none matched!
```

3.6.2 clear log all

[Command]

clear log (localnonvol | localvolatile) all

[View]

syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

[Description]

Delete all logs.

[Example]

Delete all logs in the flash:

```
BT(config-syslog)# clear log localnonvol all
BT(config-syslog)# show log localnonvol all no
syslog message now!
```

3.6.3 clear log before-time

[Command]

clear log (localnonvol | localvolatile) before-time *time*

[View]

syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

time: time format, string type, in MM/DD/YY, Hour:Minute:Second

[Description]

Delete the log before some a time (exclusive).

[Example]

Delete logs in the flash before 4/10/2017, 15:00:00:

```
BT(config-syslog)# show log localnonvol before-time 4/10/2017 15:00:00
<NOTICE>Apr 10 2017 14:56:32 BT CMTS[BT]:<cmcRfi> CMTS-
MAC=0024.684a.0003;DownStream channel 1 enable
<NOTICE>Apr 10 2017 14:58:32 BT CMTS[BT]:<cmcRfi> CMTS-
MAC=0024.684a.0003;DownStream channel 2 enable
total log amount 5,match log amount 2
BT(config-syslog)# clear log localnonvol before-time 4/10/2017 15:00:00
BT(config-syslog)# show log localnonvol before-time 4/10/2017 15:00:00 total
log amount 3,but none matched!
```

3.6.4 clear log eventid

[Command]

clear log (localnonvol | localvolatile) eventid *eventid*

[View]

syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

eventid: log event ID. Type: numerical value; range: 1-4294967295

[Description]

Delete the saved logs by event ID.

[Example]

Delete the log in the flash with event ID as 4263320578:

```
BT(config-syslog)# show log localnonvol eventid 4263320578
<EMERG>Jan 01 2019 13:56:53 BT CMTS[BT]:<user><4263320578> admin@Console
login successfully.
<EMERG>Jan 01 2019 00:01:26 BT CMTS[BT]:<user><4263320578> admin@Console
login successfully.
<EMERG>Jan 01 2019 02:08:26 BT CMTS[BT]:<user><4263320578> admin@Console
login successfully.
<EMERG>Jan 04 2019 13:46:17 BT CMTS[BT]:<user><4263320578> admin@Console
login successfully.
<EMERG>Jan 04 2019 14:03:29 BT CMTS[BT]:<user><4263320578> admi
n@172.16.36.63(telnet) login successfully.
<EMERG>Jan 04 2019 15:46:09 BT CMTS[BT]:<user><4263320578> admin@Console
login successfully.
<EMERG>Jan 04 2019 16:20:26 BT CMTS[BT]:<user><4263320578> admin@Console
login successfully.
<EMERG>Jan 04 2019 16:34:59 BT CMTS[BT]:<user><4263320578> admin@Console
login successfully.
<EMERG>Jan 04 2019 18:51:42 BT CMTS[BT]:<user><4263320578> admin@Console
login successfully.
total log amount 5261,match log amount 9
BT(config-syslog)# clear log localnonvol eventid 4263320578
BT(config-syslog)# show log localnonvol eventid 4263320578 total
log amount 5252,but none matched!
```

3.6.5 clear log last

[Command]

clear log (localnonvol | localvolatile) last *number*

[View]

syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

number: log event number. Type: numerical value; range: 1-10000

[Description]

Delete the latest logs by number.

[Example]

Delete the latest log in the flash:

```
BT(config-syslog)# show log localnonvol last 3
<EMERG>Jan 04 2019 19:09:20 BT CMTS[BT]:<cli><4263322369> admin @Console execute
command "show log localnonvol eventid 4263320578" successfully.
<EMERG>Jan 04 2019 19:13:25 BT CMTS[BT]:<cli><4263322369> admin @Console execute
command "clear log localnonvol eventid 4263320578" successfully.
<EMERG>Jan 04 2019 19:13:31 BT CMTS[BT]:<cli><4263322369> admin @Console execute
command "show log localnonvol eventid 4263320578" successfully.total log amount
5255,match log amount 3
BT(config-syslog)# clear log localnonvol last 1
BT(config-syslog)# show log localnonvol last 2
<EMERG>Jan 04 2019 19:09:20 BT CMTS[BT]:<cli><4263322369> admin @Console execute
command "show log localnonvol eventid 4263320578" successfully.
<EMERG>Jan 04 2019 19:13:25 BT CMTS[BT]:<cli><4263322369> admin @Console execute
command "clear log localnonvol eventid 4263320578" successfully.total log amount
5254,match log amount 2
```

3.6.6 clear log priority

[Command]

clear log (localnonvol | localvolatile) priority (emergency | alert | critical | error | warning | notification | informational | debug)

[View]

syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

emergency: Emergency, causing unavailability of the system

alert: Emergency, requiring immediate action

critical: Critical event

error: Error event

warning: Warning event

notification: Normal but important event

informational: Informational event

debug: Debugging information

[Description]

Delete the saved logs by priority.

[Example]

Delete all the warning event log saved in the flash:

```
BT(config-syslog)# show log localnonvol priority warning
<WARNING>Jan 04 2019 19:33:45 BT CMTS[BT]:<sysMoni><4263316227>US Temperature
 Alarm:red,CMTS-MAC=0024.6898.f0f1;
<WARNING>Jan 04 2019 19:33:45 BT CMTS[BT]:<sysMoni><4263316227>DS Temperature
 Alarm:red,CMTS-MAC=0024.6898.f0f1;
<WARNING>Jan 04  2019 19:33:58 BT CMTS[BT]:<cmtsMgmt><4263314956
> CMTS-MAC=0024.6898.f0f1;UpChannel 4: SNR=34.9 dB;
<WARNING>Jan 04  2019 19:33:58 BT CMTS[BT]:<cmtsMgmt><4263314956
> CMTS-MAC=0024.6898.f0f1;UpChannel 5: SNR=37.3 dB;
total log amount 5318,match log amount 4
BT(config-syslog)# clear log localnonvol priority warning
BT(config-syslog)# show log localnonvol priority warning total
log amount 5314,but none matched!
```

3.6.7 loglevel

[Command]

loglevel (emergency | alert | critical | error | warning | notification | informational | debug) (localnonvol | traps | syslog | localvolatile | monitor)

no loglevel (emergency | alert | critical | error | warning | notification | informational | debug) (localnonvol | traps | syslog | localvolatile | monitor)

[View]

syslog view

[Parameter]

emergency: Emergency, causing unavailability of the system

alert: Emergency, requiring immediate action

critical: Critical event

error: Error event

warning: Warning event

notification: Normal but important event

informational: Informational event

debug: Debugging information

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

syslog: Send to syslog server

traps: Send to SNMP server

monitor: Send to the display terminal

[Description]

The command "**loglevel**" is used to enable the syslog event to a server or memorizer.

The command "**no loglevel**" is used to disable the syslog event to a server or memorizer.

[Example]

Configure the warning information to SNMP server:

```
BT(config-syslog)# loglevel warning traps
BT(config-syslog)# show running-config verbose | include warning traps
 loglevel warning traps
```

3.6.8 loglevel all default

[Command]

loglevel all default

[View]

syslog view

[Parameter]

N/A

[Description]

Restore the default configuration of log level. This command does not affect other configurations of syslog.

[Example]

Restore loglevel to the factory state:

```
BT(config-syslog)# loglevel all default
BT(config-syslog)# show running-config | include default
```

3.6.9 log-server-ip

[Command]

log-server-ip (0 | 1 | 2 | 3 | 4) *ip-address* **[facility (local0 | local1 | local2 | local3 | local4 | local5 | local6 | local7)] [port** *port***]**

no log-server-ip (0 | 1 | 2 | 3 | 4)

[View]

syslog view

[Parameter]

0 | 1 | 2 | 3 | 4: Syslog server serial number

local0 | local1 | local2 | local3 | local4 | local5 | local6 | local7 : facility code for the syslog server

port: Syslog server port number, Type: numerical value; range: 1-65535; default: 514.

ip-address: IPv4 address or IPv6 address of syslog server, with format as A.B.C.D or X:X::X:X.

[Description]

The command "**log-server-ip**" is used to set syslog server IP address. The default facility code for the syslog server is local0.

The command "**no log-server-ip**" is used to delete syslog server IP address of the device.

[Example]

Set IP address of the No.2 syslog server as 10.0.0.1:

```
BT(config-syslog)# log-server-ip 2 10.0.0.1
BT(config-syslog)# show running-config | include log-server-ip
log-server-ip 2 10.0.0.1
```

3.6.10 message-to-event

[Command]

message-to-event (enable | disable)

set message-to-event eventid *eventid* **(enable | disable)**

[View]

syslog view

[Parameter]

enable: Enable reporting event messages

disable: Disable reporting event messages

eventid: Log event ID. Type: numerical value; range: 1-4294967295

[Description]

The command "**log-server-ip**" is used to enable or disable reporting all the event messages. This function is enabled by default. When this feature is disabled, the command **set message-to-event eventid** does not take effect.

The command " **set message-to-event eventid**" is used to enable or disable reporting the specified event messages. This function is enabled by default.

[Example]

Disable reporting the syslog message:

```
BT(config-syslog)# message-to-event disable
BT(config-syslog)# show running-config | include message-to-event
 message-to-event disable
```

3.6.11 set eventid level

[Command]

set eventid *eventid* **level (emergency | alert | critical | error | warning | notification | informational | debug | default)**

[View]

syslog view

[Parameter]

emergency: Emergency, causing unavailability of the system

alert: Emergency, requiring immediate action

critical: Critical event

error: Error event

warning: Warning event

notification: Normal but important event

informational: Informational event

debug: Debugging information

default: Default information

eventid: Log event ID. Type: numerical value; range: 1-4294967295

[Description]

Set corresponding event level for some a corresponding syslog.

[Example]

Set the log with eventid as 8641 as warning:

```
BT(config-syslog)# set eventid 8641 level warning
```

3.6.12 set-log-num

[Command]

set-log-num *log-num*

[View]

syslog view

[Parameter]

log-num: Max. log number of syslog. Type: numerical value; range: 10-10000; default: 1000

[Description]

Set the maximum log number.

[Example]

Modify the maximum log number to 500:

```
BT(config-syslog)# set-log-num 500
BT(config-syslog)# show running-config | include set
set-log-num 500
```

Note:

Reduce the maximum log number. Old records exceeding the number will be deleted.

3.6.13 show alarm list

[Command]

show alarm list (*alarm-id* **| all)**

[View]

syslog view

[Parameter]

all: All the alarm

alarm-id : Alarm ID, Type: numerical value; range: 1-4294967295

[Description]

This command is used to display the specified alarm or to display all alarms.

[Example]

Display all alarms.

```
BT(config-syslog)# show alarm list all
Alarm ID                Type                          Alarm Name
------------------------------ ---------------------------------- ----------------------------------------
4263314956(0xfe1d060c) cmtsMgmt                  SIGQ_WARNING
4263314957(0xfe1d060d) cmtsMgmt                  SIGQ_RECOVERY
4263316229(0xfe1d0b05) sysMoni                   DOL_CPU_UTIL_WARNS
4263316230(0xfe1d0b06) sysMoni                   DOL_CPU_UTIL_RECOV
4263314960(0xfe1d0610) cmtsMgmt                  SPECTRUM_GP_CHNL_BAD
```

```
4263314959(0xfe1d060f) cmtsMgmt                SPECTRUM_GP_CHNL_GOOD
4263316227(0xfe1d0b03) sysMoni                 DOL_SYSTEM_TEMP_WARNS
4263316228(0xfe1d0b04) sysMoni                 DOL_SYSTEM_TEMP_RECOV
4263316231(0xfe1d0b07) sysMoni                 DOL_CHIP_TEMP_WARNS
4263316232(0xfe1d0b08) sysMoni                 DOL_CHIP_TEMP_RECOV
4263314963(0xfe1d0613) cmtsMgmt                CHNL_UTIL_WARNING
4263314964(0xfe1d0614) cmtsMgmt                CHNL_UTIL_RECOVERY
4263319042(0xfe1d1602) portMgr                 DOL_UPLINK_UTIL_WARNING
4263319043(0xfe1d1603) portMgr                 DOL_UPLINK_UTIL_RECOVERY
4263324418(0xfe1d2b02) event                   EVENT_SIMU_ALARM_RECV
4263324417(0xfe1d2b01) event                   EVENT_SIMU_ALARM_WARN
4263316225(0xfe1d0b01) sysMoni                 DOL_RAM_UTIL_WARNS
4263316226(0xfe1d0b02) sysMoni                 DOL_RAM_UTIL_RECOV
4263330049(0xfe1d4101) admissionCtrl           DOL_MODEM_ADC_BANDWIDTH_ALARM
4263330050(0xfe1d4102) admissionCtrl           DOL_MODEM_ADC_BANDWIDTH_CLEAR
4263317513(0xfe1d1009) modemMgmt               DOL_CM_PARTIAL_SVC_WARN
4263317514(0xfe1d100a) modemMgmt               DOL_CM_PARTIAL_SVC_RECOV
------------------------------ ----------------------------------- ----------------------------------------
Total 22 alarms
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Alarm ID	Alarm ID
Type	Alarm type
Alarm Name	Alarm Name

3.6.14 show alarm table

[Command]

show alarm table

[View]

syslog view

[Parameter]

N/A

[Description]

This command is used to display the alarm table in the CMTS.

[Example]

Displays the alarm information table generated on the current device.

```
BT(config-syslog)# show alarm table
```

```
sequence first time          last time               counts level       ID
description
118      2019-01-01 00:31:03 2019-01-01 00:31:03 1   notification       4263314960
CMTS-MAC=0024.6898.f0f1,cha
nnel:1,spectrum-group quality to bad,current snr 34.8,corrCode rate 0,unCorrCode rate
0.
214      2019-01-01 00:24:00 2019-01-01 00:24:00 1      notification 4263314960
CMTS-MAC=0024.6898.f0f1,cha
nnel:2,spectrum-group quality to bad,current snr 35.0,corrCode rate 0,unCorrCode rate
0.
321     2019-04-04 08:22:02  2019-04-04 08:22:02 1      warning      4263317513
<CM-MAC=4432.c83c.8a1d> - P
artial Service with <US: 5> <DS: -->
322     2019-04-04 08:26:49  2019-04-04 08:26:49 1      warning      4263317513
<CM-MAC=001c.1df5.740f> - P
artial Service with <US: --> <DS: 7>
326     2019-01-04 19:33:58  2019-01-04 19:33:58 1      warning      4263314956
CMTS-MAC=0024.6898.f0f1;UpC
hannel 4: SNR=34.9 dB;
327     2019-01-04 19:33:58  2019-01-04 19:33:58 1      warning      4263314956
CMTS-MAC=0024.6898.f0f1;UpC
hannel 5: SNR=37.3 dB;
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
sequence	The sequence of the alarm
first time	The first time of the alarm
last time	The last time of the alarm
counts	The counts of the alarm
level	The level of the alarm
ID	The alarm ID
description	The description of the alarm

3.6.15 show event list

[Command]

show event list (*evert-id* **| all)**

[View]

syslog view

[Parameter]

all: All the events

event-id: Event ID, Type: numerical value; range: 1-4294967295

[Description]

This command is used to display the specified events or to display all events.

[Example]

Display all events.

```
BT(config-syslog)# show event list all
Event ID                Type                          Event Name
------------------------------ ---------------------------------- ----------------------------------------
4263319041(0xfe1d1601) portMgr                       DOL_UPLINK
4263330051(0xfe1d4103) admissionCtrl                 DOL_MODEM_ADC_REJECT_DYN_EVENT
4263330052(0xfe1d4104) admissionCtrl                 DOL_MODEM_ADC_REJECT_CM_EVENT
4263317761(0xfe1d1101) sav                           EVENT_SAV_DROP_COUNTER_REPORT
4263317505(0xfe1d1001) modemMgmt                     DOL_SPEC_CM_DEPARTURE
4263317507(0xfe1d1003) modemMgmt                     DOL_SPEC_CM_REG
4263317508(0xfe1d1004) modemMgmt                     DOL_CM_DS_FREQ_OR_TIMEOUT
4263317509(0xfe1d1005) modemMgmt                     DOL_CM_IPv4_CONFLICT
4263317510(0xfe1d1006) modemMgmt                     DOL_CM_IPv6_CONFLICT
4263317511(0xfe1d1007) modemMgmt                     DOL_CM_REG_FAILED
4263317512(0xfe1d1008) modemMgmt                     DOL_CM_DS_FREQ_OR_RESCAN
0067060500(0x03ff4314) modemMgmt                     DOL_CM_PARTIAL_SVC_DBCRSP_EVENT
0073055400(0x045abca8) modemMgmt                     DOL_CM_PARTIAL_SVC_REGACK_TCS_EVENT
0073055500(0x045abd0c) modemMgmt                     DOL_CM_PARTIAL_SVC_REGACK_RCS_EVENT
4263314945(0xfe1d0601) cmtsMgmt                      CMC_LINK_DISCOVERY
4263314946(0xfe1d0602) cmtsMgmt                      CMC_LOSE_LINK
4263314948(0xfe1d0604) cmtsMgmt                      DS_PARM_CHANGE
4263314949(0xfe1d0605) cmtsMgmt                      DS_SHUTDOWN
4263314950(0xfe1d0606) cmtsMgmt                      DS_ENABLE
4263314951(0xfe1d0607) cmtsMgmt                      US_SHUTDOWN
4263314952(0xfe1d0608) cmtsMgmt                      US_ENABLE
4263314953(0xfe1d0609) cmtsMgmt                      US_PARM_CHANGE
4263314954(0xfe1d060a) cmtsMgmt                      CMC_CONFIG_FAILED_ID
4263314955(0xfe1d060b) cmtsMgmt                      CMC_RESET
4263314958(0xfe1d060e) cmtsMgmt                      SPECTRUM_GP_HOP
4263314961(0xfe1d0611) cmtsMgmt                      CMTS_LINK_UP
4263314962(0xfe1d0612) cmtsMgmt                      CMTS_LINK_DOWN
4263324673(0xfe1d2c01) sysConfig                     EVENT_ZCONFIG_FAILED
4263324674(0xfe1d2c02) sysConfig                     EVENT_ZCONFIG_OK
4263320577(0xfe1d1c01) user                          USER_LOGIN_FAILED
4263320578(0xfe1d1c02) user                          USER_LOGIN_OK
4263321857(0xfe1d2101) update                        UPGRADE_FAILED
4263321858(0xfe1d2102) update                        UPGRADE_OK
4263322369(0xfe1d2301) cli                           EXCUTE_COMMAND_SUCC
4263322370(0xfe1d2302) cli                           EXCUTE_COMMAND_ERRO
```

```
4263322371(0xfe1d2303) cli                    DOL_REBOOT
4263322372(0xfe1d2304) cli                    SYSTEM_POWER_ON
4263318529(0xfe1d1401) cpeMgmt                DOL_CPE_IPv4_CONFLICT
4263318530(0xfe1d1402) cpeMgmt                DOL_CPE_IPv6_CONFLICT
4263325185(0xfe1d2e01) ntp                    EVENT_NTP_RECV_TIMEOUT
4263330561(0xfe1d4301) cmAccessList           ACCESS_LIST_REJECT
0075010100(0x04789034) bondingGroup           DOCSIS_BONDING_GROUP_SF_REG
4263314967(0xfe1d0617) cmtsMgmt               STATE_SYNC_CACHE_OVERFLOW
4263314968(0xfe1d0618) cmtsMgmt               STATE_SYNC_FAILED
0073010800(0x045a0e70) dhcpv6                 DHCPv6_CM_EUI64_INVALID_EVENT
4263329282(0xfe1d3e02) dhcpv6                 DHCPv6_CM_CONFIG_NOT_EXIST_EVENT
4263316481(0xfe1d0c01) dhcp                   DHCP_CM_CONFIG_NOT_EXIST_EVENT
0066030400(0x03ef8b40) certificate            DOCSIS_CERT_CRL_FAIL_TO_GET
0066030401(0x03ef8b41) certificate            DOCSIS_CERT_OCSP_FAIL_TO_GET
0066030402(0x03ef8b42) certificate            DOCSIS_CERT_CRL_NOT_AVAILABLE
0067060100(0x03ff4184) loadbalance            DBC_RSP_UNKNOWN_TRANS
0067060200(0x03ff41e8) loadbalance            DBC_RSP_REJECT
0067060300(0x03ff424c) loadbalance            DBC_RSP_NORECEIVE
0067060400(0x03ff42b0) loadbalance            DBC_RSP_OTHER
0067030100(0x03fecc54) loadbalance            DCC_RSP_NORECEIVE_OLD_CHNL
0067030200(0x03feccb8) loadbalance            DCC_RSP_NORECEIVE_NEW_CHNL
0067030300(0x03fecd1c) loadbalance            DCC_RSP_REJECT_UNSPICIFIED
0067030400(0x03fecd80) loadbalance            DCC_RSP_REJECT_UNKNOWN_TRANSID
0067030600(0x03fece48) loadbalance            DCC_RSP_REJECT_SYNTAX_ERROR
0067030500(0x03fecde4) loadbalance            DCC_RSP_REJECT_ANTHFAIL
4263320833(0xfe1d1d01) ipset                  DOL_CMTS_IPv4_CONFLICT
4263320834(0xfe1d1d02) ipset                  DOL_CMTS_IPv6_CONFLICT
0082010300(0x04e360bc) upSigQ                 UP_RANGING_FAIL
4263333121(0xfe1d4d01) macMgmt                MAC_HASH_CONFLICT
4263331842(0xfe1d4802) bondingGroup           DOCSIS_BONDING_GROUP_OVERFLOW
------------------------------ ---------------------------------- ----------------------------------------
Total 65 events
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Event ID	Event ID
Type	Event type
Event Name	Event Name

3.6.16 show log after-time

[Command]

show log (localnonvol | localvolatile) after-time *time*

[View]

enable view, config view, cmts view, syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

time: time format, string type, in MM/DD/YY, Hour:Minute:Second

[Description]

Display all logs no earlier than some a time.

[Example]

Display the saved logs in flash after 1/4/2019, 19:40:00:

```
BT(config-syslog)# show log localnonvol after-time 1/4/2019 19:40:00
<EMERG>Jan 04 2019 19:40:06 BT CMTS[BT]:<cli><4263322370> admin@Consoleexecute
command "load config tftp 172.16.36.63
 40011test.cfg" failed.
<EMERG>Jan 04 2019 19:40:25 BT CMTS[BT]:<cli><4263322369> admin@Consoleexecute
command "load config tftp 172.16.36.63
 40011test.cfg" successfully.
<EMERG>Jan 04 2019 19:41:04 BT CMTS[BT]:<cli><4263322371> Reboot thesystem.
total log amount 1000,match log amount 3
```

3.6.17 show log all

[Command]

show log (localnonvol | localvolatile) all

[View]

enable view, config view, cmts view, syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

[Description]

Display all logs.

[Example]

Display all logs in the memory:

```
BT(config-syslog)# show log localnonvol all
<EMERG>Jan 04 2019 19:39:12 BT CMTS[BT]:<cli><4263322369> admin@Consoleexecute
command "list | include log-server-ip
" successfully.
<EMERG>Jan 04 2019 19:39:42 BT CMTS[BT]:<cli><4263322369> admin@Consoleexecute
command "exit" successfully.
<EMERG>Jan 04 2019 19:39:43 BT CMTS[BT]:<cli><4263322369> This eventhas happened 2
times from 2019-01-04,19:39:42 to
2019-01-04,19:39:43
<EMERG>Jan 04 2019 19:40:06 BT CMTS[BT]:<cli><4263322370> admin@Consoleexecute
command "load config tftp 172.16.36.63
 40011test.cfg" failed.
<EMERG>Jan 04 2019 19:40:25 BT CMTS[BT]:<cli><4263322369> admin@Consoleexecute
command "load config tftp 172.16.36.63
 40011test.cfg" successfully.
<EMERG>Jan 04 2019 19:41:04 BT CMTS[BT]:<cli><4263322371> Reboot thesystem.
total log amount 6,match log amount 6
```

3.6.18 show log before-time

[Command]

show log (localnonvol | localvolatile) before-time *time*

[View]

enable view, config view, cmts view, syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

time: time format, string type, in MM/DD/YY, Hour:Minute:Second

[Description]

Display all logs earlier than some a time (exclusive).

[Example]

Display the saved logs in the flash before than 1/4/2019, 19:50:00:

```
BT(config-syslog)# show log localnonvol before-time 1/4/2019 19:50:00
<EMERG>Jan 04 2019 19:39:12 BT CMTS[BT]:<cli><4263322369>admin@Console
execute command "list | include log-server-ip
" successfully.
```

```
<EMERG>Jan 04 2019 19:39:42 BT CMTS[BT]:<cli><4263322369>admin@Console execute
command "exit" successfully.
<EMERG>Jan 04 2019 19:39:43 BT CMTS[BT]:<cli><4263322369> This eventhas happened 2
times from  2019-01-04,19:39:42 to
 2019-01-04,19:39:43
<EMERG>Jan 04 2019 19:40:06 BT CMTS[BT]:<cli><4263322370>admin@Console execute
command "load config tftp 172.16.36.63
 40011test.cfg" failed.
<EMERG>Jan 04 2019 19:40:25 BT CMTS[BT]:<cli><4263322369>admin@Console execute
command "load config tftp 172.16.36.63
 40011test.cfg" successfully.
<EMERG>Jan 04 2019 19:41:04 BT CMTS[BT]:<cli><4263322371> Reboot thesystem.
total log amount 6,match log amount 6
```

3.6.19 show log eventid

[Command]

show log (localnonvol | localvolatile) eventid *eventid*

[View]

enable view, config view, cmts view, syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

eventid: Log event ID. Type: numerical value; range: 1-4294967295

[Description]

Display the saved logs by event ID.

[Example]

Display the saved logs in the flash, with event ID as 4263320578:

```
BT(config-syslog)# show log localnonvol eventid 4263320578
<EMERG>Jan 01 2019 13:56:53 BT CMTS[BT]:<user><4263320578> admin@Console login
successfully.
<EMERG>Jan 01 2019 00:01:26 BT CMTS[BT]:<user><4263320578> admin@Console login
successfully.
<EMERG>Jan 01 2019 02:08:26 BT CMTS[BT]:<user><4263320578> admin@Console login
successfully.
<EMERG>Jan 04 2019 13:46:17 BT CMTS[BT]:<user><4263320578> admin@Console login
successfully.
```

```
<EMERG>Jan 04 2019 14:03:29 BT CMTS[BT]:<user><4263320578> admin@172.16.36.63(telnet)
login successfully.
<EMERG>Jan 04 2019 15:46:09 BT CMTS[BT]:<user><4263320578> admin@Console login
successfully.
<EMERG>Jan 04 2019 16:20:26 BT CMTS[BT]:<user><4263320578> admin@Console login
successfully.
<EMERG>Jan 04 2019 16:34:59 BT CMTS[BT]:<user><4263320578> admin@Console login
successfully.
<EMERG>Jan 04 2019 18:51:42 BT CMTS[BT]:<user><4263320578> admin@Console login
successfully.
total log amount 5261,match log amount 9
```

3.6.20 show log last

[Command]

show log (localnonvol | localvolatile) last *log-num*

[View]

enable view, config view, cmts view, syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

log-num: Number of the latest event to be displayed. Type: numerical value; range: 1-10000

[Description]

Display the saved last logs by number.

[Example]

Displays the latest 3 logs saved in flash:

```
BT(config-syslog)# show log localnonvol last 3
<EMERG>Jan 04 2019 19:40:06 BT CMTS[BT]:<cli><4263322370> admin@Consoleexecute
command "load config tftp 172.16.36.63
 40011test.cfg" failed.
<EMERG>Jan 04 2019 19:40:25 BT CMTS[BT]:<cli><4263322369> admin@Consoleexecute
command "load config tftp 172.16.36.63
 40011test.cfg" successfully.
<EMERG>Jan 04 2019 19:41:04 BT CMTS[BT]:<cli><4263322371> Reboot thesystem.
total log amount 1000,match log amount 3
```

3.6.21 show log period-time

[Command]

show log (localnonvol | localvolatile) period-time *begin-time end-time*

[View]

enable view, config view, cmts view, syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

begin-time: start time, string type, format: MM/DD/YY, Hour:Minute:Second

end-time: end time, string type, format: MM/DD/YY, Hour:Minute:Second

[Description]

Display the logs in some a period of time, including the start time and the end time.

[Example]

Display the logs saved in the flash from 1/4/2019, 19:38:00 to 1/4/2019, 19:40:00:

```
BT(config-syslog)# show log localnonvol period-time 1/4/2019 19:38:00
1/4/2019 19:40:00
<EMERG>Jan 04 2019 19:38:17 BT CMTS[BT]:<cli><4263322369> admin@Consoleexecute
command "con ter" successfully.
<EMERG>Jan 04 2019 19:38:21 BT CMTS[BT]:<cli><4263322369> admin@Consoleexecute
command "syslog " successfully.
<EMERG>Jan 04 2019 19:38:35 BT CMTS[BT]:<cli><4263322369> admin@Consoleexecute
command "show log localnonvol priority
 warning" successfully.
<EMERG>Jan 04 2019 19:39:12 BT CMTS[BT]:<cli><4263322369> admin@Consoleexecute
command "list | include log-server-ip
" successfully.
<EMERG>Jan 04 2019 19:39:42 BT CMTS[BT]:<cli><4263322369> admin@Consoleexecute
command "exit" successfully.
total log amount 5,match log amount 5
```

3.6.22 show log priority

[Command]

show log (localnonvol | localvolatile) priority (emergency | alert | critical | error | warning | notification | informational | debug)

[View]

enable view, config view, cmts view, syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

emergency: Emergency, causing unavailability of the system

alert: Emergency, requiring immediate action

critical: Critical event

error: Error event

warning: Warning event

notification: Normal but important event

informational: Informational event

debug: Debugging information

[Description]

Display the saved logs by priority value.

[Example]

Display the saved logs in flash with priority as notification event:

```
BT(config-syslog)# show log localnonvol priority notification
<NOTICE>Apr 09 2019 16:09:07 BT CMTS[BT]:<cmtsMgmt><4263314953> CMTS-
MAC=0024.6898.f0f1;US 1 changed;powerlevel:0.0->1.0;
total log amount 1,match log amount 1
```

3.6.23 show monitor status

[Command]

show monitor status

[View]

syslog view

[Parameter]

N/A

[Description]

This command is used to display printing syslog to current terminal switch. This switch can be configured by using the command "**terminal monitor**" and "**terminal no monitor**".

[Example]

Print the syslog to current terminal.

```
BT(config-syslog)# terminal monitor
BT(config-syslog)# show monitor status
The switch of monitor is on.
```

3.6.24 snmp community

[Command]

snmp community (ro | rw) *community*

[View]

config view

[Parameter]

ro: Configure the community string with read-only permission

rw: Configure the community string with read-write permission

community: community field. Type: string; range: 1-31 characters

[Description]

This command is used to configure the community string for SNMP communication between SNMP server and agent. The default ro string is public and rw string is private.

[Example]

Configure the snmp community string of the system as ro public and rw private

```
BT(config)# snmp community ro public
BT(config)# snmp community rw private
BT(config)# show running-config verbose | include snmp com
snmp community ro "public"
snmp community rw "private"
```

3.6.25 terminal monitor

[Command]

terminal monitor

terminal no monitor

[View]

syslog view

[Parameter]

N/A

[Description]

The command "**terminal monitor**" is used to enable printing syslog to current terminal. The switch configuration status can be viewed by using the command "**show monitor status**".

The command "**terminal no monitor**" is used to disable printing syslog to current terminal.

[Example]

Print syslog to current terminal.

```
BT(config-syslog)# terminal monitor
BT(config-syslog)# show monitor status
The switch of monitor is on.
```

3.6.26 trap-heartbeat

[Command]

trap-heartbeat

no trap-heartbeat

[View]

config view

[Parameter]

N/A

[Description]

The command "**trap-heartbeat**" is used to configure sending the heartbeat trap packet to the trap server. By default, the heartbeat trap packet is enabled.

The command "**no trap-heartbeat**" is used to configure not sending the heartbeat trap packet to the trap server.

[Example]

Configure disabling the heartbeat trap packet in the config view.

```
BT(config)# no trap-heartbeat
BT(config)# show running-config verbose | include trap-heartbeat
```

```
no trap-heartbeat
```

3.6.27 trap-server-ip

[Command]

trap-server-ip (0 | 1 | 2 | 3 | 4) *ip-address* **[port** *port*] **[community** *community*]

no trap-server-ip (0 | 1 | 2 | 3 | 4)

[View]

syslog view

[Parameter]

0 | 1 | 2 | 3 | 4: trap server serial number

ip-address: IPv4 address or IPv6 address of trap server, with format as A.B.C.D or X:X::X:X.

port: Trap server port number, Type: numerical value; range: 1-65535; default: 162.

community: Trap community, string type, range: N/A; default: public

[Description]

The command "**trap-server-ip**" is used to set IP address, port number, and community of trap server.

The command "**no trap-server-ip**" is used to delete the trap server.

[Example]

Set IP address of trap server 2 as 10.0.0.1:

```
BT(config-syslog)# trap-server-ip 2 10.0.0.1
BT(config-syslog)# show running-config | include trap-server-ip
 trap-server-ip 2 10.0.0.1
```

3.6.28 throttle-admin

[Command]

throttle-admin (inhibited | maintainBelowThreshold | stopAtThreshold | unconstrained)

no throttle-admin

[View]

syslog view

[Parameter]

inhibited: prohibit transferring all trap messages and syslog messages.

maintainBelowThreshold: the system allows sending trap messages or syslog messages in the set time interval only if their quantity does not exceed the set threshold. Otherwise, stop sending until the next time interval arrives, and then count again and send trap messages or syslog messages.

stopAtThreshold: Stop sending messages when the quantity of message reaches the set threshold in the set time interval, which will be restored only after the message mode is reset.

unconstrained: Make no restrict on trap or syslog message.

[Description]

The command "**throttle-admin**" is used to set the rate limit for sending logs. By default, it is unconstrained.

The command "**no throttle-admin**" is used to restore the default rate limit for sending logs.

[Example]

Set the throttle mode as maintainBelowThreshold:

```
BT(config-syslog)# throttle-admin maintainBelowThreshold
BT(config-syslog)# show running-config
syslog
 throttle-admin maintainBelowThreshold
 loglevel debug monitor
exit
```

3.6.29 throttle-interval

[Command]

throttle-interval *interval*

no throttle-interval

[View]

syslog view

[Parameter]

interval: throttle interval, in second. Type: numerical value; range: 1-2147483647; default: 1 seconds.

[Description]

Set the interval for rate limit. This command works together with command "**throttle-threshold**", and is to set the syslog number allowed to be sent at each time interval.

[Example]

Set the throttle interval as 200 seconds:

```
BT(config-syslog)# throttle-interval 200
BT(config-syslog)# show running-config | include interval
 throttle-interval 200
```

3.6.30 throttle-threshold

[Command]

throttle-threshold *threshold*

no throttle-threshold

[View]

syslog view

[Parameter]

threshold: rate limit threshold. Type: numerical value; range: 0-4294967295; default: 0(not limited)

[Description]

Set the rate limit threshold. This command works together with command "**throttle-interval**", and is to set the syslog number allowed to be sent at each time interval.

[Example]

Set the throttle threshold as 2000:

```
BT(config-syslog)# throttle-threshold 2000
BT(config-syslog)# show running-config | include threshold
 throttle-threshold 2000
```

3.6.31 up-down-trap

[Command]

up-down-trap (enable | disable)

[View]

syslog view

[Parameter]

enable: Enable the print of the up trap and down trap in uplink port

disable: Disable the print of the up trap and down trap in uplink port

[Description]

This command is used to enable or disable the print of the up trap and down trap in uplink port . This feature is enabled by default.

[Example]

Disable the print of the up trap and down trap in uplink port:

```
BT(config-if-uplink1)# up-down-trap disable
BT(config-if-uplink1)# show running-config | include up-down
 up-down-trap disable
```

3.6.32 upload

[Command]

upload (localvatile | localnonvol) ftp *ip-address username password filename*

upload (localvolatile | localnonvol) tftp *ip-address filename*

[View]

syslog view

[Parameter]

localnonvol: the storage mode is flash

localvolatile: the storage mode is memory

username: FTP username. Type: string; range: 1-50 characters.

password: FTP password. Type: string; range: 1-50 characters.

ip-address: Valid IP address of FTP/TFTP server, with format as A.B.C.D or X:X::X:X.

filename: Name of file saved in FTP/TFTP server. Type: string; range: N/A.

[Description]

Upload the log saved in the flash or memory to the FTP/TFTP server.

[Example]

Upload syslog in current memory to the server with IP address as 10.10.31.211 and name it as syslog:

```
BT(config-syslog)# upload localvolatile tftp 10.10.31.211 syslog
```

3.7 License management

3.7.1 license tftp-server ip auto-filename

[Command]

license tftp-server ip *ip-address* **auto-filename**

[View]

config view

[Parameter]

ip-address: IPv4 address or IPv6 address of TFTP server, with format as A.B.C.D or X:X::X:X.

auto-filename: Automatic acquisition of license files by devices

[Description]

The **license tftp-server ip auto-filename** command is used to automatically obtain the license file of the device.

The obtained license file name is in the format of fixed “license_sn.tar.gz” , and only the "SN" number in the file name is not fixed.

When the device is restarted, it will check whether there is a license, if not, it will get the license from the tftp-server according to this configuration; when there is a license, it will use the local license directly. This configuration takes effect when the device is restarted without a license.

[Example]

Get license_sn.tar.gz file of device IP 1.1.1.1 from TFTP server:

```
BT (config)# license tftp-server ip 1.1.1.1 auto-filenameBT
(config)# show running-config | in license tftp license tftp-
server ip 1.1.1.1 auto-filename
```

3.7.2 load license ftp

[Command]

load license ftp *ip-address username password licensefilename*

[View]

enable view

[Parameter]

ip-address: IPv4 address or IPv6 address of FTP server, with format as A.B.C.D or X:X::X:X.

username: FTP username. Type: string; range: 1-50 characters.

password: FTP password. Type: string; range: 1-50 characters

licensefilename: The license file name of the FTP/TFTP server. Type: string; range: 1-64 characters.

[Description]

The **load license FTP** command is used to import license files from FTP servers into CMTS.

[Example]

Import the license file on the FTP server into CMTS:

```
BT# load license ftp 192.166.166.13 admin 123456
license_1708CCEP220003241.tar.gz
BT# show license
MFG License:
  Subject: Manufacturer License
  License Serial Number: 1550566880310
  MFG License pubkey:
2d:2d:2d:2d:2d:42:45:47:49:4e:20:50:55:42:4c:49:43:20:4b:45:59:2d:2d:2d:2d:2d:0a:4d:4
9:47:66:4d
41:30:47:43:53:71:47:53:49:62:33:44:51:45:42:41:51:55:41:41:34:47:4e:41:44:43:42:69:5
1:4b:42:67
51:43:75:32:39:2f:48:44:71:6f:4d:58:41:37:72:64:6e:4d:51:2f:62:63:38:2f:72:4e:6d:0a:5
8:2b:73:69
67:72:31:57:32:46:42:6e:65:4c:54:6b:72:74:44:44:59:74:49:69:61:76:2f:6e:30:47:59:54:5
5:33:42:72
4f:64:41:33:36:6e:59:7a:4d:72:51:76:54:33:7a:2f:46:68:57:6c:75:68:34:46:43:35:41:70:0
a:47:41:4d
61:67:33:6b:38:4d:55:34:58:6c:72:57:56:32:38:71:7a:46:6e:73:35:4b:78:43:6f:50:70:2b:5
1:2f:32:70
33:61:6b:35:66:33:71:32:64:48:73:36:45:57:6f:6a:4c:77:34:74:47:55:4b:4c:5a:5a:6b:45:7
2:0a:44:62
4d:7a:61:77:41:57:30:68:2f:6a:6c:44:76:50:2f:77:49:44:41:51:41:42:0a:2d:2d:2d:2d:2d:4
5:4e:44:20
  Signature:
48:6e:2f:78:67:6c:53:67:63:47:4a:6c:72:59:6f:34:55:48:6e:47:42:63:59:71:37:38:72:48:4
a:62:46:56
45:64:61:44:30:31:37:76:4d:2b:75:57:7a:31:51:73:76:31:45:4a:38:4d:61:4d:4a:66:4d:39:3
6:42:49:38
36:55:34:6b:36:41:56:68:59:51:6d:33:48:46:57:35:65:4a:6d:68:39:53:76:4f:53:79:69:5a:5
6:45:4c:56
70:4a:32:55:61:54:6c:65:79:6f:4d:50:79:45:62:46:4e:67:39:74:52:52:66:36:41:41:4e:45:4
a:72:59:48
70:57:6a:43:36:62:6a:79:56:43:6b:6d:30:64:34:38:78:73:4a:49:63:32:38:36:6e:6c:52:46:7
1:5a:68:64
  Thumbprint:
```

```
6a:32:d9:0c:59:c9:7f:4a:5d:0d:af:8c:25:40:e4:a2:57:f0:0c:cd:00:00:00:00:00:00:00:00:0
0:00:00:00
CMTS License:
  License status: 1
  Subject: CMTS License
  License Serial Number: 1550646225808
  Authorizationinfo:
      sc ds and nc eqam:      32
      sc us:      8
      ofdm ds:    2
      ofdma us:   1
      bc eqam:    8
      cm:         400
  Device SN: 1708CCEP220003241
  Signature:

43:47:32:72:52:74:50:62:36:70:31:77:52:46:76:31:73:30:48:75:33:54:66:35:72:72:66:67:5
a:78:62:4b
36:32:75:46:4d:58:49:33:51:35:50:7a:33:34:52:78:33:4b:42:53:76:45:5a:75:6c:61:6d:69:7
7:56:4d:59
57:41:62:62:75:62:66:63:73:77:6b:68:2f:56:68:47:57:44:7a:71:79:4e:4a:64:70:74:6f:58:4
d:49:46:4e
2b:35:72:70:47:6d:6b:4e:38:77:6c:2b:61:53:46:64:32:6d:31:49:72:4d:51:30:79:42:34:57:2
b:75:2b:48
4d:78:59:64:69:37:71:46:47:66:46:31:6c:65:74:43:71:38:67:6c:77:51:6a:7a:4a:34:4d:35:4
e:55:31:55
  Thumbprint:
68:e8:c7:f7:22:5a:2e:8c:97:70:88:5b:04:2f:b1:19:e4:ea:15:af:00:00:00:00:00:00:00:00:0
0:00:00:00
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MFG License	Manufacture License
CMTS License	Equipment license
Subject	Theme, fixed as Manufacture License or CMTS License
License Serial Number	License serial number, the sequence code assigned to each license
MFG License pubkey	License's public key
Signature:	License signature of manufacturer or equipment
Thumbprint:	License fingerprint of manufacturer or equipment
Authorizationinfo	Authorization information
sc ds and nc eqam	Maximum number of available SC downstream channels and NC EQAM channels (total)
sc us	Maximum number of available SC upstream channels
ofdm ds	Maximum number of downstream channels available for OFDM
ofdma us	Maximum number of available upstream channels for OFDMA
bc eqam	Maximum number of available BC EQAM channels

Parameter	Description
cm	Maximum CM quantity
Device SN	Device SN supported by device license

3.7.3 load license tftp

[Command]

load license tftp *ip-address licensefilename*

[View]

enable view

[Parameter]

ip-address: IPv4 address or IPv6 address of TFTP server, with format as A.B.C.D or X:X::X:X.

licensefilename: The license file name of the FTP/TFTP server. Type: string; range: 1-64 characters.

[Description]

The **load license tftp** command is used to import license files from TFTP servers into CMTS.

[Example]

Import the license file on the TFTP server into CMTS:

```
BT# load license tftp 192.166.166.13 license_1708CCEP220003241.tar.gz
BT# show license
MFG License:
  Subject: Manufacturer License
  License Serial Number: 1550566880310
  MFG License pubkey:

2d:2d:2d:2d:2d:42:45:47:49:4e:20:50:55:42:4c:49:43:20:4b:45:59:2d:2d:2d:2d:2d:0a:4d:4
9:47:66:4d
41:30:47:43:53:71:47:53:49:62:33:44:51:45:42:41:51:55:41:41:34:47:4e:41:44:43:42:69:5
1:4b:42:67
51:43:75:32:39:2f:48:44:71:6f:4d:58:41:37:72:64:6e:4d:51:2f:62:63:38:2f:72:4e:6d:0a:5
8:2b:73:69
67:72:31:57:32:46:42:6e:65:4c:54:6b:72:74:44:44:59:74:49:69:61:76:2f:6e:30:47:59:54:5
5:33:42:72
4f:64:41:33:36:6e:59:7a:4d:72:51:76:54:33:7a:2f:46:68:57:6c:75:68:34:46:43:35:41:70:0
a:47:41:4d
61:67:33:6b:38:4d:55:34:58:6c:72:57:56:32:38:71:7a:46:6e:73:35:4b:78:43:6f:50:70:2b:5
1:2f:32:70
33:61:6b:35:66:33:71:32:64:48:73:36:45:57:6f:6a:4c:77:34:74:47:55:4b:4c:5a:5a:6b:45:7
2:0a:44:62
```

```
4d:7a:61:77:41:57:30:68:2f:6a:6c:44:76:50:2f:77:49:44:41:51:41:42:0a:2d:2d:2d:2d:2d:4
5:4e:44:20
  Signature:

48:6e:2f:78:67:6c:53:67:63:47:4a:6c:72:59:6f:34:55:48:6e:47:42:63:59:71:37:38:72:48:4
a:62:46:56
45:64:61:44:30:31:37:76:4d:2b:75:57:7a:31:51:73:76:31:45:4a:38:4d:61:4d:4a:66:4d:39:3
6:42:49:38
36:55:34:6b:36:41:56:68:59:51:6d:33:48:46:57:35:65:4a:6d:68:39:53:76:4f:53:79:69:5a:5
6:45:4c:56
70:4a:32:55:61:54:6c:65:79:6f:4d:50:79:45:62:46:4e:67:39:74:52:52:66:36:41:41:4e:45:4
a:72:59:48
70:57:6a:43:36:62:6a:79:56:43:6b:6d:30:64:34:38:78:73:4a:49:63:32:38:36:6e:6c:52:46:7
1:5a:68:64
  Thumbprint:

6a:32:d9:0c:59:c9:7f:4a:5d:0d:af:8c:25:40:e4:a2:57:f0:0c:cd:00:00:00:00:00:00:00:00:0
0:00:00:00
CMTS License:
  License status: 1
  Subject: CMTS License
  License Serial Number: 1550646225808
  Authorizationinfo:
      sc ds and nc eqam:      32
      sc us:      8
      ofdm ds:    2
      ofdma us:   1
      bc eqam:    8
      cm:         400
  Device SN: 1708CCEP220003241
  Signature:

43:47:32:72:52:74:50:62:36:70:31:77:52:46:76:31:73:30:48:75:33:54:66:35:72:72:66:67:5
a:78:62:4b
36:32:75:46:4d:58:49:33:51:35:50:7a:33:34:52:78:33:4b:42:53:76:45:5a:75:6c:61:6d:69:7
7:56:4d:59
57:41:62:62:75:62:66:63:73:77:6b:68:2f:56:68:47:57:44:7a:71:79:4e:4a:64:70:74:6f:58:4
d:49:46:4e
2b:35:72:70:47:6d:6b:4e:38:77:6c:2b:61:53:46:64:32:6d:31:49:72:4d:51:30:79:42:34:57:2
b:75:2b:48
4d:78:59:64:69:37:71:46:47:66:46:31:6c:65:74:43:71:38:67:6c:77:51:6a:7a:4a:34:4d:35:4
e:55:31:55
  Thumbprint:

68:e8:c7:f7:22:5a:2e:8c:97:70:88:5b:04:2f:b1:19:e4:ea:15:af:00:00:00:00:00:00:00:00:0
0:00:00:00
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MFG License	Manufacture License
CMTS License	Equipment license
Subject	Theme, fixed as Manufacture License or CMTS License
License Serial Number	License serial number, the sequence code assigned to each license
MFG License pubkey	License's public key
Signature:	License signature of manufacturer or equipment
Thumbprint:	License fingerprint of manufacturer or equipment
Authorizationinfo	Authorization information
sc ds and nc eqam	Maximum number of available SC downstream channels and NC EQAM channels (total)
sc us	Maximum number of available SC upstream channels
ofdm ds	Maximum number of downstream channels available for OFDM
ofdma us	Maximum number of available upstream channels for OFDMA
bc eqam	Maximum number of available BC EQAM channels
cm	Maximum CM quantity
Device SN	Device SN supported by device license

3.7.4 show license

[Command]

`show license`

[View]

enable view, config view

[Parameter]

N/A

[Description]

The **`show license`** command is used to display information about the manufacturer and device licenses

[Example]

Display license information for the device:

```
BT # show license
MFG License:
  Subject: Manufacturer License
  License Serial Number: 1550566880310
  MFG License pubkey:

2d:2d:2d:2d:2d:42:45:47:49:4e:20:50:55:42:4c:49:43:20:4b:45:59:2d:2d:2d:2d:2d:0a:4d:4
9:47:66:4d
```

```
41:30:47:43:53:71:47:53:49:62:33:44:51:45:42:41:51:55:41:41:34:47:4e:41:44:43:42:69:5
1:4b:42:67
51:43:75:32:39:2f:48:44:71:6f:4d:58:41:37:72:64:6e:4d:51:2f:62:63:38:2f:72:4e:6d:0a:5
8:2b:73:69
67:72:31:57:32:46:42:6e:65:4c:54:6b:72:74:44:44:59:74:49:69:61:76:2f:6e:30:47:59:54:5
5:33:42:72
4f:64:41:33:36:6e:59:7a:4d:72:51:76:54:33:7a:2f:46:68:57:6c:75:68:34:46:43:35:41:70:0
a:47:41:4d
61:67:33:6b:38:4d:55:34:58:6c:72:57:56:32:38:71:7a:46:6e:73:35:4b:78:43:6f:50:70:2b:5
1:2f:32:70
33:61:6b:35:66:33:71:32:64:48:73:36:45:57:6f:6a:4c:77:34:74:47:55:4b:4c:5a:5a:6b:45:7
2:0a:44:62
4d:7a:61:77:41:57:30:68:2f:6a:6c:44:76:50:2f:77:49:44:41:51:41:42:0a:2d:2d:2d:2d:2d:4
5:4e:44:20
  Signature:
48:6e:2f:78:67:6c:53:67:63:47:4a:6c:72:59:6f:34:55:48:6e:47:42:63:59:71:37:38:72:48:4
a:62:46:56
45:64:61:44:30:31:37:76:4d:2b:75:57:7a:31:51:73:76:31:45:4a:38:4d:61:4d:4a:66:4d:39:3
6:42:49:38
36:55:34:6b:36:41:56:68:59:51:6d:33:48:46:57:35:65:4a:6d:68:39:53:76:4f:53:79:69:5a:5
6:45:4c:56
70:4a:32:55:61:54:6c:65:79:6f:4d:50:79:45:62:46:4e:67:39:74:52:52:66:36:41:41:4e:45:4
a:72:59:48
70:57:6a:43:36:62:6a:79:56:43:6b:6d:30:64:34:38:78:73:4a:49:63:32:38:36:6e:6c:52:46:7
1:5a:68:64
  Thumbprint:
6a:32:d9:0c:59:c9:7f:4a:5d:0d:af:8c:25:40:e4:a2:57:f0:0c:cd:00:00:00:00:00:00:00:00:0
0:00:00:00
CMTS License:
  License status: active
  Subject: CMTS License
  License Serial Number: 1550646225808
  Authorizationinfo:
      sc ds and nc eqam:      32
      sc us:      8
      ofdm ds:    2
      ofdma us:   1
      bc eqam:    8
      cm:         400
  Device SN: 1708CCEP220003241
  Signature:
43:47:32:72:52:74:50:62:36:70:31:77:52:46:76:31:73:30:48:75:33:54:66:35:72:72:66:67:5
a:78:62:4b
36:32:75:46:4d:58:49:33:51:35:50:7a:33:34:52:78:33:4b:42:53:76:45:5a:75:6c:61:6d:69:7
7:56:4d:59
57:41:62:62:75:62:66:63:73:77:6b:68:2f:56:68:47:57:44:7a:71:79:4e:4a:64:70:74:6f:58:4
```

```
d:49:46:4e
2b:35:72:70:47:6d:6b:4e:38:77:6c:2b:61:53:46:64:32:6d:31:49:72:4d:51:30:79:42:34:57:2
b:75:2b:48
4d:78:59:64:69:37:71:46:47:66:46:31:6c:65:74:43:71:38:67:6c:77:51:6a:7a:4a:34:4d:35:4
e:55:31:55
  Thumbprint:
68:e8:c7:f7:22:5a:2e:8c:97:70:88:5b:04:2f:b1:19:e4:ea:15:af:00:00:00:00:00:00:00:00:0
0:00:00:00
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MFG License	Manufacture License
CMTS License	Equipment license
Subject	Theme, fixed as Manufacture License or CMTS License
License Serial Number	License serial number, the sequence code assigned to each license
MFG License pubkey	License's public key
Signature:	License signature of manufacturer or equipment
Thumbprint:	License fingerprint of manufacturer or equipment
Authorizationinfo	Authorization information
sc ds and nc eqam	Maximum number of available SC downstream channels and NC EQAM channels (total)
sc us	Maximum number of available SC upstream channels
ofdm ds	Maximum number of downstream channels available for OFDM
ofdma us	Maximum number of available upstream channels for OFDMA
bc eqam	Maximum number of available BC EQAM channels
cm	Maximum CM quantity
Device SN	Device SN supported by device license

3.7.5 no license tftp-server

[Command]

no license tftp-server

[View]

config view

[Parameter]

N/A

[Description]

Delete the TFTP server configuration where the device automatically gets the license file.

⚠ Warning:

After executing this command, the device will not be able to automatically retrieve the configuration file from the TFTP server on reboot.

[Example]

Delete the TFTP server configuration where the device automatically gets the license file.

```
BT (config)# no license tftp-server
BT (config)# show running-config | in license
BT (config)#
```

Chapter 4 Network Management

4.1 Network Tools and Regular Commands

4.1.1 dns

[Command]

dns (0 | 1) *ip-address*

no dns (0 | 1)

[View]

config view

[Parameter]

0: Preferred DNS

1: Standby DNS

ip-address: DNS server, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

[Description]

The command "**dns**" is used to configure DNS manually, including the preferred DNS or standby DNS, and DNS server address. The system may update DNS synchronously when acquiring IP address automatically through DHCP. After finishing the configuration, you can view relevant configurations with command "**show dns**".

The command "**no dns**" is used to delete DNS configurations.

[Example]

Add the preferred DNS server with IP address as 10.10.10.1

```
BT(config)# dns 0 10.10.10.1 BT(config)# show
running-config | include dnsdns 0 10.10.10.1
BT(config)# show dns
Type: D Dynamic, S Static
DNS Server     Type      IP Address
    0          S         10.10.10.1
```

4.1.2 gateway

[Command]

gateway *gateway*

no gateway [ipv6]

[View]

config view

[Parameter]

ipv6:IPv6 function

gateway: Gateway address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

[Description]

The command "**gateway**" is used to configure the gateway address. After successful configuration, the device can access the external network via the gateway.

The command "**no gateway**" is used to delete the gateway.

[Example]

Add the gateway address of the device as 192.168.2.1

```
BT(config) # gateway 192.168.2.1 BT(config)# show
running-config | include gatewaygateway 192.168.2.1
```

4.1.3 gratuitous-arp

[Command]

gratuitous-arp (enable | disable)

[View]

config view

[Parameter]

enable: Enable the gratuitous ARP function

disable: Disable the gratuitous ARP function

[Description]

This command is used to enable or disable the gratuitous ARP function. By default, the gratuitous ARP function is disabled. When the switches from the superior network keep off the active ARP request access CMTS equipment, need CMTS device send gratuitous ARP message, in order to switches learning to the ARP table entry.

[Example]

Configure enabling the gratuitous ARP function:

```
BT(config)# gratuitous-arp enable BT(config)#
show gratuitous-arp configgratuitous-arp
enable
gratuitous-arp period 6
```

4.1.4 gratuitous-arp period

[Command]

gratuitous-arp period *period*

no gratuitous-arp period

[View]

config view

[Parameter]

period: Period of transmission of gratuitous ARP function, in minutes. Type: numerical value; range: 0-60; default: 6

[Description]

The command "**gratuitous-arp period**" is used to configure the period of transmission of gratuitous ARP function.

The command "**no gratuitous-arp period**" is used to restore the default period of transmission of gratuitous ARP function.

[Example]

Configure period of transmission of gratuitous ARP function as 10 minutes:

```
BT(config)# gratuitous-arp period 10
BT(config)# show gratuitous-arp config
gratuitous-arp enable
gratuitous-arp period 10
```

4.1.5 ping

[Command]

ping *(destination-name | destination-address)* **[srcip** *source-address***]** **[timeout** *millisecond***]** **[pktnum (***packets-number* **| unlimited)] [pktsize** *packets-size***]**

[View]

enable view, config view, cmts view

[Parameter]

unlimited: unlimited number of ping packet. The device will always implement the ping operation until it is stopped. Press <Ctrl> + <C> to stop the operation.

destination-name: destination domain name, Type: string; range:1-506 bytes.

destination-address: destination IP address. it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

source-address: source IP address, If this parameter is not configured, the device will select a local interface IP address automatically. it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X

millisecond: destination response timeout value, i.e., return the timeout if the opposite terminal doesn't respond within the timeout period after sending a "ping" request. Type: numerical value; range: 1-65535000; unit: ms; default: 3000

packets-number: number of ping packet. Type: numerical value; range: 1-65535; default: 4.

packets-size: size of ping packet, in bytes. Type: numerical value; range: 0-48453; default:56.

[Description]

This command is used to implement the ping operation on the device to test whether the network communication is normal or not. You can configure the destination address, source address, response timeout of ping packet, number of ping packet, and size of ping packet as required. To set a destination domain name, it also requires configuring **dns** command.

[Example]

Test whether the communication between CMTS and the host with address as 192.168.0.9 is normal:

```
BT# ping 192.168.0.9
PING 192.168.0.9 (192.168.0.9): 56 data bytes
56 bytes from 192.168.0.9: seq=0 ttl=64 time=2.326 ms
56 bytes from 192.168.0.9: seq=1 ttl=64 time=0.262 ms
56 bytes from 192.168.0.9: seq=2 ttl=64 time=0.262 ms
56 bytes from 192.168.0.9: seq=3 ttl=64 time=1.178 ms
--- 192.168.0.9 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
```

4.1.6 ping docsis

[Command]

ping docsis *ipv4-address* **vlan (untag |** *vlan-id***) [pktnum** *packets-number***]**

ping docsis (*ipv6-address* **|** *mac-address***) [pktnum** *packets-number***]**

[View]

enable view, config view, cmts view

[Parameter]

untag: VLAN as untag

ipv4-address: IPv4 address of management port, dotted decimal type; range: 0.0.0.0-255.255.255.255; default: 192.168.0.10.

ipv6-address: IPv6 address of management port, 32-bit hexadecimal type; range: 0::0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

packets-number: number of ping packet. Type: numerical value; range: 1-100; default: 4

[Description]

This command is used for ping DOCSIS operation on the device to specify whether the link between the tested CM and MAC layer of CMTS device is smooth or not.

[Example]

Test whether the communication between CM with address as 001c.1df5.7400 and MAC layer of CMTS device is normal.

```
BT(config)# ping docsis 001c.1df5.7400
 reply from 001c.1df5.7400,ping upstream 3.time=22ms,tadj=0,padj=0,fadj=0.(success)
 reply from 001c.1df5.7400,ping upstream 3.time=26ms,tadj=0,padj=0,fadj=0.(success)
 reply from 001c.1df5.7400,ping upstream 3.time=13ms,tadj=0,padj=0,fadj=0.(success)
 reply from 001c.1df5.7400,ping upstream 3.time=25ms,tadj=0,padj=0,fadj=0.(success)
success rate is 100.0 percent.(4/4)
```

4.1.7 show arp

[Command]

show arp

[View]

config view, enable view

[Parameter]

N/A

[Description]

This command is used to display the ARP table.

[Example]

Display the ARP table.

```
BT(config)# show arp
IP address      MAC address           Type        Interface
-------------------------------------------------------------------------------
10.10.28.1      10:51:72:27:65:3e     dynamic     gigabitethernet0
-------------------------------------------------------------------------------
Total: 1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
IP address	ARP IP address
MAC address	ARP MAC address
Type	ARP Type(including static and dynamic)
Interface	ARP Interface(including gigabitethernet0 and vlanifXX)

4.1.8 show dns

[Command]

show dns

[View]

config view, enable view

[Parameter]

N/A

[Description]

This command is used to display current DNS configuration information. In Type echo information, S indicates the statically configured dns and D indicates the automatically acquired dns. For relevant configuration information, refer to the section for command "**dns**".

[Example]

Display current DNS configuration information.

```
BT(config)# show dns
Type: D Dynamic, S Static
DNS Server    Type      IP Address
```

```
1           S        10.10.10.1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
DNS Server	DNS server number
Type	Type of DNS server. S indicates statically configured dns; D indicates automatically acquired dns.
IP Address	IP address of DNS server.

4.1.9 show gratuitous-arp config

[Command]

show gratuitous-arp config

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the configuration of gratuitous ARP function.

[Example]

Display the configuration of gratuitous ARP function:

```
BT(config)# show gratuitous-arp config
gratuitous-arp enable
gratuitous-arp period 10
```

4.1.10 tracert

[Command]

tracert *[source-address] (destination-name | destination-address)*

[View]

enable view, config view, cmts view

[Parameter]

source-address: Source IP address, If this parameter is not configured, the device will select a local interface IP address automatically. it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

destination-name: Destination domain name, Type: string; range: 1-505 characters.

destination-address: Destination IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

[Description]

This command is used to set the source ip and destination address of tracert command, to test whether the routing is reachable.

[Example]

Test the routing from IP address 192.168.2.2 to the destination address 192.168.2.9

```
BT(config)# tracert 192.168.2.2 192.168.2.9
traceroute to 192.168.2.9 (192.168.2.9) from 192.168.2.2, 30 hops max, 38 byte
packets
 1  192.168.2.2 (192.168.2.2)  3002.004 ms !H  3002.096 ms !H  3003.932 ms !H
Trace complete.
```

4.2 IP address Management

4.2.1 ip address

[Command]

ip address *ip-address netmask* **(primary | secondary)**

no ip address primary

no ip address *ip-address netmask* **secondary**

ipv6 address *ipv6-address prefix*

ipv6 address *ipv6-address* **link-local**

ipv6 address *ipv6-address/prefix* **[eui-64]**

no ipv6 address *ipv6-address prefix*

no ipv6 address *ipv6-address* **link-local**

no ipv6 address *ipv6-address/prefix* **[eui-64]**

[View]

config view, vlan view

[Parameter]

primary: primary IP address. One primary IP address can be configured in each view. Repeated configuration will cover the previous configuration; It allows configuring at most 1 primary IP address in each view.

secondary: secondary IP address. It allows configuring 62 secondary IP address in the device.

link-local: Generate link local address

eui-64: Generate IPv6 address by eui-64

ip-address: IP address of the system, dotted decimal type; range: 0.0.0.0-255.255.255.255.

netmask: Subnet mask of the system, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ipv6-address: IPv6 address, with format as X:X::X:X.

prefix: IPv6 address prefix, Type: numerical value; range: 0-128.

[Description]

ip address in the config view: add no VLAN TAG;

ip address in the vlan view: add VLAN TAG;

The command "**ip address**" is used to configure the virtual interface address of the device. The device supports configuring 1 primary IP address and 62 secondary IP address. The IP address can be used together with the command "ip address" in the bundle view. It is mainly applicable to the three-layer relay, and is also used for network management login;

The command "**no ip address primary**" is used to delete the primary IP address.

The command "**no ip address secondary**" is used to delete the secondary IP address.

The command "**ipv6 address**" is used to configure the system IPv6 address of the device. It supports 1 link local address and 10 global unicast address in each view.

The command "**ipv6 address** *ipv6-address prefix*" and "**ipv6 address** *ipv6-address/prefix*" is used to configure the global unicast address of the device in two styles, and users can choose which command configuration IPv6 address according to their own usage habits.

The command "**ipv6 address eui-64**" is used to create the global unicast address of the device by EUI-64.

The command "**ipv6 address link-local**" is used to configure the link local address of the device. It will replace the automatically generated link local address of the system. While delete it, the system will recover automatically generated link local address.

[Example]

Set the primary IP address and its mask in the config view:

```
BT(config)# ip address 192.168.3.100 255.255.255.0 primary
BT(config)# ip address 192.168.3.101 255.255.255.0 secondary
```

```
BT(config)# interface vlanif 1
BT(config-if-vlan1)# ip address 192.168.5.10 255.255.255.0 primary
BT(config-if-vlan1)# exit
BT(config)# show running-config | include ip address
ip address 192.168.3.100 255.255.255.0 primary
ip address 192.168.3.101 255.255.255.0 secondary
 ip address 192.168.5.10 255.255.255.0 primary
```

Note:

1. In each view, it allows to configure at most 1 primary IP address and 62 secondary IP address;
2. The device supports 63 IPv4 address total, in which are supported 62 secondary IPv4 address.
3. Deletion of primary IP address does not affect the secondary IP address, while the configuration of secondary IP address is not affected by that of primary IP address.

4.2.2 ip address dhcp-alloc

[Command]

ip address dhcp-alloc [*option60* [*number*]]

ipv6 address dhcp-alloc [*option16* [*number*]]

no (ip | ipv6) address dhcp-alloc

[View]

config view, vlan view

[Parameter]

ip: IPv4 function

ipv6: IPv6 function

option60 : option60 field used by DHCPv4 client. Type: string; range: 1-128 characters; default: docsis

option16 : option60 field used by DHCPv6 client. Type: string; range: 1-128 characters; default: docsis

number : Number of attempts to acquire. Type: numerical value; range: 1-50; the default value is keep trying

[Description]

The command "**ip address dhcp-alloc**" is used to enable the function of automatic IP address acquisition of the device. After enabling it, DHCP client will acquire IP address automatically. You can view the acquired address with command "**show dhcp client**";

The command "**no ip address dhcp-alloc**" is used to disable the function of automatic IP address acquisition.

[Example]

Enable automatic IP address acquisition, and the default option60 is docsis:

```
BT(config)# ip address dhcp-alloc docsis 5
BT(config)# show dhcp client
 Interface    Vlan ID    Ip Address      Ip Mask          MAC Address       Gateway
 br0          NA         192.168.2.162   255.255.255.0    0024.684a.0003    NA
```

Note:

1. After enabling the function of automatic IP address acquisition, the original static IP address configuration will be cleared automatically.
2. The interval for automatic acquisition of device IP address is 30s.

4.2.3 ip route

[Command]

ip route *ip-address netmask nexthop*

no ip route *ip-address netmask*

no ip route all

ipv6 route *ip-address prefix nexthop*

no ipv6 route *ip-address prefix*

[View]

config view

[Parameter]

ip-address: destination IP address of static routing, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

netmask: destination mask of static routing, dotted decimal type; range: 0.0.0.0-255.255.255.255.

prefix: IPv6 address prefix . Type: numerical value; range: 1-128.

nexthop: next-hop IP address of static routing, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

all: all static routings

[Description]

The command "**ip route**" is used to configure the information of static routing for orientation and forwarding against the packets received; the command will check the destination IP address, subnet mask and next-hop IP address respectively. In case of illegal parameter configuration, the system will give relevant prompts. After command configuration, you can view relevant routing information with command "**show ip routing-table**".

The command "**no ip route**" is used to delete the static routing information.

[Example]

Configure the default static routing information:

```
BT(config)# ip route 192.168.0.3 255.255.255.0 192.168.2.1
BT(config)# show running-config | include route
ip route 192.168.0.0 255.255.255.0 192.168.2.1
BT(config)# show ip routing-table
Destination          Netmask          Nexthop         Type       Interface
192.168.2.0          255.255.255.0    *               direct     gigabitethernet0
192.168.0.0          255.255.255.0    192.168.2.1     static     gigabitethernet0
192.168.168.0        255.255.255.0    *               direct     gigabitethernet0
```

4.2.4 outband ip-address

[Command]

outband ip-address *ipv4-address netmask*

outband ipv6 address *ipv6-address/prefix*

outband ipv6 address *ipv6-address* **link-local**

no outband ipv6 address *ipv6-address/prefix*

no outband ipv6 address *ipv6-address* **link-local**

[View]

config view

[Parameter]

ip: IPv4 function

ipv6: IPv6 function

ipv4-address: IPv4 address of management port, dotted decimal type; range: 0.0.0.0-255.255.255.255; default: 192.168.0.10.

netmask: subnet mask of management port, dotted decimal type; range: 0.0.0.0-255.255.255.255; default: 255.255.255.0.

ipv6-address: IPv6 address of management port, 32-bit hexadecimal type; range: 0::0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff.

prefix: IPv6 address prefix . Type: numerical value; range: 1-128.

[Description]

The command "**outband ip-address**" is used to configure the out-of-band management IP address of the device. After successful configuration, you can access the device via the management port, and view the management port information with command "**show outband-info**".

The command "**outband ipv6 address link-local**" is used to configure the link local address of outband. It will replace the automatically generated link local address of the outband. While delete it, the system will recover automatically generated link local address.

The command "**no outband ip-address**" is used to delete the out-of-band management IP address of the device.

The command "**no outband ipv6 address link-local**" is used to delete the link local address of outband.

[Example]

Configure the out-of-band management IP address:

```
BT(config)# outband ip-address 192.168.0.100 255.255.255.0
BT(config)# show running-config | include outbandoutband
ip-address 192.168.0.100 255.255.255.0 BT(config)# show
outband-info
Ip Address      : 192.168.0.100
Ip Mask         : 255.255.255.0
MAC Address     : 0024.683a.0003
```

4.2.5 show dhcp client

[Command]

show (dhcp | dhcpv6) client [(all | *vlan-id*)]

[View]

enable view, config view, vlan view

[Parameter]

dhcp: IPv4 network

dhcpv6: IPv6 network

all: All the automatic IP address acquisition

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

This command is used to display the function of automatic IP address acquisition. For the configuration of automatic IP address acquisition, refer to the section for command "**ip address dhcp-alloc**".

[Example]

Display the information of automatically acquired IP address:

```
BT(config)# show dhcp client all
 Interface   Vlan ID   Ip Address      Ip Mask         MAC Address      Gateway
 br0         NA        192.168.2.102   255.255.255.0   0024.684a.0003   NA
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Interface	Local interface with IP address automatically acquired
Vlan ID	Local VLAN with IP address automatically acquired. In case of no VLAN, the value is NA
Ip Address	IP address automatically acquired
Ip Mask	Subnet mask automatically acquired
MAC Address	MAC address
Gateway	Gateway information. In case of no gateway, the value is NA

4.2.6 show ip routing-table

[Command]

show (ip | ipv6) routing-table

[View]

config view

[Parameter]

ip: IPv4 function

ipv6: IPv6 function

[Description]

Display the information of static routing, including destination address, subnet mask, next-hop address and local interface information. The route whose nexthop is unreached will not be listed in this table. Users can check the ineffective route configuration according to the command "**show running-config**". For configuration of routing information, refer to the section for command "**ip route**".

[Example]

Display the IPv4 information of static routing:

```
BT(config)# show ip routing-table
Destination       Netmask           Nexthop        Type      Interface
0.0.0.0           0.0.0.0           10.10.28.1     static    gigabitethernet0
10.10.29.0        255.255.255.0     *              direct    gigabitethernet0
127.0.0.0         255.0.0.0         *              direct    loop
192.168.0.0       255.255.255.0     *              direct    fastethernet0
192.168.168.0     255.255.255.0     *              direct    gigabitethernet0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Destination	Destination address of routing
Netmask	Subnet mask
Nexthop	Next-hop address
Type	Type of routing information
Interface	Local interface of routing

4.2.7 show ipv6 interface

[Command]

show ipv6 interface [vlanif *vlan-id*]

[View]

config view, vlan view

[Parameter]

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

The command "**show ipv6 interface**" display all the configuration information of IPv6 .

The command "**show ipv6 interface vlanif**" display the single designated configuration information of IPv6 .

[Example]

Display the configuration information of IPv6 of VLAN 10:

```
BT(config-if-vlan10)# show ipv6 interface vlanif 10
link-local address is fe80::2022:23ff:fe22:2222
Global unicast address(es):
1299::10/30
1288::2022:23ff:fe22:2222/64
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
link-local address	Link local address
Global unicast address(es):	Global unicast address

4.2.8 show outband-info

[Command]

show outband-info [ipv6]

[View]

enable view, config view

[Parameter]

ipv6: IPv6 function.

[Description]

The command "**show outband-info**" display the information of out-of-band management port on the device, including IP address, subnet mask, and MAC address. For relevant commands for management port configuration, refer to Section "**outband ip-address**".

The command "**show outband-info ipv6**" display the IPv6 information of out-of-band management port on the device.

[Example]

Display the out-of-band management information:

```
BT# show outband-info Ip
Address        : 192.168.0.10
Ip Mask        : 255.255.255.0
MAC Address    : 08:20:92:65:52:01
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Ip Address	IP address of management port
Ip Mask	Subnet mask of management port
MAC Address	MAC address of management port

Display the out-of-band management IPv6 information:

```
BT# show outband-info ipv6
link-local address is fe80::666:ffff:1111:ffff
Global unicast address(es):
3004::22/128
3004::23/128
3004::24/128
3004::25/128
```

```
3004::26/128
3004::27/128
3004::28/128
3004::21/128
3001::20/64
3004::29/128
```

4.3 IPDR Management

4.3.1 ipdr collector

[Command]

ipdr collector *collector* **ip-addr** *ip-address* [*port*]

no ipdr collector *collector*

[View]

config view

[Parameter]

collector: IPDR collector name, Type: string; range: 1-32 bytes.

ip-address: IP address of IPDR collector, dotted decimal type; range: 0.0.0.0-255.255.255.255.

port: port number of IPDR collector. Type: numerical value; range: 1-65535; default: 4737

[Description]

The command "**ipdr collector**" is used to configure the IPDR (IP Detail Recording) collector name, IP address of IPDR collector and port number of IPDR collector.

The command "**no ipdr collector**" is used to delete the IPDR collector .

[Example]

Configure the IPDR collector name as name1, IP address as 10.10.10.10 and port number as 1:

```
BT(config)# ipdr collector name1 ip-addr 10.10.10.10 1
BT(config)# show running-config | include collector
 ipdr collector name1 ip-addr 10.10.10.10
BT(config)# show ipdr collector All IPDR
Collectors:
        name1: 10.10.10.10:1
```

4.3.2 ipdr session session-id

[Command]

ipdr session *session-id* **(on | off)**

[View]

config view

[Parameter]

on: Enable the IPDR session function.

off: Disable the IPDR session function.

session-id: Session ID of IPDR. Type: numerical value; range: 1-255.

[Description]

This command is an action, not as a configuration command which can be saved, it could be set on to enable the function and off to disable the function. Before configuring this feature first need to to create a session ID via the command "**ipdr session name**".

[Example]

Enable the IPDR session 1:

```
BT(config)# ipdr session 1 on
It is an action command, not as a configuration command which can be saved
BT(config)# show ipdr session 1
IPDR Sessions:
Session 1:
    Name:s1   Descr:s1d
    Session Type:time-interval 15
    Session State:ON
    Associated to:
    Session Template:
        DOCSIS-SAMIS-TYPE-1
```

4.3.3 ipdr exporter

[Command]

ipdr exporter

no ipdr exporter

[View]

config view

[Parameter]

N/A

[Description]

This command is used to enable the IPDR exporter.

[Example]

Enable the IPDR exporter

```
BT(config)# ipdr exporter BT(config)#
show ipdr exporterIPDR Exporter:ON
```

4.3.4 ipdr exporter ack-timeout

[Command]

ipdr exporter ack-timeout *interval*

[View]

config view

[Parameter]

interval: ACK timeout period; in seconds. Type: numerical value; range: 5-60; default: 60

[Description]

This command is used to configure the IPDR exporter timeout period.

[Example]

Configure the IPDR exporter timeout period as 50 seconds:

```
BT(config)# ipdr exporter ack-timeout 50
BT(config)# show running-config | include exporter
 ipdr exporter keepalive 150
 ipdr exporter max-unacked 100
 ipdr exporter ack-timeout 50
```

4.3.5 ipdr exporter keepalive

[Command]

ipdr exporter keepalive *interval*

[View]

config view

[Parameter]

interval: Keepalive period; in seconds. Type: numerical value; range: 5-300; default: 300

[Description]

This command is used to configure the IPDR keepalive period.

[Example]

Configure the IPDR keepalive period as 150 seconds:

```
BT(config)# ipdr exporter keepalive 150
BT(config)# show running-config | include exporter
 ipdr exporter keepalive 150
 ipdr exporter max-unacked 100
```

4.3.6 ipdr exporter max-unacked

[Command]

ipdr exporter max-unacked *max-unacked*

[View]

config view

[Parameter]

max-unacked: Maximum number of no ACK records of IPDR exporter. Type: numerical value; range: 5-200; default: 200

[Description]

This command is used to configure maximum number of no ACK records of IPDR exporter.

[Example]

Configure the maximum number of no ACK records as 100:

```
BT(config)# ipdr exporter max-unacked 100
BT(config)# show running-config | include exporter
 ipdr exporter max-unacked 100
```

4.3.7 ipdr session associate

[Command]

ipdr session *session-id* **associate** *collector* **priority** *priority*

no ipdr session *session-id* **associate** *collector*

[View]

config view

[Parameter]

session-id: Session ID of IPDR. Type: numerical value; range: 1-255.

collector: IPDR collector name, Type: string; range: 1-32 bytes.

priority: Priority of IPDR collector. The smaller the value, the higher the priority. Type: numerical value; range: 1-10.

[Description]

The command "**ipdr session associate**" is used to create the associate of IPDR.

The command "**no ipdr session associate**" is used to delete the associate of IPDR.

[Example]

Create the associate 1 of IPDR:

```
BT(config)# ipdr session 1 associate collector priority 1
```

4.3.8 ipdr session name

[Command]

ipdr session *session-id* **name** *session-name* **description** *description*

no ipdr session *session-id*

[View]

config view

[Parameter]

session-id: Session ID of IPDR. Type: numerical value; range: 1-255.

session-name: IPDR session name, Type: string; range: 1-32 bytes.

description: IPDR collector description, Type: string; range: 1-32 bytes.

[Description]

The command "**ipdr session name**" is used to create the session ID of IPDR.

The command "**no ipdr session**" is used to delete the session ID of IPDR.

[Example]

Create the session ID 1 of IPDR:

```
BT(config)# ipdr session 1 name name1 description test
BT(config)# show running-config | include session
```

```
ipdr session 1 name name1 description test
ipdr session 1 type event
```

4.3.9 ipdr session template

[Command]

ipdr session *session-id* **template (samis-type-1 | samis-type-2 | cmts-cm-reg-status-type | cpe-type | cmts-us-util-stats-type | cmts-ds-util-stats-type | spectrum-measurement-type | cmts-cm-us-stats-type)**

no ipdr session *session-id* **template (samis-type-1 | samis-type-2 | cmts-cm-reg-status-type | cpe-type | cmts-us-util-stats-type | cmts-ds-util-stats-type | spectrum-measurement-type | cmts-cm-us-stats-type)**

[View]

config view

[Parameter]

cmts-cm-reg-status-type: IPDR session ID template mode as cmts-cm-reg-status-type

cmts-cm-us-stats-type: IPDR session ID template mode as cmts-cm-us-stats-type

cmts-ds-util-stats-type: IPDR session ID template mode as cmts-ds-util-stats-type

cmts-us-util-stats-type: IPDR session ID template mode as cmts-us-util-stats-type

cpe-type: IPDR session ID template mode as cpe-type

samis-type-1: IPDR session ID template mode as samis-type-1

samis-type-2: IPDR session ID template mode as samis-type-2

spectrum-measurement-type: IPDR session ID template mode as spectrum-measurement-type

session-id: Session ID of IPDR. Type: numerical value; range: 1-255.

[Description]

The command "**ipdr session template**" is used to configure the template of IPDR session ID.

The command "**no ipdr session template**" is used to delete the template of IPDR session ID.

[Example]

Configure the template of IPDR session ID as CMTS-CM-REG-STATUS-TYPE:

```
BT(config)# ipdr session 1 template  cmts-cm-reg-status-type
BT(config)# show running-config | include session
 ipdr session 1 name name1 description test
 ipdr session 1 type time-interval 60
```

```
ipdr session 1 template  cmts-cm-reg-status-type
```

4.3.10 ipdr session type

[Command]

ipdr session *session-id* **type (ad-hoc | event)**

ipdr session *session-id* **type time-interval** *interval*

no ipdr session *session-id* **type**

[View]

config view

[Parameter]

ad-hoc: IPDR session type as ad-hoc type, the IPDR collector to trigger information read operations.

event: IPDR session ID template mode as event type, the device reporting event actively.

time-interval *interval*: IPDR session ID template mode as periodical collection type, and configure the period. Type of period: numerical value; range: 15-1440.

session-id: Session ID of IPDR. Type: numerical value; range: 1-255.

[Description]

The command "**ipdr session type**" is used to configure the type of IPDR session. By default, IPDR session type is event. When the type is ad-hoc, it need to configure the command "**ipdr collector**". When the type is time-interval, it need to configure an information collection cycle by the command "**ipdr session type time-interval**". Before configuring this feature first need to to create a session ID by the command "**ipdr session name**".

The command "**no ipdr session type**" is used to restore the default session type.

[Example]

Configure the type of IPDR session as ad-hoc:

```
BT(config)# ipdr session 1 type ad-hoc
BT(config)# show running-config | include session
 ipdr session 1 name name1 description test
 ipdr session 1 type ad-hoc
```

4.3.11 show ipdr exporter

[Command]

show ipdr exporter

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display the configuration of IPDR exporter.

[Example]

Display the configuration of IPDR exporter:

```
BT(config)# show ipdr exporter
IPDR Exporter:ON
```

4.3.12 show ipdr collector

[Command]

show ipdr [session *session-id*] **collector [***collector***]**

[View]

config view

[Parameter]

session-id: Session ID of IPDR. Type: numerical value; range: 1-255.

collector: IPDR collector name, Type: string; range: 1-32 bytes.

[Description]

This command is used to display the configuration of IPDR collector.

[Example]

Display the configuration of IPDR collector:

```
BT(config)# show ipdr collector
All IPDR Collectors:
        name1: 10.10.10.10:1
```

4.3.13 show ipdr config

[Command]

show ipdr config

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display all the configuration of IPDR.

[Example]

Display all the configuration of IPDR:

```
BT(config)# show ipdr config
All IPDR Sessions:
Session 1:
    Name: s1   Descr: s1d
    Session Type:ad-hoc
    Session State:ON
    Assciated to:
        test
    Session Template:
        DOCSIS-CMTS-US-UTIL-STATS-TYPE
        DOCSIS-SAMIS-TYPE-2
Session 2:
    Name: s2   Descr: s2d
    Session Type:event
    Session State:OFF
    Assciated to:
    Session Template:
All IPDR Collectors:
        test: 200.200.200.16:4737
IPDR Exporter:ON
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Session Type	Type of IPDR session
Session State	State of IPDR session
Assciated to	Assciated of IPDR session
Session Template	Template of IPDR session
All IPDR Collectors	All Collectors of IPDR session
IPDR Exporter	State of IPDR exporter

4.3.14 show ipdr session

[Command]

show ipdr session [*session-id***]**

[View]

config view

[Parameter]

session-id: Session ID of IPDR. Type: numerical value; range: 1-255.

[Description]

This command is used to display the configuration of IPDR session.

[Example]

Display the configuration of IPDR session:

```
BT(config)# show ipdr session
All IPDR Sessions:
Session 1:
          Name: s1   Descr: s1d
          Session Type: ad-hoc
          Session State:ON
          Associated to:
                  qqq
          Session Template:
                  DOCSIS_SPECTUM_MEASURE_TYPE
```

4.4 RSH Management

4.4.1 ip rcmd remote-host

[Command]

ip rcmd remote-host *local-name ip-address remote-name* **[enable]**

no ip rcmd remote-host *local-name ip-address remote-name*

[View]

config view

[Parameter]

local-name: Local user name, Type: string, range: 1-15 bytes.

ip-address: Remote user IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

remote-name: Remote user name, Type: string, range: 1-15 bytes.

[Description]

This command is used to configure the rsh service, remote client users can be mapped to a local user to execute commands on a view.

The command "**ip rcmd remote-host**" is used to map a remote client user to a local user, and let the user execute commands in configured view. When this command is used with key world"enable", mapped user will execute commands in "enable" view. When this command is used without key world"enable", mapped user will execute commands in "view" view.

The command "**no ip rcmd remote-host**" is used to delete the map between a remote client user and a local user.

[Example]

Configure rsh service, to allow user "root" at 172.16.2.108 to operate under "view" view, just as local user "admin" do.

```
BT(config)# ip rcmd remote-host admin 172.16.2.108 root
BT(config)# show running-config | include rcmd
 ip rcmd remote-host admin 172.16.2.108 root
 ip rcmd rsh-enable
```

4.4.2 ip rcmd rsh-enable

[Command]

ip rcmd rsh-enable

no ip rcmd rsh-enable

[View]

config view

[Parameter]

N/A

[Description]

This command is used to enable or disable the rsh service function.

[Example]

Enable the rsh function:

```
BT(config)# ip rcmd rsh-enable
BT(config)# show running-config | include rsh
```

```
ip rcmd rsh-enable
```

4.5 Vlan Management

4.5.1 description

[Command]

description *description*

no description

[View]

vlan view

[Parameter]

description: Description of the VLAN information. Type: string; range:1-100 bytes.

[Description]

The command "**description**" is used to configure the VLAN descriptive information, a description of the default value is NULL.

The command "**no description**" is used to delete the VLAN descriptive information.

[Example]

Configure descriptive information is "this is vlan 100 "of VLAN 100:

```
BT(config-if-vlan100)# description "this is vlan 100"
BT(config-if-vlan100)# show running-config
interface vlan 100
description "this is vlan 100"
exit
```

4.5.2 interface vlanif

[Command]

interface vlanif *vlan-id*

no interface vlanif *vlan-id*

[View]

config view

[Parameter]

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

The command "**interface vlanif**" is used to create and enter the vlan virtual interface. If the virtual interface is created, the virtual interface view is directly entered.

The command "**no interface vlanif**" is used to remove the specified VLAN interfaces and configurations.

[Example]

Create and enter the vlan virtual interface 1:

```
BT(config)# interface vlanif 1
BT(config-if-vlan1)#
```

4.5.3 management-vlan

[Command]

management-vlan *vlan-id*

management-vlan untag

[View]

config view

[Parameter]

untag: VLAN as untag

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

This command is used to configure the management VLAN ID. Currently only support one management VLAN, with range as 1-4094 and default management VLAN as untag. Visitors are only allowed to access through management VLAN.

[Example]

Configure the management VLAN as 100 in the config view.

```
BT(config)# management-vlan 100
BT(config)# show running-config | include management-vlan
management-vlan 100
```

4.5.4 qos priority

[Command]

qos priority *priority*

[View]

vlan view

[Parameter]

priority: Priority of VLAN packets . Type: numerical value; range: 0-7; default: 0.

[Description]

This command is used to configure priority of VLAN packets.

[Example]

Configure the priority of VLAN packets as 4:

```
BT(config-if-vlan1)# qos priority 4
BT(config-if-vlan1)# show running-config | include qos
 qos priority 4
```

4.5.5 show interface vlanif

[Command]

show interface vlanif [*vlan-id* | **untag**]

[View]

enable view, config view

[Parameter]

untag: VLAN ID as untag

vlan-id: VLAN ID. Type: numerical value; range: 1-4094.

[Description]

show interface vlanif: This command is used to display IP address information of all VLAN.

show interface vlanif *vlan-id*: This command is used to display IP address information of the specified VLAN.

[Example]

Display IP address information of all VLAN:

```
BT(config)# show interface vlanif
 Vlan ID  MAC Address     Type     Level      Category        Ip Address/Maskbits

 untag    0024.6851.0108  static   primary    unicast         10.10.28.146/24
```

```
                          static   N/A        link-local      fe80::224:68ff:fe51:108

  100     0024.6851.0108  static   primary    unicast         10.10.10.10/24
                          static   secondary  unicast         10.10.10.11/24
                          static   N/A        link-local      fe80::224:68ff:fe51:108
                          static   N/A        global-unicast  10:10:10:10::10/64
                          static   N/A        global-unicast  10:10:10:11::10/64
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Format
Vlan ID	Local VLAN ID of VLAN information
MAC Address	MAC address
Type	VLAN information, including dhcp and static.
Level	Type of IP address, including primary IP address and secondary IP address.
Category	VLAN category, including unicast, link-local and global-unicast
Ip Address/Maskbits	IP address / Subnet mask

4.5.6 show management-vlan

[Command]

show management-vlan

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display current management VLAN value.

[Example]

Display the management VLAN value in the config view.

```
BT(config)# show management-vlan
management vlan:100
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
management vlan	Current management VLAN value

4.6 Subnet Vlan Management

4.6.1 ip-subnet-vlan cfi

[Command]

ip-subnet-vlan cfi *cfi*

[View]

cmts view

[Parameter]

cfi: CFI value. Type: numerical value; range: 0-1; default: 0.

[Description]

Configure CFI (Canonical Format Indicator) field of subnet VLAN, for identifying the packet. You can view the configured CFI field with command "**show ip-subnet-vlan cfi**".

[Example]

Set CFI as 1

```
BT(config-if-cmts-1)# ip-subnet-vlan cfi 1 BT(config-
if-cmts-1)# show ip-subnet-vlan cfiip-subnet-vlan cfi
1
```

4.6.2 ip-subnet-vlan tpid

[Command]

ip-subnet-vlan tpid *tpid*

[View]

cmts view

[Parameter]

tpid: TPID value, hexadecimal type, range: 0001-ffff; default: 8100

[Description]

Configure TPID (Tag Protocol Identifier) of subnet VLAN, for configuring the tag protocol identifier of subnet VLAN. You can view the configured TPID field with command "**show ip-subnet-vlan tpid**".

[Example]

Set TPID as 8100

```
BT(config-if-cmts-1)#    ip-subnet-vlan    tpid    8100
BT(config-if-cmts-1)#   show   ip-subnet-vlan   tpid ip-
subnet-vlan tpid 8100
```

4.6.3 ip-subnet-vlan vlan

[Command]

ip-subnet-vlan *ip-address netmask* **vlan** *vlan-id* **priority** *priority*

no ip-subnet-vlan *ip-address netmask*

no ip-subnet-vlan all

[View]

cmts view

[Parameter]

all: All subnet VLAN

ip-address: IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

netmask: subnet mask, dotted decimal type; range: 0.0.0.0-255.255.255.255.

vlan-id: VLAN ID. Type: numerical value; range: 1-4094.

priority: VLAN priority. Type: numerical value; range: 0-7.

[Description]

The command "**ip-subnet-vlan**" is used to add the configurations of subnet VLAN, including IP address, subnet mask, VLAN ID and priority, for setting the subnet VLAN to restrict the broadcast generated by the subnets in a smaller subnet environment, so as to ensure better network. You can view the configured subnet VLAN information with command "**show ip-subnet-vlan**".

The command "**no ip-subnet-vlan**" is used to delete the configurations of current specified subnet VLAN.

[Example]

Tag VLAN 100 to the inbound packet at cable port with subnet as 172.16.1.1 255.255.255.0

```
BT(config-if-cmts-1)# ip-subnet-vlan 172.16.1.1 255.255.255.0 vlan 100
priority 2
BT(config-if-cmts-1)# show ip-subnet-vlan vlan 100IP
Address          Subnet Mask       VLAN Id     Priority
172.16.1.1       255.255.255.0     100         2
```

4.6.4 show ip-subnet-vlan

[Command]

show ip-subnet-vlan vlan *vlan-id*

show ip-subnet-vlan all

[View]

cmts view

[Parameter]

vlan-id: VLAN ID. Type: numerical value; range: 1-4094.

all: all VLAN

[Description]

Query current subnet VLAN configurations.

[Example]

Query current subnet VLAN configurations.

```
BT(config-if-cmts-1)# show ip-subnet-vlan vlan 100
IP Address      Subnet Mask      VLAN Id     Priority
172.16.1.1      255.255.255.0    100         2
```

- In the example, the command echo parameters are explained in the following table:

Parameter	Description
IP Address	IP address of the specified VLAN
Subnet Mask	Subnet mask of the specified VLAN
VLAN Id	ID of the specified VLAN
Priority	Priority of the specified VLAN

4.6.5 show ip-subnet-vlan cfi

[Command]

show ip-subnet-vlan cfi

[View]

cmts view

[Parameter]

N/A

[Description]

Display CFI value of current subnet VLAN.

[Example]

Query CFI value configured by current subnet VLAN.

```
BT(config-if-cmts-1)# show ip-subnet-vlan cfi
ip-subnet-vlan cfi 0
```

- In the example, the command echo parameters are explained in the following table:

Parameter	Description
ip-subnet-vlan cfi	CFI value of current subnet VLAN

4.6.6 show ip-subnet-vlan tpid

[Command]

show ip-subnet-vlan tpid

[View]

cmts view

[Parameter]

N/A

[Description]

Display TPID value of current subnet VLAN.

[Example]

Query TPID value configured by current subnet VLAN

```
BT(config-if-cmts-1)# show ip-subnet-vlan tpid
ip-subnet-vlan tpid 8100
```

- In the example, the command echo parameters are explained in the following table:

Parameter	Description
ip-subnet-vlan tpid	TPID value of current subnet VLAN

4.7 L2VPN Management

4.7.1 cable modem mac-range vlan map

[Command]

cable modem *begin-mac end-mac* **vlan** *vlan-id* **map priority** *priority* [*ModemName*]

no cable modem *begin-mac* **mac-range vlan map**

[View]

config view

[Parameter]

begin-mac: Start MAC address of CM, format: AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

end-mac: End MAC address of CM, format: AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

vlan-id: VLAN ID. Type: numerical value; range: 1-4094.

priority: Priority of upstream packet tag. Type: numerical value; range: 0-7.

ModemName: Option, to set the name of the specified CM. Type: string; range: 1-20 characters.

[Description]

The command "**cable modem vlan**" is used to configure VLAN mapping of CM with specified MAC address segment. VLAN mapping refers to giving VLAN tag on CPE upstream packet under the specified CM, but removing VLAN tag from the downstream packet. This command can configure maximum 40 VLAN mapping.

The command "**no cable modem mac-range vlan map**" is used to delete VLAN mapping in the range of the specified CM MAC address segment.

[Example]

Configure VLAN mapping of CM MAC address segment:

```
BT(config)# cable modem 0014.f8bf.0c68 0014.f8bf.0c78 vlan 1 map priority 0
```

Note:

This command does not affect the packet processing of CM, but affects that of CPE only.

Cable source verify function becomes invalid when the CM configured VLAN mapping.

4.7.2 cable vpn-name vlan map

[Command]

cable vpn-name *vpn-name* **vlan** *vlan-id* **map**

no cable vpn-name *vpn-name* **vlan map**

[View]

config view

[Parameter]

vpn-name: The identification of ARRIS VPN, Type: numerical value; range: 1-65535.

vlan-id: VLAN ID, Type: numerical value; range: 1-4094.

[Description]

The command "**cable vpn-name vlan map**" is used to configure the ARRIS VPN name to VLAN mapping. VLAN mapping only add the VLAN identification for the upstream message of the CPE of the specified CM and delete the VLAN identification for the downstream message. It allows configuring up to 10 ARRIS VPN name to VLAN mapping;

The command "**no cable vpn-name vlan map**" is used to delete the ARRIS VPN name to VLAN mapping.

[Example]

Configure ARRIS VPN name to VLAN mapping:

```
BT(config)# cable vpn-name 1 vlan 1 map
BT(config)# show running-config | include vpn-name
 cable vpn-name 1 vlan 1 map
```

4.7.3 show cable mac-range vlan-map

[Command]

show cable mac-range vlan-map

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display VLAN mapping of all CM MAC address segments.

[Example]

Display VLAN mapping of all CM:

```
BT# show cable mac-range vlan-map
 cable modem 00:14:F8:BF:0C:68 00:14:F8:BF:0C:78 vlan 1 map priority 0 " "
```

4.7.4 show cable modem vlan map

[Command]

show cable modem [(*ip-address* | *mac-address*)] vlan map

[View]

enable view, config view

[Parameter]

ip-address: IP address of the system, dotted decimal type; range: 0.0.0.0-255.255.255.255.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

This command is used to display VPN configuration information of all CM.

[Example]

Display VPN configuration information of all CM:

```
BT(config)# show cable modem vlan map
 MacAddress      cos  vlanID  sfID  status    vpnID
 2476.7d06.ce96  0    10      1     Activate  416c:6361-7465:6c4c-7563:656e-742d:5375
                                              6d61:7669:7369:6f6e
 28be.9bfe.ae42  0    10      2     Activate  416c:6361-7465:6c4c-7563:656e-742d:5375
                                              6d61:7669:7369:6f6e
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
cos	The matching cos value of upstream service flow
vlanID	vlan ID of vlan tag on the matching service flow
sfID	Upstream service flow ID
status	State of setting: Active: set successfully Fail: set unsuccessfully
vpnID	VPN ID (display by 16 digits in a unified way, with vacancy filled with 0)

4.7.5 show cable modem vpn-name

[Command]

show cable modem [(*ip-address* | *mac-address*)] vpn-name

[View]

enable view, config view, cmts view

[Parameter]

ip-address: IP address of the system, dotted decimal type; range: 0.0.0.0-255.255.255.255.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

This command is used to display all ARRIS VPN information of the specified CM or all CM, including ARRIS VPN name to VLAN mapping, the CM MAC address and CMTS index information.

[Example]

Display VLAN mapping of all CM:

```
BT(config)# show cable modem vpn-name
Mac Address        I/F    Vpn Name    vlan    ID status
 4432.c83c.8970    C1     65535       1750    Active
```

4.7.6 show cable vpn-name all

[Command]

show cable vpn-name all

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display all ARRIS VPN information to VLAN mapping.

[Example]

Display VLAN mapping of all CM:

```
BT(config)# show cable vlan-map
cable modem 0014.F8BF.0C68 vlan 1 map priority 0 dhcp-relay "test"
```

4.7.7 show cable vpn vlan all

[Command]

show cable vpn vlan all

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display all VLAN with TAG to be removed.

[Example]

Display all VLAN with TAG to be removed:

```
BT(config)# show interface vlanif
  vlan 4 untagged
```

4.8 DHCP Relay Configuration

4.8.1 cable dhcp device

[Command]

cable (dhcp | dhcpv6) device [*index***]** *device*

no cable (dhcp | dhcpv6) device *index*

[View]

bundle view

[Parameter]

dhcp: IPv4 network

dhcpv6: IPv6 network

index: Name of user-defined device index. Type: numerical value; range: 1-10.

device: Name of user-defined device. Type: string; range: 1-16 characters.

[Description]

The command "**cable dhcp device**" is used to configure corresponding user-defined device. Each bundle can create up to 10 extension terminal type. Identification of each terminal type can be set up to 4 strings. Before configuring the giaddr and expand of the Terminal Type helper address, user need to first create an extended type of device.

The command "**no cable dhcp device**" is used to delete corresponding user-defined device. When user delete a option string of corresponding user-defined device will automatically delete the option60, giaddr, helper address and dhcp-mode configuration.

The command "**no cable dhcpv6 device**" is used to delete DHCPv6 user-defined device. When user delete a option string of corresponding user-defined device will automatically delete the vendor-class, linkaddress, destination and dhcpv6-mode configuration.

[Example]

Configure the custom device type as cablemodem:

```
BT(config-if-bundle2)# cable dhcp device cablemodem
BT(config-if-bundle2)# show running-config | include cablemodem
 cable dhcp device 1 "cablemodem"
```

Note:

1. When matching user-defined equipment parameters, long characters take precedence and maximum length matches. This parameter cannot take the existing device type: cm / host / stb / mta (case insensitive).
2. The option 60 identification string of the custom device type cannot be configured or the configuration cannot contain the identification string defined by C-DOCSIS, such as docsis, stb, pktc.

4.8.2 cable dhcp-giaddr

[Command]

cable dhcp-giaddr (primary | policy | strict)

cable dhcp-giaddr (cm | host | mta | stb | *device*) *giaddr*

no cable dhcp-giaddr [(cm | host | mta | stb | *device*)]

[View]

bundle view

[Parameter]

primary: Set the relay mode as primary, i.e., all devices share the same relay

policy: Set the relay mode as policy, i.e., CM and other devices use different kinds of relay

strict: Set the relay mode as strict, i.e., each kind of device uses different kinds of relay

cm: Terminal type: CM

host: Terminal type: HOST

mta: Terminal type: MTA

stb: Terminal type: STB

giaddr: Gateway IP address (giaddr), dotted decimal type; range: 0.0.0.0-255.255.255.255.

device: Name of user-defined device. Type: string; range: 1-16 characters.

[Description]

cable dhcp-giaddr (primary | policy | strict): This command is used to set giaddr relay mode, with default as primary; when it is set as primary, all devices share the same relay; when it is set as policy, CM and other devices use two different kinds of relay; when it is set as strict, each kind of device uses different kinds of relay.

cable dhcp-giaddr (cm | host | mta | stb | *device*) *giaddr*: This command is used to set corresponding relay IP address of the device;

no cable dhcp-giaddr: This command is used to restore the default giaddr configurations, including restoring giaddr mode to the default state and deleting gateway IP address of all devices;

no cable dhcp-giaddr (cm | host | mta | stb | *device*)**:** This command is used to delete the specified relay IP address of some a device.

[Example]

Set giaddr insertion mode as primary:

```
BT(config-if-bundle1)# cable dhcp-giaddr primary
BT(config-if-bundle1)# exit
BT(config)# show interface bundle all | include primary
 cable dhcp-giaddr primary
```

Set giaddr of CM as 192.168.1.100:

```
BT(config-if-bundle1)# cable dhcp-giaddr cm 192.168.1.100
BT(config-if-bundle1)# show running-config | include cm
 cable dhcp-giaddr cm 192.168.1.100
```

4.8.3 cable dhcp-mode

[Command]

cable dhcp-mode (cm | host | mta | stb | *device*) **(snooping | l2-relay | l3-relay)**

cable dhcpv6-mode (cm | host | mta | stb | *device*) **(snooping | l2-relay | l3-relay | ldra)**

[View]

config view

[Parameter]

dhcp-mode: Relay IPv4 packet

dhcpv6-mode: Relay IPv6 packet

snooping: Snooping

l2-relay: Layer-2 relay

l3-relay: Layer-3 relay

ldra: Lightweight DHCPv6 Relay Agent mode

cm: Terminal type: CM

host: Terminal type: HOST

mta: Terminal type: MTA

stb: Terminal type: STB

device: Name of user-defined device. Type: string; range: 1-16 characters.

[Description]

This command is used to configure forwarding mode of DHCP messages against corresponding device. In case of no configuration of layer-2 relay forwarding, by default, it is transparent.

snooping : Without any processing against DHCP for transparent transmission directly.

l2-relay: The device will add Option 82 only to its DHCP packet and then forward upwards, without any processing against non-DHCP packets.

l3-relay: The device will implement the relay forwarding against DHCPv4 packets according to other configurations. Layer-3 forwarding requires the configuration of primary IP address and secondary IP address of bundle, refer to the section for command: ip address.

Lightweight DHCPv6 relay agent mode: used by DHCPv6, the device encapsulates the uplink original solicit / request message into DHCPv6 message, and adds interface ID, remote ID, vendor specific, link address as empty in the outer layer, which is encapsulated as relay forward message and forwarded to the uplink;

After the device peels off the relay package and interface ID of the received downlink relay reply message, it forwards the DHCPv6 message to the terminal device.

[Example]

Configure layer-2 relay against DHCP of host device:

```
BT(config)# cable dhcp-mode host l2-relay BT(config)#
cable dhcpv6-mode host l2-relay BT(config)# show
running-config | include dhcp-l2
 cable dhcp-mode host l2-relay
 cable dhcpv6-mode host l2-relay
```

```
BT(config)# cable dhcpv6-mode mta ldra BT(config)# show
running-config | include dhcpv6-modecable dhcpv6-mode mta
ldra
BT(config)#
```

4.8.4 cable dhcp option

[Command]

cable dhcp-option60 (cm | host | mta | stb | *device*) [*index*] *option*

no cable dhcp-option60 *device index*

cable dhcpv6-option vendor-class (cm | host | mta | stb | *device*) [*index*] *option*

no cable dhcpv6-option vendor-class *device index*

[View]

bundle view

[Parameter]

cm: Terminal type: CM

host: Terminal type: HOST

mta: Terminal type: MTA

stb: Terminal type: STB

device: Name of user-defined device. Type: string; range: 1-16 characters.

index: Option index. Type: numerical value; range: 1-4.

option: option60 string (IPv4 network) or option vendor class string (IPv6 network). Type: string; range: 1-16 characters.

[Description]

The command " **cable dhcp-option60**" is used to configure option60 string of corresponding user-defined device. When index is not configured, the device defaults to the minimum value available.

The command "**no cable dhcp-option60**" is used to delete option60 string of corresponding user-defined device.

The command " **cable dhcpv6-option vendor-class**" is used to configure vendor class string of corresponding user-defined device. When index is not configured, the device defaults to the minimum value available.

The command "**no dhcpv6-option vendor-class**" is used to delete vendor class string of corresponding user-defined device.

[Example]

Configure user-defined device as cm, and configure option60 string as cm-option:

```
BT(config-if-bundle2)# cable dhcp-option60 cm 2 cm-option60
BT(config-if-bundle2)# show running-config
 cable dhcp-option60 cm 2 "cm-option60"
```

4.8.5 cable dhcp-tag

[Command]

cable (dhcp-tag | dhcpv6-tag) (cm | host | mta | stb | *device*) **vlan** *vlan-id* **priority** *priority*

no cable (dhcp-tag | dhcpv6-tag) (cm | host | mta | stb | *device*)

[View]

bundle view

[Parameter]

dhcp-tag: Add VLAN TAG for IPv4 packet

dhcpv6-tag: Add VLAN TAG for IPv6 packet

cm: Terminal type: CM

host: Terminal type: HOST

mta: Terminal type: MTA

stb: Terminal type: STB

device: Name of user-defined device. Type: string; range: 1-16 characters.

vlan-id: VLAN ID. Type: numerical value; range: 1-4094.

priority: COS priority. Type: numerical value; range: 0-7.

[Description]

The command "**cable dhcp-tag**" is used to add VLAN tag to DHCP packet and data packet by terminal type.

The command "**no cable dhcp-tag**" is used to delete VLAN tag added to DHCP packet and data packet of the specified type of device.

[Example]

Add VLAN tag to DHCP packet of the device with type as host:

```
BT(config-if-bundle1)# cable dhcp-tag host vlan 100 priority 7
BT(config)# show running-config | include dhcp-tag
cable dhcp-tag host vlan 100 priority 7
```

Note:

The device with the same type must be configured the same dhcp-tag and dhcpv6-tag.

For example:

cable dhcp-tag cm vlan 100 priority 1

cable dhcp-tag host vlan 200 priority 2

cable dhcpv6-tag cm vlan 100 priority 1

cable dhcpv6-tag host vlan 200 priority 2

4.8.6 cable helper-address

[Command]

cable helper-address (all | cm | host | mta | stb | *device*) [*index*] *ip-address*

no cable helper-address (all | cm | host | mta | stb | *device*) *index*

[View]

bundle view

[Parameter]

all: Terminal type: all

cm: Terminal type: CM

host: Terminal type: HOST

mta: Terminal type: MTA

stb: Terminal type: STB

index: Index. Type: numerical value; range: 1-5. When index is not configured, the device defaults to the minimum value available.

device: Name of user-defined device. Type: string; range: 1-16 characters.

ip-address: DHCP server address (helper-address), dotted decimal type; range: 0.0.0.0-255.255.255.255.

[Description]

This command "**cable helper-address all**" is used to set the universal DHCP server address. CMTS device supports 5 DHCP servers.

This command "**cable helper-address (cm | host | mta | stb |** *device*)" is used to set the dedicated DHCP server address. Each type of device can configure up to 5 DHCP servers. If any dedicated DHCP server has been specified, prefer selecting the dedicated DHCP server. Otherwise select the universal DHCP server.

The command "**no cable helper-address all**" is used to delete the universal DHCP server address.

The command "**no cable helper-address (cm | host | mta | stb |** *device*)" is used to delete the dedicated DHCP server address.

[Example]

Set the universal DHCP server address as 192.168.1.100:

```
BT(config-if-bundle1)# cable helper-address all 192.168.1.100
BT(config-if-bundle1)# show running-config | include helper
 cable helper-address all 1 192.168.1.100
```

4.8.7 cable vpn dhcp-transparent

[Command]

cable vpn dhcp-transparent

no cable vpn dhcp-transparent

[View]

config view

[Parameter]

enable: Configure DHCP Relay transparent and DHCP message related to VPN service;

disable: Configure DHCP Relay nontransparent and DHCP message related to VPN service;N/A

[Description]

The command "**cable vpn dhcp-transparent** " is used to configure DHCP Relay transparent and DHCP message related to VPN service; by default, it is transparent.

The command "**no cable vpn dhcp-transparent** " is used to delete the DHCP Relay transparent and DHCP message related to VPN service; in case of no configuration.

[Example]

Configure DHCP Relay transparent and DHCP message related to VPN service:

```
BT(config)# cable vpn dhcp-transparent
```

```
BT(config)# show running-config verbose | include dhcp-transparent
cable vpn dhcp-transparent
```

4.8.8 description

[Command]

description *description*

no description

[View]

bundle view

[Parameter]

description: The bundle description. Type: string; range: 1-255 characters.

[Description]

The command "**description**" is used to configure the description of the bundle.

The command "**no description**" is used to delete the description of the bundle.

[Example]

Configure the bundle description as dhcprelay1:

```
BT(config-if-bundle1)# description dhcprelay1
BT(config-if-bundle1)# show running-config | include description
 description "dhcprelay1"
```

4.8.9 dhcp information option circuit-id-prefix

[Command]

dhcp information option circuit-id-prefix (hex | string) *String*

no dhcp information option circuit-id-prefix

[View]

config view

[Parameter]

hex: Hexadecimal representation.

string: String representation.

String: Option82.1 (IPv4 network) or option18 string (IPv6 network). Type: string; range: 1-64 characters.

[Description]

The command "**dhcp information option circuit-id-prefix**" is used to configure option string of agent circuit ID in IPv4 network or allows the client to provide interface information to the DHCPv6 server.

The command "**no dhcp information option circuit-id-prefix**" is used to delete option string of agent circuit ID in IPv4 network or allows the client to provide interface information to the DHCPv6 server.

[Example]

Configure option field of agent circuit ID in hexadecimal as string representation BT :

```
BT(config)# dhcp information option circuit-id-prefix string BT
BT(config)# show dhcp circuit-id-prefix
Hex Format        :746f70766973696f6e
String Format     :BT
```

4.8.10 interface bundle

[Command]

interface bundle *bundle-id*

no interface bundle *bundle-id*

[View]

config view

[Parameter]

bundle-id: bundle ID. Type: numerical value; range: 1-32.

[Description]

The command "**interface bundle**" is used to create and enter the bundle view. The maximum 32 bundles can be created, respectively 1-32;

The command "**no interface bundle**" is used to delete the created bundle and its relevant configurations.

[Example]

Enter bundle 1:

```
BT(config)# interface bundle 1
BT(config-if-bundle1)#
```

4.8.11 ip address

[Command]

ip address *ip-address netmask*

no ip address primary

ip address [*index*] *ip-address netmask* **secondary**

no ip address *index* **secondary**

ipv6 address [*index*] *ipv6-address prefix*

ipv6 address [*index*] *ipv6-mask*

no ipv6 address *index*

[View]

bundle view

[Parameter]

ip-address: IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

netmask: Subnet mask, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ipv6-address: IPv6 address, with format as X:X::X:X.

prefix: IPv6 address prefix . Type: numerical value; range: 1-128.

index: Index. Type: numerical value; range(IPv4 secondary index): 1-10; range(IPv6 secondary index): 1-20. When index is not configured, the device defaults to the minimum value available.

[Description]

The command "**ip address**" is used to configure the primary IP address under bundle. Repeated configuration will replace the previous configuration. In case of no configuration of ip address corresponding to relevant giaddr, by default, the global IP address will be taken as DHCP Relay.

The command "**no ip address**" is used to delete the primary IP address under bundle.

The command "**ip address secondary**" is used to configure the secondary IP address under bundle. Each bundle supports configuring the maximum 20 secondary IP address. In case of no configuration of ip address corresponding to relevant giaddr, by default, the global IP address will be taken as DHCP Relay.

The command "**no ip address secondary**" is used to delete the secondary IP address under bundle.

The command "**ipv6 address**" is used to configure the IPv6 address under bundle.

The command "**no ipv6 address**" is used to delete the IPv6 address under bundle.

[Example]

Configure the primary IP address of bundle as 10.1.0.2:

```
BT(config-if-bundle1)# ip address 10.1.0.2 255.255.255.0
BT(config-if-bundle1)# show running-config | include ip address
 ip address 10.1.0.2 255.255.255.0
```

4.8.12 ipv6 dhcp relay destination

[Command]

ipv6 dhcp relay destination (cm | host | mta | stb | *device*) [*index*] *sverer-ipv6*

no ipv6 dhcp relay destination [(cm | host | mta | stb | *device*)] [*index*]

[View]

bundle view

[Parameter]

cm: Terminal type: CM

host: Terminal type: HOST

mta: Terminal type: MTA

stb: Terminal type: STB

device: Name of user-defined device. Type: string; range: 1-16 characters.

index: Index value, DHCPv6 server index, Type: numerical value, range: 1-5;. Without index parameters, the minimum value of unused index is allocated by default.

sverer-ipv6:DHCPv6 Server. with format as X:X::X:X.

[Description]

The command "**ipv6 dhcp relay destination**" is used to configure the DHCPv6 Server.

The command "**no ipv6 dhcp relay destination**" is used to delete the DHCPv6 Server.

[Example]

Configure the DHCPv6 server address as 1000::1000:

```
BT(config-if-bundle1.1)# ipv6 dhcp relay destination 1000::1000
BT(config-if-bundle1.1)# show running-config | include destination
 ipv6 dhcp relay destination 1 1000::1000
```

4.8.13 ipv6 dhcp relay link-address

[Command]

ipv6 dhcp relay link-address (cm | host | mta | stb | *device*) **relay-ipv6**

no ipv6 dhcp relay link-address [(cm | host | mta | stb | *device*)]

[View]

bundle view

[Parameter]

cm: Terminal type: CM

host: Terminal type: HOST

mta: Terminal type: MTA

stb: Terminal type: STB

device: Name of user-defined device. Type: string; range: 1-16 characters.

relay-ipv6: Relay address of the device(the device relay through the link-address IP). with format as X:X::X:X.

[Description]

The command "**ipv6 dhcp relay link-address**" is used to configure the relay address of the device. If no configure the relay address, the device will choose the first IPv6 address as the relay address.

The command "**no ipv6 dhcp relay link-address**" is used to delete the configuration of relay address.

[Example]

Configure the DHCPv6 server address as 1000::1000 and the relay address of the device as 2000::8:

```
BT(config-if-bundle1)# ipv6 dhcp relay destination 1000::1000 link-address2000::8
BT(config-if-bundle1)# show running-config | include relay
 ipv6 dhcp relay destination 1000::1000 link-address 2000::8
```

4.8.14 show dhcp circuit-id-prefix

[Command]

show dhcp circuit-id-prefix

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display the configuration of option82.1 or option18.

[Example]

View the configuration of option82.1 or option18:

```
BT(config)# show dhcp circuit-id-prefix
Hex Format      61626364
String Format  :abcd
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Hex Format	Hexadecimal format of option82.1 or option18
String Format	String format of option82.1 or option18

4.8.15 show dhcp-relay counter

[Command]

show dhcp-relay counter

show dhcpv6-relay counter

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the DHCP packet statistics.

[Example]

View the DHCPv4 packet statistics:

```
BT# show dhcp-relay counter
DiscoverRecvs       18
DiscoverSends       18
DiscoverDrops       0
OfferRecvs          0
```

```
OfferSends          0
OfferDrops          0
RequestRecvs        0
RequestSends        0
RequestDrops        0
AckRecvs            0
AckSends            0
AckDrops            0
OtherRecvs          0
OtherSends          0
OtherDrops          0
eaeDrops            0
FloodDhcpPkts       0
UnKnownDhcpPkts     0
TimeoutDrops        0
CongestionDrops     0
CongestionSatus     FASLE
QueuePkts           0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
DiscoverRecvs	Number of received discover packets
DiscoverSends	Number of discover packets to be sent
DiscoverDrops	Number of discarded discover packets
OfferRecvs	Number of received offer packets
OfferSends	Number of offer packets to be sent
OfferDrops	Number of discarded offer packets
RequestRecvs	Number of received request packets
RequestSends	Number of request packets to be sent
RequestDrops	Number of discarded request packets
AckRecvs	Number of received ACK packets
AckSends	Number of ACK packets to be sent
AckDrops	Number of discarded ACK packets
OtherRecvs	Number of received other packets
OtherSends	Number of other packets to be sent
OtherDrops	Number of discarded other packets
eaeDrops	Number of discarded EAE packets
FloodDhcpPkts	Number of DHCP packets flooding, including the downstream request packets and upstream reply packets
UnKnownDhcpPkts	Number of DHCP packets of unknown type of message, including the downstream request packets and upstream reply packets
TimeoutDrops	Number of DHCP packets in DHCP queue longer than the 30s
CongestionDrops	Number of packets discarded during congestion queue
CongestionSatus	DHCP queue congestion status. When the congestion status is TRUE, FALSE non-congested state.

Parameter	Description
QueuePkts	Number of DHCP packets in DHCP queue.

4.8.16 show interface bundle all

[Command]

show interface bundle all

[View]

enable view, config view, bundle view

[Parameter]

N/A

[Description]

This command is used to display the configuration information of all created bundles.

[Example]

View the configuration information of all bundles:

```
BT(config)# show interface bundle all
!
interface bundle 1
 cable dhcp-giaddr primary
 ip address 172.16.10.253 255.255.255.0
 cable helper-address all 1 172.16.10.254
 cable source verify enable
 cable ipv6 source verify enable
 cable source verify leasequery-filter upstream 5 10
exit
!
interface bundle 2
 cable dhcp-giaddr primary
 ipv6 dhcp relay link-address cm 2000::8
 cable source verify enable
 cable ipv6 source verify enable
 cable source verify leasequery-filter upstream 5 10
exit
```

4.8.17 show ip dhcp binding

[Command]

show ip dhcp binding

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the binding relationship table for the IP address and the MAC address of the device via the DHCP. When the terminal equipment complete the DHCP to generate this table; fails to renew when the release or the expiration of the lease for 5 minutes, remove the table entry.

[Example]

View the binding relationship table of the device via the DHCP:

```
BT(config)# show ip dhcp binding
MAC Address        IP Address      Expire time     Device Type
a4a8.0fa9.607c     10.10.28.15     0d1h36m         CM
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of the device
IP Address	IP address of the device via the DHCP
Expire time	End time of lease
Device Type	Terminal device type

4.8.18 vlan

[Command]

vlan (untag | *vlan-id*)

vlan *start-vlan-id* **to** *end-vlan-id*

no vlan [(untag | *vlan-id*)]

no vlan *start-vlan-id* **to** *end-vlan-id*

[View]

config view

[Parameter]

untag: VLAN as untag

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

start-vlan-id: Start VLAN ID. Type: numerical value; range: 1-4094

end-vlan-id: End VLAN ID. Type: numerical value; range: 1-4094

[Description]

The command "**description**" is used to add the the bundle VLAN. The device can select bundles based on VLANs in DHCP packets during the discovery phase. When a bundle is created, all VLANs and Untag VLANs are allowed by default.

The command "**no description**" is used to delete the bundle VLAN.

[Example]

Add VLAN 1 and enter the vlan view:

```
BT(config)# vlanif 1
BT(config-if-vlan1)#
```

4.8.19 ipv6 ra suppress

[Command]

ipv6 ra suppress

no ipv6 ra suppress

[View]

config view

[Parameter]

N/A

[Description]

The command "**ipv6 ra suppress**" is used to enables IPv6 RA suppression. After enabling, the device does not respond to the RS message sent by the terminal device.

The command "**no ipv6 ra suppress**" is used to turn off IPv6 RA suppression. After it is turned off, the device will respond to the RA message after receiving the RS message sent by the terminal device. Off by default.

[Example]

Enables IPv6 RA suppression:

```
BT(config)# ipv6 ra suppress
BT(config)# show running-config | include ipv6 ra
ipv6 ra suppress
```

4.9 TFTP proxy

4.9.1 cable tftp proxy

[Command]

cable tftp-proxy

no cable tftp-proxy

[View]

cmts view

[Parameter]

N/A

[Description]

cable tftp-proxy: enable TFTP proxy function.

no cable tftp-proxy: disable TFTP proxy function, the feature is off by default.

[Example]

Enable TFTP proxy function:

```
BT(config-if-cmts-1)# cable tftp-proxy
BT(config-if-cmts-1)#
```

Disable TFTP proxy function:

```
BT(config-if-cmts-1)# no cable tftp-proxy
BT(config-if-cmts-1)#
```

4.9.2 cable tftp-proxy server

[Command]

cable tftp-proxy server ipv4 *ipv4-address*

no cable tftp-proxy server ipv4

cable tftp-proxy server ipv6 *ipv6-address*

no cable tftp-proxy server ipv6

[View]

cmts view

[Parameter]

ipv4-address: IPv4 unicast address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ipv6-address: IPv6 unicast address, 32-bit hexadecimal type; range: 0::0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff.

[Description]

By default, there is no TFTP proxy server address.

The command "**cable tftp-proxy server ipv4**" is used to configure the TFTP proxy IPv4 address to replace the next server IP address in the Offer / ACK message.

The command "**no cable tftp-proxy server ipv4**" is used to remove TFTP proxy IPv4 address configuration.

The command "**cable tftp-proxy server ipv6**" is used to configure the TFTP proxy IPv6 address and replace the suboption TFTP Server Address (option17.32) of the vendor specific information in the Advertisement / Reply message.

The command "**no cable tftp-proxy server ipv6**" is used to deletes the TFTP proxy IPv6 address configuration.

[Example]

The IPv4 server address of the specified TFTP proxy is 192.168.100.100:

```
BT(config-if-cmts-1)# cable tftp-proxy server ipv4 192.168.100.100
BT(config-if-cmts-1)#
```

The IPv6 server address of the specified TFTP proxy is 1000:: 1000:

```
BT(config-if-cmts-1)# cable tftp-proxy server ipv6 1000::1000
BT(config-if-cmts-1)#
```

Delete the IPv4 server address of TFTP proxy:

```
BT(config-if-cmts-1)# no cable tftp-proxy server ipv4
BT(config-if-cmts-1)#
```

Delete the Ipv6 server address of TFTP proxy:

```
BT(config-if-cmts-1)# no cable tftp-proxy server ipv6
BT(config-if-cmts-1)#
```

4.9.3 cable tftp-proxy option

[Command]

cable tftp-proxy option (ip | mac)

no cable tftp-proxy option (ip | mac)

[View]

config view

[Parameter]

ip: Specifies that the option value is the IP (IPv4 or IPv6) address of CM.

mac: Specifies that the option value is the MAC address of CM.

[Description]

The command "**cable tftp-proxy option ip**" is used to turn on the IP option. CMTS must insert the IP address option in TFTP request. The option value is the IP (IPv4 or IPv6) address obtained by CM.

The command " **no cable tftp-proxy option ip**" is used to turn off the IP option. CMTS does not insert the IP address option in TFTP request; it is turned off by default.

The command "**cable tftp-proxy option mac**" is used to turn on the MAC option. CMTS must insert the MAC address option in TFTP request. The option value is the MAC address of CM.

The command "**no cable tftp-proxy option mac**" is used to turn off MAC option. CMTS does not insert MAC address option in TFTP request; it is turned off by default.

The IP and MAC options can be turned on or off individually or simultaneously.

[Example]

Turn On the IP option:

```
BT(config)# cable tftp-proxy option ip
BT(config)#
```

Turn On the MAC option:

```
BT(config)# cable tftp-proxy option mac
BT(config)#
```

4.9.4 cable tftp-proxy config-file learning

[Command]

cable tftp-proxy config-file learning

no cable tftp-proxy config-file learning

[View]

config view

[Parameter]

N/A

[Description]

The command "**cable tftp-proxy config-file learning**" is used to turn on the profile learning function.

The command "**no cable tftp-proxy config-file learning**" is used to turn off the profile learning function.

This function is on by default. When enabled, CMTS will learn the content of configuration file downloaded by cm from TFTP server and compare it with the content when cm registers. If the content is inconsistent, CM's status is set to reject (m), and CM's upstream service flow is disabled.

[Example]

Turn On the profile learning function:

```
BT(config)# cable tftp-proxy config-file learning
BT(config)#
```

Turn Off the profile learning function:

```
BT(config)# no cable tftp-proxy config-file learning
BT(config)#
```

4.10 Local Provisioning Configuration

4.10.1 address-prefix

[Command]

address-prefix *ipv6-mask* **lifetime** *valid-lifetime pre-lifetime*

no address-prefix

[View]

ip-dhcpv6-pool view

[Parameter]

ipv6-mask: IPv6 address and mask, with format as X:X::X:X/M.

valid-lifetime: valid-lifetime of the IP address pool, in seconds. Type: numerical value; range: 600-4294967295.

pre-lifetime: preferred lifetime of the IP address pool, in seconds. Type: numerical value; range: 600-4294967295.

[Description]

The command "**address-prefix lifetime**" is used to configure the IPv6 address pool, the valid-lifetime and preferred lifetime of address pool.

The command "**no address-prefix**" is used to delete the configuration of the IPv6 address pool.

[Example]

Configure the IPv6 address pool as 1000::1000/64, the valid-lifetime as 36000 seconds and preferredlifetime as 3600 seconds:

```
BT(ip-dhcpv6-pool)# address-prefix 1000::1000/64 lifetime 36000 3600
```

```
BT(ip-dhcpv6-pool)# show ipv6 dhcp-pool config
Primary DNS      :
Secondary DNS    :
TFTP server      :
IA_NA pool       : 1000::/64
IA_NA pref       : 3600s
IA_NA valid      : 36000s
IA_PD pool       :
IA_PD pref       :
IA_PD valid      :
IA_PD length     :
Bootfile cm-3.0 : disable
```

4.10.2 bootfile cm-type

[Command]

bootfile cm-3.0

no bootfile cm-3.0

[View]

ip-dhcp-pool view

[Parameter]

N/A

[Description]

The command "**bootfile cm-3.0**" is used to enable the configuration file select function of 3.0 CM and 3.1 CM. When the function is enabled, the CMTS will provision "cm3.0.cfg" for the 3.0 CM and 3.1 CM.

The command "**no bootfile cm-3.0**" is used to disable the configuration file select function of 3.0 CM. When the function is disabled, the CMTS will provision all CM with the 2.0CM configuration file.

[Example]

Enable the CM configuration file selection function:

```
BT(ip-dhcp-pool)# bootfile cm-3.0
```

4.10.3 cable local-provisioning support cm

[Command]

cable [ipv6] local-provisioning support cm

no cable [ipv6] local-provisioning support cm

[View]

config view

[Parameter]

ipv6: IPv6 services. Without this parameter defaults to IPv4 services.

[Description]

The "**cable [ipv6] local-provisioning support cm**"command is used to enable the local provisioning DHCP server the CMTS device for CM support services, and assign addresses from IPv4 or IPv6 address pool. By default, this function is disabled.

The "**no cable [ipv6] local-provisioning support cm**"command is used to disable the local provisioning DHCP server the CMTS device for CM support services.

[Example]

Enable the local provisioning DHCP server the CMTS device for CM support services, and assign addresses from IPv4 address pool :

```
BT(config)# cable local-provisioning support cm BT(config)# show
running-config verbose | include supportcable local-provisioning
support cm
no cable ipv6 local-provisioning support cm
```

4.10.4 cable local-provisioning support cpe

[Command]

cable [ipv6] local-provisioning support cpe

no cable [ipv6] local-provisioning support cpe

[View]

config view

[Parameter]

ipv6: IPv6 services. Without this parameter defaults to IPv4 services.

[Description]

The "**cable [ipv6] local-provisioning support cpe**"command is used to enable the local provisioning DHCP server the CMTS device for CPE support services, and assign addresses from IPv4 or IPv6 address pool. By default, this function is disabled.

The "**no cable [ipv6] local-provisioning support cpe**"command is used to disable the local provisioning DHCP server the CMTS device for CPE support services.

[Example]

Enable the local provisioning DHCP server the CMTS device for CPE support services, and assign addresses from IPv4 address pool :

```
BT(config)# cable local-provisioning support cpe BT(config)#
show running-config verbose | include supportcable local-
provisioning support cpe
no cable ipv6 local-provisioning support cpe
```

4.10.5 client-class

[Command]

client-class *class-id*

no client-class *class-id*

[View]

config view

[Parameter]

class-id: Client-class number. Type: numerical value; range: 1-32.

[Description]

The command "**client-class**" is used to create and enter the client-class view. It supports 32 client-class at most, 1-32.

The command "**no client-class**" is used to delete the client-class and its associated configuration.

[Example]

Enter the client-class view 1 from the config view:

```
BT(config)# client-class 1
BT(client-class-1)#
```

4.10.6 client-class bind cm-config

[Command]

client-class bind cm-config *filename*

no client-class bind cm-config

[View]

client-class view

[Parameter]

filename: The name of CM configuration file. Type: string; range: 1-64 characters.

[Description]

The command "**client-class bind cm-config**" is used to bind the CM configuration file to client-class.

The command "**no client-class bind cm-config**" is used to delete the CM configuration file which binding to the client-class.

[Example]

Bind the CM configuration file to client-class:

```
BT(client-class-1)# client-class bind cm-config online.cfg
BT(client-class-1)# show running-config
 client-class bind cm-config "online.cfg"
```

4.10.7 default-router

[Command]

default-router *ip-address*

no default-router

[View]

ip-dhcp-pool view

[Parameter]

ip-address: IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

[Description]

The command "**default-router**" is used to configure the default router of IPv4 address pool.

The command "**no default-router**" is used to delete the configuration of the default router.

[Example]

Configure the default router of address pool as 10.10.28.31:

```
BT(ip-dhcp-pool)# default-router 10.10.28.31
BT(ip-dhcp-pool)# show dhcp-server config
Server host MAC   :0024.68ab.cdcc
Server host IP    :10.10.28.82
Next sever IP     :10.10.28.82
Boot file name    :cm.cfg
Network  IP       :10.10.28.82/23
Lease             :10d0h0m0s
Default route     :10.10.28.31
```

```
Primary DNS       :
Secondary DNS     :
```

4.10.8 description

[Command]

description *description*

no description

[View]

client-class view

[Parameter]

description : Client class description. Type: string; range: 1-255 characters.

[Description]

The command "**description**" is used to add the description of the client class.

The command "**no description**" is used to delete the description of the client class.

[Example]

Configure the description of the client class:

```
BT(client-class-1)# description "this class is for online"
BT(client-class-1)# show running-config
 description "this class is for online"
```

4.10.9 dns-server

[Command]

dns-server *ip-primary* **[***ip-secondary***]**

dns-server *ipv6-primary* **[***ipv6-secondary***]**

no dns-server

[View]

dns-server ip-primary [ip-secondary]: ip-dhcp-pool view

dns-server ipv6-primary [ipv6-secondary]: ipv6-dhcp-pool view

no dns-server: ip-dhcp-pool view, ipv6-dhcp-pool view

[Parameter]

ip-primary: Primary DNS IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ip-secondary: Secondary DNS IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ipv6-primary: Primary DNS IPv6 address, with format as X:X::X:X.

ipv6-secondary: Secondary DNS IPv6 address, with format as X:X::X:X.

[Description]

The command "**dns-server**" is used to configure the DNS server address of IPv4 or IPv6 address pool.

The command "**no dns-server**" is used to delete the configuration of the DNS server address.

[Example]

Configure the DNS server address of address pool as 192.168.1.12:

```
BT(ip-dhcp-pool)# dns-server 192.168.1.12
BT(ip-dhcp-pool)# show dhcp-server config
Server host MAC   :0024.68ab.cdcc
Server host IP    :10.10.28.82
Next sever IP     :10.10.28.82
Boot file name    :cm.cfg
Network  IP       :10.10.28.82/23
Lease             :10d0h0m0s
Default route     :10.10.28.31
Primary DNS       :192.168.1.12
Secondary DNS     :
```

4.10.10 ip dhcp excluded-address

[Command]

ip dhcp excluded-address *start-ip end-ip*

no ip dhcp excluded-address *start-ip end-ip*

[View]

config view

[Parameters]

start-ip: Start IP address, point decimal type, range: 0.0.0.0-255.255.255.255

end-ip: End IP address, point decimal type, range: 0.0.0.0-255.255.255.255

[Description]

The **ip dhcp excluded-address** command is used to configure the excluded IP address segment in the address pool, and the excluded address segment is skipped during IP assignment for the local provisioning DHCP Server. A maximum of 20 sets of addresses can be configured.

The **no ip dhcp excluded-address** command is used to delete the excluded IP address segment in the address pool.

[Example]

Exclude the IP address range for 10.0.0.10-10.0.0.12 in 10.0.0.1 network segment:

```
BT(ip-dhcp-pool)# show running-config
network 10.0.0.1 255.255.255.0
lease days 9 hours 11 minutes 11 seconds 22
default-router 10.0.0.3
dns-server 1.1.1.2 2.2.2.2
bootfile cm-3.0 enable BT(ip-
dhcp-pool)# exit
BT(config)# ip dhcp excluded-address 10.0.0.10 10.0.0.12
BT(config)# show running-config | include excluded-addressip dhcp
excluded-address 10.0.0.10 10.0.0.12
```

Note:

1. Please make sure that the related parameters for the local provisioning DHCP server in the device are properly configured before using this command;
2. If the command fails to execute, the system will provide the relevant prompts based on the reasons of failure.

4.10.11 ip dhcp-pool

[Command]

(ip | ipv6) dhcp-pool

no (ip | ipv6) dhcp-pool

[View]

config view

[Parameter]

ip: IPv4 services.

ipv6: IPv6 services.

[Description]

The command "**(ip | ipv6) dhcp-pool**" is used to enter the view of DHCP service IPv4 or IPv6 address pool. In this view, the command will take effect when the command "**cable local-provisioning**" is configured as enable.

The command "**no (ip | ipv6) dhcp-pool**" is used to delete the configuration of dhcp server address pool.

[Example]

Enter the view of DHCP service IP address pool:

```
BT(config)# ip dhcp-pool
BT(ip-dhcp-pool)#
```

4.10.12 lease

[Command]

lease *leasetime*

lease days *day* **[hours** *hour* **[minutes** *minute* **[seconds** *second***]]]**

[View]

ip-dhcp-pool view

[Parameter]

leasetime: lease time of IP address in the IP address pool, with time granularity as 30 minutes; the time within 10 days can be configured. Type: numerical value; range: 1-480.

day: lease time of IP address in the IP address pool, in days. Type: numerical value; range: 0-10

hour: lease time of IP address in the IP address pool, in hours. Type: numerical value; range: 0-23

minute: lease time of IP address in the IP address pool, in minutes. Type: numerical value; range: 0-59

second: lease time of IP address in the IP address pool, in seconds. Type: numerical value; range: 0-59

[Description]

This command is used to configure the lease time of IP address in the IP address pool.

[Example]

Configure the lease time of IP address in the IP address pool as 1 hour:

```
BT(ip-dhcp-pool)# lease 2
BT(ip-dhcp-pool)# show dhcp-server config
Server host MAC :0024.68ab.cdcc
Server host IP   :10.10.28.82
Next sever IP    :10.10.28.82
Boot file name   :cm.cfg
```

```
Network  IP       :10.10.28.82/23
Lease             :0d1h0m0s
Default route     :10.10.28.31
Primary DNS       :192.168.1.12
Secondary DNS     :
```

4.10.13 member mac

[Command]

member mac *mac-start [mac-end]*

no member mac *mac-start [mac-end]*

no member mac all

[View]

ip-dhcp-pool view

[Parameter]

mac-start: Start MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF.

mac-end: End MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF.

Requirements on parameter configuration: *mac-start* shall not be greater than *mac-end*, and *mac-start mac-end* together form a MAC address segment, called a MACRange. Different MACRanges not allowed overlap.

[Description]

The command "**member mac**" is used to add the CM MACRange to the client class.

The command "**no member mac**" is used to delete the CM MACRange from the client class.

[Example]

Add the CM MACRange to the client class:

```
BT(client-class-1)# member mac  0012.0000.0000 0012.0000.0012
BT(client-class-1)# show running-config
 member mac 0012.0000.0000 0012.0000.0012
```

4.10.14 network

[Command]

network *ip-address netmask*

network start-ip *ip-begin* **end-ip** *end-ip*

no network start-ip *ip-begin* **end-ip** *end-ip*

[View]

ip-dhcp-pool view

[Parameter]

ip-address: IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255; default: 192.168.0.0

netmask: Subnet mask, dotted decimal type; range: 0.0.0.0-255.255.255.255; default: 255.255.255.0

start-ip: Start IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255

end-ip: End IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255

Requirements on parameter configuration: *ip-start* shall not be greater than *ip-end*, and *ip-start* *ip-end* together form an IP address segment, called an IPRange. Different IPRanges not allowed overlap.

[Description]

This command is used to configure the DHCP service IP address pool. By default, CM using local service will be online by using IP address in the address pool.

The command "**network** *ip-address netmask*" is used to configure the IP address pool of DHCP service.

The command "**network start-ip** *start-ip* **end-ip** *end-ip*" is used to configure the IPRange in the IP address pool of DHCP service.

The command "**no network start-ip** *start-ip* **end-ip** *end-ip*" is used to delete the IPRange in the IP address pool.

[Example]

Configure the range of assignable IP address in the IP address pool:

```
BT(ip-dhcp-pool)# network 192.168.10.0 255.255.255.0
BT(ip-dhcp-pool)# show dhcp-server config
Server host MAC   :0024.68ab.cdcc
Server host IP    :10.10.28.82
Next sever IP     :10.10.28.82
Boot file name    :cm.cfg
Network  IP       :192.168.10.0/24
Lease             :0d1h0m0s
Default route     :10.10.28.31
Primary DNS       :192.168.1.12
Secondary DNS     :
```

Configure the IPRange in the IP address pool:

```
BT(ip-dhcp-pool)# show running-config
network 10.0.0.1 255.255.255.0
lease days 9 hours 11 minutes 11 seconds 22
```

```
default-router 10.0.0.3
dns-server 1.1.1.2 2.2.2.2
bootfile cm-3.0 enable
BT(ip-dhcp-pool)# network start-ip 10.0.0.10 end-ip 10.0.0.20
```

Note:

1. Before using this command, make sure that the local provisioning is configured on the device.
2. DHCP server assigned to the cm of the actual available IP address does not include equipment itself takes up the IP address, the distribution segment of the network address and the broadcast address.
3. If the command fails, the system will provide the relevant prompt for the cause of the failure.

4.10.15 prefix-delegation

[Command]

prefix-delegation *ipv6-mask prefix-length* **lifetime** *valid-lifetime pre-lifetime*

no prefix-delegation

[View]

ip-dhcpv6-pool view

[Parameter]

ipv6-mask: IPv6 address and mask, with format as X:X::X:X/M.

prefix: The IP prefix length of the IPv6 address. Type: numerical value; range: 0-128.

valid-lifetime: valid-lifetime of the IP address pool, in seconds. Type: numerical value; range: 600-4294967295.

pre-lifetime: preferred lifetime of the IP address pool, in seconds. Type: numerical value; range: 600-4294967295.

[Description]

The command "**prefix-delegation**" is used to configure the IA PD address, the valid-lifetime and preferred lifetime of address pool.

The command "**no prefix-delegation**" is used to delete the configuration of the IA PD address.

[Example]

Configure the IA PD address as 2000::2000/64, the prefix length as 64, the valid-lifetime as 18000 seconds and preferred lifetime as 1800 seconds:

```
BT(ip-dhcpv6-pool)# prefix-delegation 2000::2000/64 64 lifetime 18000 1800
```

```
BT(ip-dhcpv6-pool)# show ipv6 dhcp-pool config
Primary DNS      :
Secondary DNS    :
TFTP server      :
IA_NA pool       : 1000::/64
IA_NA pref       : 3600s
IA_NA valid      : 36000s
IA_PD pool       : 2000::/64
IA_PD pref       : 1800s
IA_PD valid      : 18000s
IA_PD length     : 64
Bootfile cm-3.0 : disable
```

4.10.16 show cable local-provisioning

[Command]

show cable [ipv6] local-provisioning

[View]

config view

[Parameter]

ipv6: IPv6 services. Without this parameter defaults to IPv4 services.

[Description]

This command is used to display the state of integrated DHCP and TFTP service inside CMTS. For the configuration of this function, refer to the section for command "**cable local-provisioning**".

[Example]

Display local DHCP and TFTP functions:

```
BT(config)# show cable local-provisioning
cable local-provisioning support cm
no cable local-provisioning support cpe
```

4.10.17 show client-class all

[Command]

show client-class all

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display the detailed configuration of client class.

[Example]

Display the detailed configuration of client class:

```
BT(config)# show client-class all
!
client-class 1
 client-class bind cm-config "online.cfg"
 member mac 0000.0000.0001
 member mac 0000.0000.0002
exit
!
client-class 12
 description "this class is for online"
 client-class bind cm-config "Arris.cfg"
 member mac 0012.0000.0000 0012.0000.0012
 member mac fc00.0000.0000 fcfe.ffff.ffff
exit
!
client-class 32
 client-class bind cm-config "online-staticip.cfg"
 member mac 001c.0000.0000 001f.0000.0000
exit
```

4.10.18 show dhcp-server config

[Command]

show dhcp-server config

[View]

ip-dhcp-pool view

[Parameter]

N/A

[Description]

This command is used to display the detailed configuration of DHCP service.

[Example]

Display the detailed configuration of DHCP service:

```
BT(ip-dhcp-pool)# show dhcp-server config
Server host MAC   :0024.68ab.cdcc
Server host IP    :10.10.28.82
Next sever IP     :10.10.28.82
Boot file name    :cm.cfg
Network  IP       :10.10.28.82/23
lease             :10d0h0m0s
Default route     :10.10.28.31
Primary DNS       :
Secondary DNS     :
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Server host MAC	MAC address of DHCP server
Server host IP	IP address of DHCP server
Next sever IP	TFTP server IP address specified by DHCP server
Boot file name	Name of CM configuration file
Network IP	IP address of the address pool
Lease	Lease of IP address
Default route	Default route address
Primary DNS	Primary DNS address
Secondary DNS	Secondary DNS address

4.10.19 show ip dhcp-pool

[Command]

show ip dhcp-pool

[View]

config view

[Parameter]

ip: IPv4 services.

[Description]

This command is used to display the configuration of DHCP service IP address pool.

[Example]

View IP address pool:

```
BT(config)# show ip dhcp-pool
```

```
ip dhcp-pool
 network 192.168.10.0 255.255.255.0
 network start-ip 10.0.0.11 end-ip 10.0.0.12
 network start-ip 10.0.0.13 end-ip 10.0.0.13
 network start-ip 10.0.0.14 end-ip 10.0.0.16
 lease 0d1h0m0s
 default-router
 dns-server
 bootfile cm-3.0 disable
exit
```

4.10.20 show ip dhcp-pool used-status

[Command]

show (ip | ipv6) dhcp-pool used-status

[View]

show ip dhcp-pool used-status: ip-dhcp-pool view

show ipv6 dhcp-pool used-status: ip-dhcpv6-pool view

[Parameter]

ip: IPv4 services.

ipv6: IPv6 services.

[Description]

This command is used to display information of the assigned IP address in IP address pool.

[Example]

Display the assigned IP address in IP address pool:

```
BT(ip-dhcp-pool)# show ip dhcp-pool used-status
Client MAC          IP Address       LeaseEnd
fc94.e349.471c      192.168.10.1     2014 Jan 01  00:49:01
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Client MAC	MAC address of terminal device with address assigned
IP Address	IP address assigned
LeaseEnd	End time of lease

4.10.21 show ipv6 dhcp-pool config

[Command]

show ipv6 dhcp-pool config

[View]

ip-dhcpv6-pool view

[Parameter]

N/A

[Description]

This command is used to display the configuration of DHCP IP address pool.

[Example]

View IP address pool:

```
BT(ip-dhcpv6-pool)# show ipv6 dhcp-pool config
Primary DNS      :
Secondary DNS    :
TFTP server      :
IA_NA pool       : 1000::/64
IA_NA pref       : 3600s
IA_NA valid      : 36000s
IA_PD pool       : 2000::/64
IA_PD pref       : 1800s
IA_PD valid      : 18000s
IA_PD length     : 64
Bootfile cm-3.0 : disable
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Primary DNS	Primary DNS server address.
Secondary DNS	Secondary DNS server address.
TFTP server	TFTP server address.
IA_NA pool	Identity association for non-temporary addresses pool.
IA_NA pref	Identity association for non-temporary addresses preferred lifetime.
IA_NA valid	Identity association for non-temporary addresses valid lifetime.
IA_PD pool	Identity Association for Prefix Delegation option pool.
IA_PD pref	Identity Association for Prefix Delegation option preferred lifetime.
IA_PD valid	Identity Association for Prefix Delegation option valid lifetime.
IA_PD length	Identity Association for Prefix Delegation option length.
Bootfile cm-3.0	Distinguish the status of CM version of the configuration file.

4.10.22 tftp-server

[Command]

tftp-server *ipv6-address*

no tftp-server

[View]

ip-dhcpv6-pool view

[Parameter]

ipv6-address: IPv6 address, with format as X:X::X:X.

[Description]

This command "**tftp-server** *ipv6-address*" is used to configure the TFTP server address of IPv6 address pool.

The command "**no tftp-server**" is used to delete the TFTP server address of IPv6 address pool.

[Example]

Configure the TFTP server address of address pool as 2000::3:

```
BT(ip-dhcpv6-pool)# tftp-server 2000::3 BT(ip-dhcpv6-
pool)# show ipv6 dhcp-pool configPrimary DNS    :
Secondary DNS    :
TFTP server      : 2000::3
IA_NA pool       : 1000::/64
IA_NA pref       : 3600s
IA_NA valid      : 36000s
IA_PD pool       : 2000::/64
IA_PD pref       : 1800s
IA_PD valid      : 18000s
IA_PD length     : 64
Bootfile cm-3.0 : disable
```

4.11 Rate Limit Management

4.11.1 rate-limit cm-ingress arp

[Command]

rate-limit cm-ingress arp *cm-arp*

[View]

config view

[Parameter]

cm-arp: Rate limit threshold of ARP packets at cable ingress port, in pps(packets per second). Type: numerical value; range: 0-30; default: 3

[Description]

This command is used to configure the rate limit threshold of CM-based ingress ARP packet at cable port. Any packet exceeding the threshold will be discarded.

[Example]

Configure the threshold of ingress ARP packet at cable port as 10:

```
BT(config)# rate-limit cm-ingress arp 10 BT(config)# show
rate-limit | include cm-ingress arprate-limit cm-ingress
arp 10
```

4.11.2 rate-limit cm-ingress dhcp

[Command]

rate-limit cm-ingress (dhcp | dhcpv6) *cm-dhcp*

[View]

config view

[Parameter]

dhcp: DHCPv4 packet

dhcpv6: DHCPv6 packet

cm-dhcp: Rate limit threshold of DHCP or DHCPV6 packets at cable ingress port, in pps. Type: numerical value; range: 0-30; default: 3

[Description]

This command is used to configure the rate limit threshold of CM-based ingress DHCP packet at cable port. Any packet exceeding the threshold will be discarded.

[Example]

Configure the threshold of ingress dhcp packet at cable port as 10:

```
BT(config)# rate-limit cm-ingress dhcp 10 BT(config)# show
rate-limit | include cm-ingress dhcprate-limit cm-ingress
dhcp 10
```

4.11.3 rate-limit cm-ingress icmpv6

[Command]

rate-limit cm-ingress icmpv6 *cm-icmpv6*

[View]

config view

[Parameter]

cm-icmpv6: Rate limit threshold of ICMPv6 packets at cable ingress port, in pps. Type: numerical value; range: 0-30; default: 3

[Description]

This command is used to configure the rate limit threshold of CM-based ingress ICMPv6 packet at cable port. Any packet exceeding the threshold will be discarded.

[Example]

Configure the threshold of ingress ICMPv6 packet at cable port as 20:

```
BT(config)# rate-limit cm-ingress icmpv6 20 BT(config)# show
rate-limit | include cm-ingress icmpv6rate-limit cm-ingress
icmpv6 20
```

4.11.4 rate-limit cm-ingress igmp

[Command]

rate-limit cm-ingress arp *cm-igmp*

[View]

config view

[Parameter]

cm-igmp: Rate limit threshold of IGMP packets at cable ingress port, in pps. Type: numerical value; range: 0-30; default: 3.

[Description]

This command is used to configure the speed limit threshold of IGMP messages based on CM in the direction of cable entry. Messages exceeding the threshold will be discarded.

[Example]

Configure the threshold of IGMP message speed limit in the direction of cable entry：

```
BT(config)# rate-limit cm-ingress igmp 10 BT(config)# show
rate-limit | include cm-ingress igmprate-limit cm-ingress
igmp 10
```

4.11.5 rate-limit cm-ingress mld

[Command]

rate-limit cm-ingress mld *cm-mld*

[View]

config view

[Parameter]

cm-mld: Rate limit threshold of MLD packets at cable ingress port, in pps. Type: numerical value; range: 0-30; default: 3

[Description]

This command is used to configure the speed limit threshold of M LD messages based on CM in the direction of cable entry. Messages exceeding the threshold will be discarded.

[Example]

The MLD message speed limit threshold for the cable entry direction will be configured:

```
BT(config)# rate-limit cm-ingress mld 10 BT(config)# show
rate-limit | include cm-ingress mldrate-limit cm-ingress
mld 10
```

4.11.6 rate-limit cpu-port arp

[Command]

rate-limit cpu-port arp *cpu-arp*

[View]

config view

[Parameter]

cpu-arp: Rate limit threshold of ARP packet at CPU port, in pps. Type: numerical value; range: 100-5000; default: 100

[Description]

This command is used to configure the rate limit threshold of ARP packet at CPU port. Any packet exceeding the threshold will be discarded.

[Example]

Configure the threshold of ARP at CPU port as 100:

```
BT(config)# rate-limit cpu-port arp 100
The speed of cpu-port arp has been limited to 100
BT(config)# show rate-limit | include cpu-port arprate-
limit cpu-port arp 100
```

4.11.7 rate-limit cpu-port dhcp

[Command]

rate-limit cpu-port dhcp *cpu-dhcp*

[View]

config view

[Parameter]

cpu-dhcp : Rate limit threshold of DHCP and DHCPv6 packet at CPU port, in pps. Type: numerical value; range: 100-500; default: 100

[Description]

This command is used to configure the rate limit threshold of DHCP packet at CPU port. Any packet exceeding the threshold will be discarded.

[Example]

Configure the rate limit threshold of DHCP packet at CPU port as 100:

```
BT(config)# rate-limit cpu-port dhcp 100
the speed of cpu-port dhcp has been limited to 100
BT(config)# show rate-limit | include cpu-port dhcprate-
limit cpu-port dhcp 100
```

4.11.8 rate-limit cpu-port icmpv6

[Command]

rate-limit cpu-port icmpv6 *cpu-icmpv6*

[View]

config view

[Parameter]

cpu-icmpv6: Rate limit threshold of ICMPv6 packets at CPU port, in pps(packets per second). Type: numerical value; range: 100-5000; default: 200

[Description]

This command is used to configure the rate limit threshold of ingress ICMPv6 packet at CPU port. Any packet exceeding the threshold will be discarded.

[Example]

Configure the threshold of ingress ICMPv6 packet at CPU port as 600:

```
BT(config)# rate-limit cpu-port icmpv6 600
the speed of cpu-port icmpv6 has been limited to 600
BT(config)# show rate-limit | include cpu-port icmpv6rate-
limit cable-ingress icmpv6 600
```

4.11.9 ate-limit cpu-port igmp-mld

[Command]

rate-limit cpu-port igmp-mld *cpu-igmp-mld*

[View]

config view

[Parameter]

cpu-igmp-mld: CPU IGMP and MLD message speed limit threshold, unit pps, Type: numerical value, range: 100-500, default: 200

[Description]

This command is used to configure the speed limit threshold for IGMP and MLD messages of the CPU, and messages exceeding the threshold will be discarded. The actual effective value is adjusted according to 100.

[Example]

Configure the IGMP/MLD message speed limit threshold of CPU:

```
BT(config)# rate-limit cpu-port igmp-mld 100
The speed of cpu-port igmp/mld has been limited to 100
BT(config)# show rate-limit | include cpu-port igmp-mldrate-
limit cpu-port igmp-mld 100
```

4.11.10 rate-limit cpu-port unicast

[Command]

rate-limit cpu-port unicast *cpu-unicast*

[View]

config view

[Parameter]

cpu-unicast: CPU unicast message speed limit threshold,in pps. Type: numerical value; range: 100-10000; default: 6000.

[Description]

This command is used to configure the CPU's unicast message speed limit threshold. Messages that exceed the threshold will be discarded. The actual effective value is adjusted according to 100.

[Example]

The CPU's ARP message speed limit threshold will be configured:

```
BT(config)# rate-limit cpu-port unicast 105
The speed of cpu-port unicast has been limited to 100
BT(config)# show rate-limit | include cpu-port unicastrate-
limit cpu-port unicast 105
```

4.11.11 show rate-limit

[Command]

show rate-limit

[View]

enable view, config view

[Parameter]

N/A

[Description]

Display the parameter configuration of rate limit function of the system.

[Example]

Display the parameter configuration of rate limit function of the system:

```
BT(config)# show rate-limit
rate-limit cpu-port arp 100
rate-limit cpu-port dhcp 100
rate-limit cpu-port igmp-mld 100
rate-limit cpu-port icmpv6 100
```

```
rate-limit cpu-port unicast 40000
rate-limit cm-ingress arp 10
rate-limit cm-ingress icmpv6 20
rate-limit cm-ingress dhcp 10
rate-limit cm-ingress dhcpv6 8
rate-limit cm-ingress igmp 30
rate-limit cm-ingress mld 30
```

4.11.12 show storm-control

[Command]

show storm-control

[View]

enable view, config view

[Parameter]

N/A

[Description]

Display the parameter configuration of storm suppression function of the system.

[Example]

Display the storm suppression threshold of broadcast/multicast packet at uplink/cable port:

```
BT(config)# show storm-controlstorm-
control uplink broadcast 1000 storm-
control cable broadcast 1000 storm-
control cable multicast 65535
```

4.11.13 storm-control cable broadcast

[Command]

storm-control cable broadcast *cable-broadcast*

[View]

config view

[Parameter]

cable-broadcast : Rate limit threshold of broadcast packet at cable port, in pps. Type: numerical value; range: 100-10000; default: 200

[Description]

This command is used to configure the storm suppression threshold of broadcast packet at cable port. Any packet exceeding the threshold will be discarded.

[Example]

Configure the storm suppression threshold of broadcast packet at cable port as 500:

```
BT(config)# storm-control cable broadcast 500 BT(config)# show
storm-control | include cable broadcaststorm-control cable
broadcast 500
```

4.11.14 storm-control cable multicast

[Command]

storm-control cable multicast *cable-multicast*

[View]

config view

[Parameter]

cable-multicast : Rate limit threshold of multicast packet at cable port, in pps. Type: numerical value; range: 100-300000; default: 65535.

[Description]

This command is used to configure the storm suppression threshold of multicast packet at cable port. Any packet exceeding the threshold will be discarded.

[Example]

Configure the storm suppression threshold of multicast packet at cable port as 600:

```
BT(config)# storm-control cable multicast 600 BT(config)# show
storm-control | include cable multicaststorm-control cable
multicast 600
```

4.11.15 storm-control uplink broadcast

[Command]

storm-control uplink broadcast *uplink-broadcast*

[View]

config view

[Parameter]

uplink-broadcast : Rate limit threshold of broadcast packet at uplink port, in pps. Type: numerical value; range: 100-10000; default: 200

[Description]

This command is used to configure the storm suppression threshold of broadcast packet at uplink port. Any packet exceeding the threshold will be discarded.

[Example]

Configure the storm suppression threshold of broadcast packet at uplink port as 700:

```
BT(config)# storm-control uplink broadcast 700 BT(config)# show
storm-control | include uplink broadcaststorm-control uplink
broadcast 700
```

4.12 Multicast Authorization Management

4.12.1 cable multicast authorization

[Command]

cable multicast authorization (enable | disable)

[View]

config view

[Parameter]

enable: Enable the multicast authorization

disable: Disable the multicast authorization

[Description]

This command is used to enable or disable the multicast session authorization. When the multicast authorization is enabled, CMTS has control over the permission for CM to watch the programs. Only CM with the permission can watch the programs. When the multicast authorization is disabled, CMTS allows all CM to watch the programs. By default, the multicast session authorization is disabled.

[Example]

Configure enabling the multicast authorization:

```
BT(config)# cable multicast authorization enable BT(config)# show
running-config verbose | include multicast authorcable multicast
authorization enable
cable multicast authorization max-session-num 0
cable multicast authorization default-action deny
```

4.12.2 cable multicast authorization default-action

[Command]

cable multicast authorization default-action (permit | deny)

[View]

config view

[Parameter]

permit: Join the multicast certification action as permit

deny: Join the multicast certification action as deny

[Description]

This command is used to configure the default permission for multicast session authorization. If the configuration file of CM for multicast session authorization fails to authorize some a multicast session, CM boasts the default permission. The default permission of the system is “deny”.

[Example]

Configure prohibiting the permission for multicast session authorization:

```
BT(config)# cable multicast authorization default-action deny
BT(config)# show running-config verbose | include default-actioncable
multicast authorization default-action deny
```

4.12.3 cable multicast authorization max-session-num

[Command]

cable multicast authorization max-session-num *max-session*

[View]

config view

[Parameter]

max-session: Max number of multicast session for each CM to join. Type: numerical value; range: 0-256; 0 indicates prohibiting CM to join the multicast session. The default value is 0.

[Description]

This command is used to configure the default number of multicast session for each CM to join. Each CM has a maximum number of multicast session allowed to join. If CM configuration file has specified a value, use the value in the configuration file; otherwise, use the default value.

If the number of multicast groups that CM currently joins is already the maximum number of multicast session allowed to join, regardless of the specified permission in the multicast authorization configuration file, CM is prohibited to join any new multicast session.

[Example]

Configure the number of multicast session for each CM to join as 5:

```
BT(config)# cable multicast authorization max-session-num 5 BT(config)#
show running-config verbose | include max-session-numcable multicast
authorization max-session-num 5
```

4.12.4 cable multicast authorization profile

[Command]

cable multicast authorization profile *profile-name*

no cable multicast authorization profile *profile-name*

[View]

config view

[Parameter]

profile-name: Name of profile created. Type: string; range: 1-15 characters

[Description]

The command "**cable multicast authorization profile**" is used to create a configuration file of multicast session authorization, and enter the mauth view. If the file has already been created, enter the mauth view directly.

The command "**no cable multicast authorization profile**" is used to delete the configuration file of multicast session authorization with name as *profile-name*.

[Example]

Create and enter a configuration file of multicast session authorization named "permit":

```
BT(config)# cable multicast authorization profile permit
BT(config-mauth)#
```

4.12.5 cable multicast authorization profile default

[Command]

cable multicast authorization profile default

no cable multicast authorization profile default

[View]

mauth view

[Parameter]

N/A

[Description]

The command "**cable multicast authorization profile default**" is used to set the configuration file of multicast session authorization as the default configuration file.

The command "**no cable multicast authorization profile default**" is used to set the configuration file of multicast session authorization as non-default configuration file.

[Example]

Set this configuration file of multicast session authorization as the default configuration file:

```
BT(config-mauth)# cable multicast authorization profile default
BT(config-mauth)# show running-config
cable multicast authorization profile permit
 cable multicast authorization profile default
exit
```

4.12.6 cable multicast authorization profile description

[Command]

cable multicast authorization profile description *description*

no cable multicast authorization profile description

[View]

mauth view

[Parameter]

description: Description of profile. Type: string; range: 1-255 characters

[Description]

The command "**cable multicast authorization profile description**" is used to add descriptions to the multicast session authorization file;

The command "**no cable multicast authorization profile description**" is used to delete descriptions of the authorization file

[Example]

Add the descriptions to the multicast session authorization file as multicast-test:

```
BT(config-mauth)# cable multicast authorization profile description multicast-test
BT(config-mauth)# show running-config | include description
 cable multicast authorization profile description multicast-test
```

4.12.7 cable session-rule priority

[Command]

cable session-rule *rule* **(permit | deny)** *src-address grp-address* **priority** *priority*

no cable session-rule *rule*

[View]

mauth view

[Parameter]

permit: the rule as permit

deny: the rule as deny

rule: rule ID of multicast authorization session. Type: numerical value; range: 1-65535

src-address: network section of source address, supports IPv4 and IPv6 address, when it is IPv4 address, dotted decimal + numerical value type; range: 0.0.0.0/0-255.255.255.255/32, else 32-bit hexadecimal type + numerical value type; range: 0::0/0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff/128.

grp-address: network section of destination address, supports IPv4 and IPv6 address, when it is IPv4 address, dotted decimal + numerical value type; range: 224.0.0.0/0- 239.255.255.255/32, else 32-bit hexadecimal type + numerical value type; range: ff00::/8 -ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff/128.

priority: Rule priority of multicast authorization session. Type: numerical value; range: 0-255

[Description]

The command "**cable session-rule**" is used to specify the permission for multicast session. CM acquires the permission specified by the multicast session rule through profile multicast session authorization file. Different CMs have different profile multicast session authorization files, and thus have different permissions. CM obtains the profile multicast session authorization file by any of the following ways: A. specify a file name in CM configuration file; B. if CM configuration file fails to specify one, the profile multicast session authorization file of CM will be the default profile authorization file.

The command "**no cable session-rule**" is used to delete the multicast session authorization rule.

[Example]

Specify the permission for multicast session:

```
BT(config-mauth)# cable session-rule 1 permit 0.0.0.0/0 224.1.1.2/32 priority1
BT(config-mauth)# show running-config | include priority
 cable session-rule 1 permit 0.0.0.0/0 224.1.1.2/32 priority 1
```

Note:

IGMP V2 doesn't support source IP address.

4.12.8 show cable modem multicast authorization static rule-list

[Command]

show cable modem multicast authorization static rule-list

[View]

enable view, config view, cmts view

[Parameter]

N/A.

[Description]

This command is used to view the IP multicast join authorization static session rule subtype in the CM configuration file. Viewing the corresponding static multicast authorization rule list ID by using the command show cable modem multicast profile.

[Example]

View the IP multicast join authorization static session rule subtyp:

```
BT(config-if-cmts-1)# show cable modem authorization static rule-list
Config ID  Rule ID  Action  Source IP Address/Length Group IP Address/Length Priority
1          1        permit  1.2.3.4/8                225.0.0.0/8              1
1          2        permit  1.2.3.4/8                226.0.0.0/8              2
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Config ID	Static session rule list ID
Rule ID	Static session rule ID
Action	Static session action
Source IP Address/Length	Static session source IP address
Group IP Address/Length	Static session group IP address
Priority	Static session priority

4.12.9 show cable modem multicast authorization profile

[Command]

show cable modem multicast authorization profile

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to choose which configuration file of multicast session authorization the CM used. For the create of configuration file of multicast session authorization, refer to the section for command "**cable multicast authorization profile**". The device choose which configuration file of multicast session authorization according to the configuration file of CM.

[Example]

View which configurations file of multicast authorization the CM used:

```
BT# show cable modem multicast authorization profile
Mac Address          MaxSession    StaticRuleCfgId  Profile Name
4432.c83c.88e4       10            1                lfz  gkk
4432.c83c.88e8       10            1                lfz  gkk
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Mac Address	MAC address of CM
MaxSession	Max number of multicast session for each CM to join
StaticRuleCfgId	Static rule list ID
Profile Name	Profile Name

4.12.10 show cmts multicast db

[Command]

show cmts multicast db

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to view all the multicast session DB, including Group IP,Source IP, CM MAC address in every session and number of host in session in every CM.

[Example]

View all the multicast session DB information:

```
BT(config-if-cmts-1)# show cmts multicast db
Session(S,G):(*,224.0.0.252)
I/F       CM MAC              Hosts
C1        0018.c02b.14a4      1
Session(S,G):(*,ff02::1:3)
I/F       CM MAC              Hosts
C1        0018.c02b.14a4      1
```

4.12.11 show cmts multicast db hosts

[Command]

show cmts multicast db *mac-address* **hosts**

[View]

cmts view

[Parameter]

mac-address: MAC address of a CM.Input pattern is AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF.

[Description]

This command is used to query host information of joining multicast session under a CM, including joining multicast session group IP, Source IP, host MAC address under the CM, and protocol version of joining message.

[Example]

View the host information of CM 0018.c02b.14a4 in all session:

```
BT(config-if-cmts-1)# show cmts multicast db 0018.c02b.14a4 hosts
Session(S,G):(*,224.0.0.252)
Host MAC           IGMP/MLD Ver
54e6.fc72.7730     IGMPv2
Session(S,G):(*,ff02::1:3)
Host MAC           IGMP/MLD Ver
54e6.fc72.7730     MLDv2
```

4.12.12 show cmts multicast db summary

[Command]

show cmts multicast db summary

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to view the total number of multicast session and the total number of CM in all session.

[Example]

View multicast session summary:

```
BT(config)# show cmts multicast db summary
RMD Index    Session Count    CMs Count
C1           2                2
```

4.12.13 show cmts multicast dsid

[Command]

show cmts multicast dsid

[View]

cmts view

[Parameter]

N/A

[Description]

This command it used to view DSID of all multicast session.

[Example]

View DSID of all multicast session:

```
BT(config-if-cmts-1)# show cmts multicast dsid
Multicast Group:      224.0.0.252
SessionIndex:         1
```

```
                    RMD Index:C1   SAID:0x121a       CM-Num:1
CM:0018.c02b.14a4       DS-Chan:9  dsid:0x4406     Hosts:1
   Host:54e6.fc72.7730  Timeout:2016-04-18 00:49:43 Mon
Multicast Group:     ff02::1:3
SessionIndex:        2
RMD Index:C1     SAID:0x1219     CM-Num:1
CM:0018.c02b.14a4       DS-Chan:9  dsid:0x4705     Hosts:1
   Host:54e6.fc72.7730  Timeout:2016-04-18 00:49:43 Mon
```

4.12.14 show cmts multicast running-config

[Command]

show cmts multicast running-config

[View]

config view

[Parameter]

N/A

[Description]

This command is used to view the configurations of CMTS multicast authorization.

[Example]

View the configurations of CMTS multicast authorization:

```
BT(config)# show cmts multicast running-config
!cmts multicast configuration:
cable multicast authorization enable
cable multicast authorization max-session-num 5
cable multicast authorization default-action deny
show cmts multicast running-config
cable multicast authorization profile permit
cable multicast authorization profile default
cable multicast authorization profile description multicast-test
cable session-rule 1 permit 0.0.0.0/0 224.1.1.2/32 priority 1
```

4.12.15 show cmts multicast session-cache

[Command]

show cmts multicast session-cache

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to view all multicast session, including interface,Group IP,Source IP.

[Example]

View all multicast session:

```
BT(config-if-cmts-1)# show cmts multicast session-cache
RMD Index         Session(S,G)
C1                (*,225.0.0.252)
                  (*,225.0.0.1)
```

4.13 Multicast Authorization QoS Management

4.13.1 cable multicast

[Command]

cable multicast (bond-only|bond-disable|bond-mix)

[View]

cmts view

[Parameter]

bond-only: Used to set multicast services to bind mode

bond-disable: Used to set up unbound mode for multicast services

bond-mix：Used to set multicast services to hybrid mode

[Description]

The "**cable multicast (bond-only | bond-disable | bond-mix)**" command is used to set the binding mode of multicast services:

Bond-only mode: only multicast sessions in binding mode are allowed;

Bond-disable mode: prohibit multicast session in binding mode;

Bond-mix mode: Hybrid mode, which is based on the CM mode that first joins the session, and subsequent mode CM with different CM can not join the session.

[Example]

Configure the CMTS device to support multicast sessions in bonded mode only:

```
BT(config-if-cmts-1)# cable multicast bond-only
BT(config-if-cmts-1)# show running-config | include cable multicastcable
 multicast bond-only
```

4.13.2 cable multicast group config

[Command]

cable multicast group config config-id *config-id*

no cable multicast group config config-id *config-id*

[View]

config view

[Parameter]

config-id: GC(Group Configuration) ID. Type: numerical value; range: 1-256.

[Description]

The command "**cable multicast group config**" is used to configure the GC ID and enter the mqos view. If the GC ID has already existed, enter the mqos view directly, without any additional GC ID created.

The command "**no cable multicast group config** " is used to delete the GC ID and the configuration of it.

[Example]

Configure the GC ID and enter the mqos view:

```
BT(config)# cable multicast group config 1
BT(config-mqos-1)#
```

4.13.3 cable multicast group-qos config

[Command]

cable multicast group-qos config (default | *qos-id***) service-class-name** *scn*

no cable multicast group-qos config (default | *qos-id***)**

[View]

config view

[Parameter]

default: Default GQC (Group QoS Configuration) ID.

qos-id: GQC ID. Type: numerical value; range: 1-256.

scn: Service Class Name. Type: string; range: 1-15 characters.

[Description]

The command "**cable multicast group-qos config**" is used to configure the GQC ID and service class name. If the GQC ID has already existed, modify the service class name directly. If the service class name has not existed or not downstream direction, sessions using this GQC will use built-in parameter QoS parameters.

The command "**no cable multicast group-qos config**" is used to delete the GC ID and the configuration of it.

[Example]

Configure the GQC ID 3 and the service class name as BrokerNews:

```
BT(config)# cable multicast group-qos config 3 service-class-name BrokerNews
BT(config)# show running-config | include group-qos
cable multicast group-qos config default service-class-name def
cable multicast group-qos config 3 service-class-name BrokerNews
```

4.13.4 cable multicast group rate

[Command]

cable multicast group (*group-ipv4***/***netmask* **|** *group-ipv6***/***prefix***) rate** *rate*

no cable multicast group rate

[View]

config view

[Parameter]

group-ipv4: IPv4 address of multicast group, dotted decimal type; range: 224.0.0.1-239.255.255.255; default: 192.168.0.10.

netmask: subnet mask of multicast group, Type: numerical value; range: 8-32.

group-ipv6: IPv6 address of multicast group, 32-bit hexadecimal type; range: ff00::/8.

prefix: IPv6 address prefix . Type: numerical value; range: 16-128.

rate: Expected maximum rate of multicast programs, in Mbps. Type: numerical value; range: 1-100; default: 30.

[Description]

The command "**cable multicast group rate**" is used to specify the maximum possible rate for a multicast program. This configuration will be used to add the bandwidth admission basis of a binding group when the multicast program is diverted. Threshold, it is forbidden to join. Group-ip supports IP segment configuration. The IP addresses in this segment take effect with this configuration value. This configuration specification is 256.

The command "**no cable multicast group rate**" is used to delete the configuration of maximum possible rate.

[Example]

Configure the maximum possible rate for multicast program 239.1.1.233 as 20Mbps:

```
BT(config)# cable multicast group 239.1.1.233/32 rate 20
BT(config)# show running-config | include rate
 cable multicast group 239.1.1.233/32 rate 20
```

4.13.5 cable multicast session age-time

[Command]

cable multicast session age-time *age-time*

[View]

config view

[Parameter]

age-time: Aging time, in s. Type: numerical value; range: 300-3600; default: 300.

[Description]

This command is used to set the aging time of a multicast entry. If no report packet is received from a member within the aging period, the corresponding entry is deleted.

[Example]

Configure the aging time of a multicast entry as 10 minutes:

```
BT(config)# cable multicast session age-time 600
BT(config)# show running-config | include age-time
 cable multicast session age-time 600
```

4.13.6 cable multicast static-group

[Command]

cable multicast static-group *group-ip*

no cable multicast static-group *group-ip*

[View]

ds bonding-group view

[Parameter]

group-ip: Group IP address, support IPv4 address or IPv6 address. For IPv4 address, dotted decimal type;For IPv6 address,. 32-bit hexadecimal type; range: any legal multicast address .

[Description]

The command "**cable multicast static-group**" is used to configure the channel set of static group. The set is also bonding group set, if the bonding group set is empty, This configuration does not take effect. This configuration takes precedence over the service flow Attribute Mask in the Service Class referenced by the QGC. Specifications: The maximum number of 256 in the binding group.

The command "**no cable multicast static-group**" is used to delete the channel set of static group.

[Example]

Configure the channel set of static group, the group IP address as 239.1.1.233:

```
BT(config-if-ds-bonding-group1)# cable multicast static-group 239.1.1.233
BT(config-if-ds-bonding-group1)# show running-config | include static-group
 cable multicast static-group 239.1.1.233
```

4.13.7 cable multicast vlan

[Command]

cable multicast vlan *vlan-id* **cos** *priority*

no cable multicast vlan

[View]

config view

[Parameter]

vlan-id: VLAN ID for setting multicast service. Type: numerical value; range: 1-4094

priority: The VLAN tag cos value used to set multicast services. Type: numerical value; range: 0-7

[Description]

The command "**group-qos config**" is used to configure the GQC ID for GC ID. If the GC ID not configured with GQC ID, it does not take effect.

The command "**no group-qos config**" is used to delete the GQC ID of GC ID.

The command "**cable multicast vlan** *vlan-id* **cos** *priority"* is used to set the VLAN rules for multicast services: the upstream multicast protocol message will be labeled with the set VLAN tag and then forwarded, and the downstream multicast data message with the set VLAN ID tag will be stripped of the VLAN tag and forwarded to CM.

The command "**no cable multicast vlan**" is used to delete the set multicast service VLAN rules.

[Example]

CMTS device multicast VLAN configuration is 1234, cos value is 5：

```
BT(config-if-cmts-1)# cable multicast vlan 1234 cos 5 BT(config-
if-cmts-1)# show running-config | include vlancable multicast
vlan 1234 cos 5
```

4.13.8 cable service-class name extra-alloc-bandwidth

[Command]

cable service-class name *service-class name* **extra-alloc-bandwidth** *extra-alloc-bandwidth*

[View]

config view

[Parameter]

service-class name: Service Class name.

extra-alloc-bandwidth: Configured active allocation bandwidth values. Unit: kbps, Type: numerical value; range: 0-8000, default: 0.

[Description]

This command is used to configure the bandwidth value of the active bandwidth allocation function. The default value is 0, which means no active bandwidth allocation.

[Example]

Service Class with active bandwidth allocation is named test and has a bandwidth value of 4000 kbps:

```
BT(config)# cable service-class name test extra-alloc-bandwidth 4000
```

4.13.9 cable service-class name extra-alloc-interval

[Command]

cable service-class name *service-class name* **extra-alloc-interval** *extra-alloc-interval*

[View]

config view

[Parameter]

service-class name: Service Class name.

extra-alloc-interval: The time interval for active bandwidth allocation, Unit: us, Type: numerical value; range: 500-4000, default: 1000.

[Description]

This command is used to configure the allocation time interval for the active bandwidth allocation function.

[Example]

Service Class with active bandwidth allocation function is named test and allocation time interval is 2000:

```
BT(config)# cable service-class name test extra-alloc-interval 2000
```

4.13.10 cable service-class name extra-alloc-timeout

[Command]

cable service-class name *service-class name* **extra-alloc-timeout** *extra-alloc-timeout*

[View]

config view

[Parameter]

service-class name: Service Class name.

extra-alloc-timeout: Stop active bandwidth allocation timeout, Unit: s, Type: numerical value; range: 0 or 60-65535, (When the value is 0, the timeout time is set to non-stop), default: 60.

[Description]

This command is used to configure the timeout time for stopping active bandwidth allocation. Service flows without traffic beyond that time are active bandwidth allocation by stopping. A timeout of 0 means no stopping.

[Example]

Configure the Service Class name as test and the timeout time to stop active bandwidth allocation is 6000s:

```
BT(config)# cable service-class name test extra-alloc-timeout 6000
```

4.13.11 group-qos config

[Command]

group-qos config *qos-id*

no group-qos config

[View]

config view

[Parameter]

qos-id: GQC ID. Type: numerical value; range: 1-256.

[Description]

The command "**group-qos config**" is used to configure the GQC ID for GC ID. If the GC ID not configured with GQC ID, it does not take effect.

The command "**no group-qos config**" is used to delete the GQC ID of GC ID.

[Example]

Configure the GQC ID 3 for GC 1:

```
BT(config-mqos-1)# group-qos config 3
BT(config-mqos-1)# show running-config | include group-qos
 group-qos config 3
```

4.13.12 session-range

[Command]

session-range grp-ip *group-ip* **[src-ip** *src-ip***]**

no session-range

[View]

mqos view

[Parameter]

group-ip: Group IP address, support IPv4 address and IPv6 address. For IPv4 address, dotted decimal type;For IPv6 address,. 32-bit hexadecimal type; range: any legal multicast address .

src-ip: Source IP address, support IPv4 address and IPv6 address. For IPv4 address, dotted decimal type, range: 0.0.0.0-255.255.255.255 .For IPv6 address,. 32-bit hexadecimal type; range: 0::0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff.

[Description]

The command "**session-range**" is used to configure the group IP address. If the value is empty, this configuration does not take effect.

The command "**no session-range**" is used to delete the group IP address.

[Example]

Configure the group IP address as 224.1.1.2/32:

```
BT(config-mqos-1)# session-range grp-ip 224.1.1.2/32 src-ip 10.10.10.250/32
BT(config-mqos-1)# show running-config | include session
 session-range grp-ip 224.1.1.2/32 src-ip 10.10.10.250/32
```

4.13.13 show cable multicast group-qos config

[Command]

show cable multicast group-qos config

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to view all the GQC information.

[Example]

View all the GQC information:

```
BT(config-if-cmts-1)# show cable multicast group-qos config
Group-QoS Config    Service Class
ID                  Name
Default             default
1                   MpegSD
2                   BrokerNews
Total GQC:3
```

4.13.14 show cable multicast group config

[Command]

show cable multicast group config

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to view all the GC information.

[Example]

View all the GC information:

```
BT(config-if-cmts-1)# show cable multicast group config
Group Config      Session Range           Group QoS Config
ID                (S,G)                   ID
1                 (*,225.0.0.252/32)      3
2                 (*,225.0.0.1/32)        5
Total GC:2
```

4.13.15 show cmts multicast statistics

[Command]

show cmts multicast statistics *sessionIndex*

[View]

cmts view

[Parameter]

sessionIndex: Index of multicast sessions, range: 1-256.

[Description]

This command is used to view the data stream statistics of a multicast session .Data is updated every minute .

[Example]

View the data stream statistics of multicast session 1:

```
BT(config-if-cmts-1)# show cmts multicast statistics 1
Session(S,G):(*,224.0.0.252)
Packets Queued  : 0
Bytes Queued    : 0
Packets Passed  : 2253
Bytes Passed    : 2307072
Packets Dropped : 0
```

4.13.16 show cmts multicast statistics proto

[Command]

show cmts multicast statistics proto

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to view the global statistics of protocol packets .

[Example]

View the global statistics of protocol packets:

```
BT(config-if-cmts-1)# show cmts multicast statistics proto
Last General Query Time:          2019-04-09 17:04:24 Tue
Gen Query Response Interval:      10.0 sec
Min Report Timeout Interval:      145.0 sec
-----------------------------------------------------
IgmpGeneralMemQueries:            311
IgmpGrpSpecificQueries:           0
IgmpQueriesUsRxDropped:           0
IgmpV2MemRptsUsRxUsTx:            0
IgmpV2MemRptsUsRxDropped:         0
IgmpLeaveGrpUsRxUsTx:             0
-----------------------------------------------------------------
IgmpV3MemRptsUsRxUsTx:            0
IgmpV3MemRptsUsRxDropped:         0
IgmpV3MemRptsUsRxBadAsmGroup:     0
IgmpV3MemRptsUsRxBadSsmGroup:     0
IgmpUsRxUnsupportedDropped:       0
IgmpDsRxUnsupportedDropped:       0
-----------------------------------------------------------------
MldGeneralMemQueries:             0
MldGrpSpecificQueries:            0
MldQueriesUsRxDropped:            0
MldV1SolicitedNodeRptsUsRx:       15
MldV1MemRptsUsRxUsTx:             0
MldV1MemDoneUsRxUsTx:             0
MldV1MemRptsUsRxDropped:          0
MldV2MemRptsUsRxUsTx:             0
```

```
MldV2MemRptsUsRxDropped:          0
MldV2MemRptsUsRxBadAsmGroup:      0
MldV2MemRptsUsRxBadSsmGroup:      0
MldUsRxUnsupportedDropped:        0
NonMldUsForwarded:                0
NonMldDsForwarded:                0
```

4.14 PacketCable Management

4.14.1 cops pep-id

[Command]

cops pep-id *pep*

[View]

config view

[Parameter]

pep: PEP string. Type: string; range: 1-32; default: CMTS

[Description]

This command is used to specify the default policy enforcement point (PEP) used in the COPS message.

[Example]

Enable the packetcable DQoS function and PEP set to cmts-test:

```
BT(config)# packetcable BT(config)# cops
pep-id cmts-test BT(config)# show
packetcable globalPacket Cable Global
configuration:
COPS PEP ID                    : cmts-test
Packetcable DQOS Enabled       : Yes
acketcable Multimedia Enabled : No
```

4.14.2 packetcable

[Command]

packetcable

no packetcable

[View]

config view

[Parameter]

N/A

[Description]

The command "**packetcable**" is used to enable the PacketCable DQoS function. By default, the PacketCable DQoS function is disabled.

The command "**no packetcable**" is used to disable the PacketCable DQoS function.

[Example]

Enable the PacketCable DQoS function:

```
BT(config)# packetcable BT(config)# show
packetcable globalPacket Cable Global
configuration:
COPS PEP ID                    : cmts-test
Packetcable DQOS Enabled       : Yes
acketcable Multimedia Enabled : No
```

4.14.3 packetcable multimedia

[Command]

packetcable multimedia

no packetcable multimedia

[View]

config view

[Parameter]

N/A

[Description]

The command "**packetcable**" is used to enable the PacketCable multimedia function. By default, the PacketCable DQoS function is disabled.

The command "**no packetcable**" is used to disable the PacketCable multimedia function.

[Example]

Enable the PacketCable multimedia function:

```
BT(config)# packetcable multimedia
BT(config)# show packetcable globalPacket
Cable Global configuration:
COPS PEP ID                    : cmts-test
```

```
Packetcable DQOS Enabled      : Yes
Packetcable Multimedia Enabled :
Yes
```

4.14.4 show cops server

[Command]

show cops server

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to view the current COPS server to establish connections.

[Example]

View the current COPS server to establish connections:

```
BT(config)# show cops server
Handle    Type    Ip Address      srcPort    Keep-alive(s)
11231     PCMM    172.16.34.42    53453      2
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Handle	session ID
Type	COPS server type
Ip Address	COPS server IP address
srcPort	COPS server source port
Keep-alive(s)	Keep time , in seconds

4.14.5 show packetcable global

[Command]

show packetcable global

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to view the current packetcable configuration state.

[Example]

View the current packetcable configuration state:

```
BT(config)# show packetcable global
Packet Cable Global configuration:
COPS PEP ID                    : BT-CMTS
Packetcable DQOS Enabled       : No
Packetcable Multimedia Enabled :
Yes
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
COPS PEP ID	COPS PEP ID
Packetcable DQOS Enabled	Whether to enable the packetcable function
acketcable Multimedia Enabled	Whether to enable the packetcable multimedia function

4.14.6 show packetcable gate summary

[Command]

show packetcable gate summary

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to view the summary information of packetcable gate.

[Example]

View the summary information of packetcable gate:

```
BT(config)# show packetcable gate summary
GateID     SubscriberID     GC-Addr          State        Type    SFID(us)    SFID(ds)
10000      172.16.18.100    172.16.34.42     committed    MM      512         --
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
GateID	Gate ID
SubscriberID	Packetcable subscriber ID

GC-Addr	Packetcable gateway address

Parameter	Description
State	Packetcable gate state
Type	Packetcable gate type
SFID(us)	Upstream service flow ID
SFID(ds)	Downstream service flowID

4.15 Admission Control

4.15.1 cable admission-control event cm-registration

[Command]

cable admission-control event cm-registration (enable | disable)

[View]

cmts view

[Parameter]

enable: Enable the admission control function switch of CM registered events

disable: Disable the admission control function switch of CM registered events

[Description]

This command is used to enable or disable the admission control function switch of CM registered events. By default, the function is disabled.

[Example]

Configure enabling the admission control function switch of CM registered events:

```
BT(config-if-cmts-1)# cable admission-control event cm-registration enable
Warning: While the switch is turned on it is not allowed to configure admission
control parameter
BT(config-if-cmts-1)# show running-config verbose | include cm-regis
 cable admission-control event cm-registration enable
```

4.15.2 cable admission-control event dynamic-service

[Command]

cable admission-control event dynamic-service (enable | disable)

[View]

cmts view

[Parameter]

enable: Enable the admission control function switch of dynamic service flow events

disable: Disable the admission control function switch of dynamic service flow events

[Description]

This command is used to enable or disable the admission control function switch of dynamic service flow event. By default, the function is disabled.

[Example]

Configure enabling the admission control function switch of dynamic service flow event:

```
BT(config-if-cmts-1)# cable admission-control event dynamic-service enable
Warning: While the switch is turned on it is not allowed to configure admission
control parameter
BT(config-if-cmts-1)# show running-config verbose | include dynamic-service
 cable admission-control event dynamic-service enable
```

4.15.3 cable admission-control max-history

[Command]

cable admission-control max-history *max-history*

no cable admission-control max-history

[View]

cmts view

[Parameter]

max-history: Maximum number of admission control history. Type: numerical value; range: 0-1024; default: 64

[Description]

The command "**cable admission-control max-history**" is used for configuration of the maximum number of admission control history. If exceeding the maximum number of history entries, the old records will be covered by new entries.

The command "**no cable admission-control max-history**" is used to restore the default maximum number of admission control history.

[Example]

Configure the maximum number of admission control history as 100:

```
BT(config-if-cmts-1)# cable admission-control max-history 100
```

```
BT(config-if-cmts-1)# show running-config verbose | include admission-controlmax-
history
 cable admission-control max-history 100
```

4.15.4 cable admission-control us-bandwidth sched exclusive

[Command]

cable admission-control us-bandwidth sched (be | nrtps | rtps | ugs-ad | ugs) exclusive *exclusive* **[non-exclusive** *non-exclusive***]**

no cable admission-control us-bandwidth sched (be | nrtps | rtps | ugs-ad | ugs) (exclusive | non-exclusive)

[View]

cmts view

[Parameter]

be: Upstream service flow scheduling type- BE (Best Effort)

nrtps: Upstream service flow scheduling type- NRTPS (Non-Real-Time Polling Service)

rtps: Upstream service flow scheduling type- RTPS (Real-time Polling Service)

ugs-ad: Upstream service flow scheduling type- UGS-AD (Unsolicited Grant Service with Activity Detection)

ugs: Upstream service flow scheduling type- UGS (Unsolicited Grant Service)

exclusive: Exclusive bandwidth, in percent. Type: numerical value; range: 0-100; default: 0

non-exclusive: Non-exclusive bandwidth. in percent. Type: numerical value; range: 0-100; default: 0

Requirements on bandwidth configuration: The exclusive bandwidth + The non-exclusive bandwidth <= 100.

[Description]

This command is used to configure the percentage of exclusive bandwidth and non-exclusive bandwidth.

[Example]

Configure the percentage of exclusive bandwidth of BE as 10, and the percentage of non-exclusivebandwidth of BE as 50:

```
BT(config-if-cmts-1)# cable admission-control us-bandwidth sched be exclusive
10 non-exclusive 50
BT(config-if-cmts-1)# show running-config verbose | include be exclusive
 cable admission-control us-bandwidth sched be exclusive 10 non-exclusive 50
```

4.15.5 cable admission-control us-bandwidth sched minor major

[Command]

cable admission-control us-bandwidth sched (be | nrtps | rtps | ugs-ad | ugs) minor *minor* **major** *major*

no cable admission-control us-bandwidth sched (be | nrtps | rtps | ugs-ad | ugs) (minor | major)

[View]

cmts view

[Parameter]

be: Upstream service flow scheduling type- BE

nrtps: Upstream service flow scheduling type- NRTPS

rtps: Upstream service flow scheduling type- RTPS

ugs-ad: Upstream service flow scheduling type- UGS-AD

ugs: Upstream service flow scheduling type- UGS

minor: The threshold of minor level, in percent. Type: numerical value; range: 0-100; default: 0

major: The threshold of major level, in percent. Type: numerical value; range: 0-100; default: 0

Requirements on threshold configuration: The threshold of minor level < the threshold of major level.

[Description]

This command is used to configure the threshold of the special scheduling type.

[Example]

Configure the minor threshold of UGS as 20, and the major threshold of UGS as 50:

```
BT(config-if-cmts-1)# cable admission-control us-bandwidth sched ugs minor 20major 50
BT(config-if-cmts-1)# show running-config verbose | include ugs minor
 cable admission-control us-bandwidth sched ugs minor 20 major 50
```

4.15.6 show cable admission-control

[Command]

show cable admission-control

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to display all the configuration admission control function.

[Example]

Display the history information of the admission control:

```
BT(config-if-cmts-1)# show cable admission-control
cm-registration    dynamic-service  HistorySize    last-history-index
enable             enable           64             1
sched-type     exclusive   non-exclusive  minor      major
be             01          00             01         02
nrtps          00          00             01         02
rtps           00          00             01         02
ugs-ad         00          00             01         02
ugs            00          00             01         02
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
cm-registration	The state of CM registration switch
dynamic-service	State of IPDR session
HistorySize	The history size
last-history-index	The last history index
sched-type	Upstream service flow scheduling type
exclusive	Exclusive bandwidth
non-exclusive	Non exclusive bandwidth
minor	The threshold of minor level
major	The threshold of major level

4.15.7 show cable admission-control history

[Command]

show cable admission-control history

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to display the history information of the admission control. For configuration of the maximum number of admission control history, refer to the section for command line "**cable admission-control max-history**".

[Example]

Display the history information of the admission control:

```
BT(config-if-cmts-1)# show cable admission-control history
CMTS's admission control rejected history information:
Index    Time          CM MAC      Event-type    Direction      Channel    Flow-
type     Exclu         NonExclu    ActualExclu   ActualNonExclu    RFNonExclu
1        2019 Jan 01 00:03:23    2476.7d06.c1a8   REG          US          2
ugs          1.00      40.00       0.00          0.00              98.00
2        2019 Jan 01 00:03:23    2476.7d06.c1a8   REG          US          2
be           1.00      40.00       0.00          0.00              0.00
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Index	The index of history
Time	The time of history
CM MAC	CM MAC address
Event-type	Event type of admission
Direction	Direction of admission
Channel	The channel ID
Flow-type	The type of upstream flow
Exclu	The threshold of exclusive bandwidth
NonExclu	The threshold of non exclusive bandwidth
ActualExclu	Actual exclusive bandwidth
ActualNonExclu	Actual non exclusive bandwidth
RFNonExclu	Non exclusive bandwidth of the channel

4.15.8 show cable admission-control statistic upstream

[Command]

show cable admission-control statistic upstream [*channel-id***]**

[View]

cmts view

[Parameter]

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

[Description]

This command is used to display the upstream statistics of the admission control.

[Example]

Display the upstream statistics of the admission control:

```
BT(config-if-cmts-1)# show cable admission-control statistic upstream
Channel    be           nrtps        rtps          ugs-ad        ugs
       Ex    NonEx   Ex    NonEx   Ex    NonEx   Ex    NonEx   Ex    NonE
1      0.00  0.00    0.00  0.00    0.00  0.00    0.00  0.00    0.00  0.00
2      0.00  0.00    0.00  0.00    0.00  0.00    0.00  0.00    0.00  0.00
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Channel	The channel ID
be	Upstream service flow scheduling type as BE
nrtps	Upstream service flow scheduling type as NRTPS
rtps	Upstream service flow scheduling type as RTPS
ugs-ad	Upstream service flow scheduling type as UGS-AD
ugs	Upstream service flow scheduling type as UGS
Ex	Exclusive bandwidth
NonEx	Non exclusive bandwidth

4.15.9 show cable upstream ugs statistic

[Command]

show cable upstream *channel-id* **(ugs | ugs-ad) statistic**

[View]

cmts view

[Parameter]

ugs: UGS type

ugs-ad: UGS-AD type

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

[Description]

This command is used to display the statistics on the channel bandwidth occupied by the UGS or UGS-AD service flow .

[Example]

Display the statistics of UGS type on the channel 1:

```
BT(config-if-cmts-1)# show cable upstream 1 ugs statistic
Service flow statistics:
SFID    SF   Curr    Sid    Flags   Bandwidth  CM-MAC          Create-time
        Ref  State
514     4    active  4610   static  6400000    2476.7d06.c1a8  2019 Oct 24  14:28:20
Total service flow: 1
Total channel bandwidth: 5120000
Total service flow bandwidth: 6400000(125.00%)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
SFID	Service Flow ID
SF Ref	Service Flow Reference
Curr State	The current state of service flow
Sid	Primary service Flow ID
Flags	Type identification
Bandwidth	Band width of the service flow
CM-MAC	CM MAC address
Create-time	Create time of the service flow

Chapter 5 Port Configuration Management

5.1 Uplink Management

5.1.1 clear interface uplink statistics history

[Command]

clear interface uplink statistics *uplink-id* **history**

[View]

config view

[Parameter]

uplink-id: Uplink ID. Type: numerical value; range: 1-2.

[Description]

This command is used to clear all performance statistics history information of the uplink port.

[Example]

Clear the performance statistics 1 history of uplink port:

```
BT(config)# clear interface uplink statistics 1 history BT(config)#
show interface uplink statistics 1 history24h allIndex
            RxSpeed(kbps)    TxSpeed(kbps)    Time
```

5.1.2 phy

[Command]

phy (ge | 10ge | epon | gpon | 10gepon | xgpon | 2.5ge| auto)

[View]

uplink view

[Parameter]

ge: Fixed selection, optical port.

10ge: Fixed selection, optical port.

epon: Fixed selection, epon port of OLT device.

gpon: Fixed selection, gpon port of OLT device.

10gepon: Fixed selection, 10gepon port of OLT device.

xgpon: Fixed selection, xgpon port of OLT device.

2.5ge: Fixed selection, optical.

auto: automatic detection of uplink, automatic detection of uplink mode according to OLT signal.

[Description]

This command is used to set the media non-automatic selection mode of the uplink port, which can be set to AE, 2.5GAE, 10GAE, EPON, GPON, 10GEPON, XGPON and auto mode. The configuration takes effect after a reboot is required.

[Example]

The uplink port is set to optical port mode:

```
BT(config-if-uplink1)# phy ge
Uplink mod change will request system reboot,continue?(y/n) [n]y
```

Note:

phy ge only supports the uplink port rate of 1000Mbps and Full-duplex, and does not support 100Mbps.

5.1.3 phy description

[Command]

phy description *description*

no phy description

[View]

uplink view

[Parameter]

description: PHY description. Type: string; range: 1-255 characters.

[Description]

The command "**phy description**" is used to configure the description of uplink port, e.g. to identify the specific purpose of uplink port, such as EQAM and EQAM + DOCSIS.

The command "**no phy description**" is used to delete the descriptions of uplink port.

[Example]

Configure the descriptions of uplink port in the uplink view:

```
BT(config-if-uplink1)# phy description testString
```

```
BT(config-if-uplink1)# show running-config | include description
 phy description "testString"
```

5.1.4 show phy

[Command]

show phy

[View]

uplink view

[Parameter]

N/A

[Description]

This command is used to display the configuration and status of the uplink.

[Example]

Display the configuration and status of the uplink:

```
BT(config-if-uplink1)# show phy
Interface    Media        LinkStatus     Speed(Mbps)    DuplexMode     Description
-------------------------------------------------------------------------------------------------------------
  1          10GE         Up             10000          Full           gao testString
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Interface	Display uplink port ID
Media	Switching mode of uplink port, including GE, 2.5GE, 10GE, EPON, GPON, 10GEPON, XGPON or auto-XXXX
LinkStatus	Connection status of uplink port
Speed(Mbps)	Transfer rate of uplink port
DuplexMode	Communication mode of uplink port, including half-duplex, full duplex, and automatic selection
Description	Description of uplink port

5.1.5 show interface uplink monitor config

[Command]

show interface uplink monitor config

[View]

enable view, config view, uplink view

[Parameter]

N/A

[Description]

This command is used to display the sending and receiving alarm information of uplink port, mainly including the warning threshold and recovery threshold for three levels: minor/major/critical. To configure these settings, please refer to the command "**uplink util threshold-warning threshold-recovery**".

[Example]

Display the transfer alarm information of the uplink port:

```
BT(config)# show interface uplink monitor config
 Monitor              :Enable
 TxMinorAlarm(%)       0
 TxMinorRecov(%)       0
 TxMajorAlarm(%)       70
 TxMajorRecov(%)       65
 TxCritiAlarm(%)       90
 TxCritiRecov(%)       85
 RxMinorAlarm(%)       0
 RxMinorRecov(%)       0
 RxMajorAlarm(%)       70
 RxMajorRecov(%)       65
 RxCritiAlarm(%)       90
 RxCritiRecov(%)       85
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Monitor	Uplink statistics interface is enabled or not
TxMinorAlarm(%)	Sending warning threshold of Minor level
TxMinorRecov(%)	Sending recovery threshold of Minor level
TxMajorAlarm(%)	Sending warning threshold of Major level
TxMajorRecov(%)	Sending recovery threshold of Major level
TxCritiAlarm(%)	Sending warning threshold of Critical level
TxCritiRecov(%)	Sending recovery threshold of Critical level
RxMinorAlarm(%)	Receiving warning threshold of Minor level
RxMinorRecov(%)	Receiving recovery threshold of Minor level
RxMajorAlarm(%)	Receiving warning threshold of Major level
RxMajorRecov(%)	Receiving recovery threshold of Major level
RxCritiAlarm(%)	Receiving warning threshold of Critical level
RxCritiRecov(%)	Receiving recovery threshold of Critical level

5.1.6 show interface uplink statistics current

[Command]

show interface uplink statistics *uplink-id* **(current | current15m | current24h)**

[View]

enable view, config view

[Parameter]

current: Uplink statistics in recent 30 seconds.

current15m: Uplink statistics in the past 15 minutes.

current24h: Uplink statistics in the past 24 hours.

uplink-id: Uplink ID. Type: numerical value; The value is fixed to 1.

[Description]

This command is used to display the detailed statistics of data transmitted through uplink port.

[Example]

Display the detailed statistics of data transmitted through the uplink port 1 in the past 30 seconds:

```
BT(config)# show interface uplink statistics 1 current
Total elapsed time                 : 30 s
Transmit Speed                     : 0.256 (kbps)
Receive Speed                      : 0.000 (kbps)
Transmitted octets                 : 960
Received octets                    : 0
Received packets 64 octets         : 0
Received packets 65-127 octets     : 0
Received packets 128-255 octets    : 0
Received packets 256-511 octets    : 0
Received packets 512-1023 octets   : 0
Received packets 1024-1518 octets  : 0
Received packets 1519-max octets   : 0
IfInErrors                         : 0
IfInUcastPks                       : 0
IfInMulticastPks                   : 0
IfInBroadcastPks                   : 0
IfOutErrors                        : 0
IfOutUcastPks                      : 0
IfOutMulticastPks                  : 0
IfOutBroadcastPks                  : 15
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Total elapsed time	Length of statistic time
Transmit Speed	Average sending rate
Receive Speed	Average receiving rate
Transmitted octets	Total bytes sent
Received octets	Total bytes received
Received packets 64 octets	Number of received packet with length as 64 bytes
Received packets 65-127 octets	Number of received packet with length as 65-127 bytes
Received packets 128-255 octets	Number of received packet with length as 128-255 bytes
Received packets 256-511 octets	Number of received packet with length as 256-511 bytes
Received packets 512-1023 octets	Number of received packet with length as 512-1,023 bytes
Received packets 1024-1518 octets	Number of received packet with length as 1,024-1,518 bytes
Received packets 1519-max octets	Number of received packet with length exceeding 1,519 bytes
IfInErrors	Number of error packet received
IfInUcastPks	Number of unicast packet received
IfInMulticastPks	Number of multicast packet received
IfInBroadcastPks	Number of broadcast packet received
IfOutErrors	Number of error packet sent
IfOutUcastPks	Number of unicast packet sent
IfOutMulticastPks	Number of multicast packet sent
IfOutBroadcastPks	Number of broadcast packet sent

5.1.7 show interface uplink statistics history

[Command]

show interface uplink statistics *uplink-id* **history15m** (*history15m* | **all**)

show interface uplink statistics *uplink-id* **history24h** (*history24h* | **all**)

[View]

enable view, config view

[Parameter]

all: All history statistics.

history15m: Index number of 15-minute history. Type: numerical value; range: 1-96

history24h: index number of history in the past 24 hours. Type: numerical value; range: 1-30

uplink-id: Uplink ID. Type: numerical value; The value is fixed to 1.

[Description]

The command "**show interface uplink statistics history15m all**" is used to display all the history performance statistics of the uplink port every 15 minutes.It allows displaying the performance statistics of each 15-minute history in the past 24 hours.

The command "**show interface uplink statistics history15m** *history15m*" is used to display the history performance statistics of the uplink port every 15 minutes for detail. When the index number is 1, it indicates the history in the recent 15 minutes. Range: 1-96, allows displaying the performance statistics of each 15-minute history in the past 24 hours.

The command "**show interface uplink statistics history24h all**" is used to display all the history performance statistics of the uplink port every 24 hours.It allows displaying the performance statistics of each 24-hour history in the past 30 days.

The command "**show interface uplink statistics history24h** *history24h*" is used to display the history performance statistics of the uplink port every 24 hours for detail. When the index number is 1, it indicates the history in the recent 24 hours. Range: 1-30, allows displaying the performance statistics of each 24-hour history in the past 30 days.

[Example]

Display the first 15-minute history detail of the uplink port 1:

```
BT(config)# show interface uplink statistics 1 history15m 1
Record created time               : 2019 Jan 09  19:31:18
Transmit Speed                    : 0.042 (kbps)
Receive Speed                     : 1.303 (kbps)
Transmitted octets                : 4806
Received octets                   : 146600
Received packets 64 octets        : 70
Received packets 65-127 octets    : 1098
Received packets 128-255 octets   : 205
Received packets 256-511 octets   : 1
Received packets 512-1023 octets  : 0
Received packets 1024-1518 octets : 0
Received packets 1519-max octets  : 0
IfInErrors                        : 0
IfInUcastPks                      : 0
IfInMulticastPks                  : 1263
IfInBroadcastPks                  : 111
IfOutErrors                       : 0
IfOutUcastPks                     : 0
IfOutMulticastPks                 : 31
IfOutBroadcastPks                 : 1
Total history record number       : 96
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Record created time	Time of record created
Transmit Speed	Average sending rate
Receive Speed	Average receiving rate
Transmitted octets	Total bytes sent
Received octets	Total bytes received
Received packets 64 octets	Number of received packet with length as 64 bytes
Received packets 65-127 octets	Number of received packet with length as 65-127 bytes
Received packets 128-255 octets	Number of received packet with length as 128-255 bytes
Received packets 256-511 octets	Number of received packet with length as 256-511 bytes
Received packets 512-1023 octets	Number of received packet with length as 512-1,023 bytes
Received packets 1024-1518 octets	Number of received packet with length as 1,024-1,518 bytes
Received packets 1519-max octets	Number of received packet with length exceeding 1,519 bytes
IfInErrors	Number of error packet received
IfInUcastPks	Number of unicast packet received
IfInMulticastPks	Number of multicast packet received
IfInBroadcastPks	Number of broadcast packet received
IfOutErrors	Number of error packet sent
IfOutUcastPks	Number of unicast packet sent
IfOutMulticastPks	Number of multicast packet sent
IfOutBroadcastPks	Number of broadcast packet sent
Total history record number	Number of total history

Display the last 15-minute history of the uplink port 1:

```
BT(config)# show interface uplink statistics 1 history15m all
Index       RxSpeed(kbps)    TxSpeed(kbps)    Time
1           1193026.275      130972.840       2019 Apr 03  19:23:24
2           929682.731       44977.391        2019 Apr 03  19:08:00
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Index	Index of the record
RxSpeed(kbps)	Average receiving rate
TxSpeed(kbps)	Average sending rate
Time	Recording time

5.1.8 show interface uplink statistics summary

[Command]

show interface uplink statistics summary

[View]

enable view, config view

[Parameter]

N/A

[Description]

Display the current statistics receiving/sending rate and history maximum receiving/sending rate of the uplink port. This command will take effect after the monitoring function of uplink port is enabled.

[Example]

Display the current receiving/sending rate when the monitoring function of uplink port is enabled:

```
BT(config)# show interface uplink statistics summary
Port          CurrentTx(kbps)    CurrentRx(kbps)    MaxTx(kbps)      MaxRx(kbps)
 1            0.273              0.000              0.273            0.069
 2            0.000              0.000              0.000            0.000
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Port	Port number of uplink port
CurrentTx(kbps)	Current sending rate of uplink port, in kbps
CurrentRx(kbps)	Current receiving rate of uplink port, in kbps
MaxTx(kbps)	Max. sending rate of uplink port in history statistics, in kbps
MaxRx(kbps)	Max. receiving rate of uplink port in history statistics, in kbps

5.1.9 show interface uplink transceiver

[Command]

show interface uplink transceiver *uplink-id*

[View]

config view

[Parameter]

uplink-id: Uplink ID. Type: numerical value; The value is fixed to 1.

[Description]

This command is used to display the optical module information of uplink port, including temperature, voltage, bias current, transmission power and receiving power of optical module.

[Example]

Display the phy optical module information of uplink port 1:

```
BT(config)# show interface uplink transceiver 1
  Identifier                : SFP
```

```
Nominal bit rate(Mb/s) : 1300
Vendor Name            : OPWAY
Wave length(nm)        : 1550
Vendor PN              : OP5420DI-53
Vendor SN              : 1303071530
Date code              : 130308
Temperature(C)         : 53.00
Voltage(mV)            : 3278.00
Bias current(mA)       : 15.00
Tx power(dBm)          : -7.66
Rx power(dBm)          : -
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Identifier	Identifier of optical module on uplink port
Nominal bit rate(Mb/s)	Rated transmission rate of optical module on uplink port, in Mb/s
Vendor Name	Vendor name of optical module on uplink port
Wave length(nm)	Wavelength of optical module on uplink port, in nm
Vendor PN	Vendor PN code of optical module on uplink port
Vendor SN	Vendor SN code of optical module on uplink port
Date code	Production date code of optical module on uplink port
Temperature(C)	Temperature of optical module on uplink port, in Celsius
Voltage(mV)	Voltage of optical module on uplink port, in mV
Bias current(mA)	Current bias current value of optical module on uplink port
Tx power(dBm)	Transmission power of optical module on uplink port, in dBm
Rx power(dBm)	Receiving power of optical module on uplink port, in dBm

5.1.10 uplink statistics

[Command]

uplink statistics (enable | disable)

[View]

config view

[Parameter]

enable: Enable the performance statistics of uplink port

disable: Disable the performance statistics of uplink port

[Description]

This command is used to control enabling / disabling the performance statistics function of uplink port. By default, it is disabled.

[Example]

Enable the performance statistics of uplink port:

```
BT(config)# uplink statistics enable
BT(config)# show running-config verbose | include statistics
uplink statistics enable
```

5.1.11 uplink util threshold

[Command]

uplink (egress | ingress) util threshold-warning *warning-minor warning-major warning-critical* **threshold-recovery** *recovery-minor recovery-major recovery-critical*

[View]

config view

[Parameter]

ingress: Ingress direction

egress: Egress direction

warning-minor: Warning threshold for minor level. Type: numerical value; range: 0-100; default: 0

warning-major: Warning threshold for major level. Type: numerical value; range: 0-100; default: 70

warning-critical: Warning threshold for critical level. Type: numerical value; range: 0-100; default: 90

recovery-minor: Recovery threshold for minor level. Type: numerical value; range: 0-100; default: 0

recovery-major: Recovery threshold for major level. Type: numerical value; range: 0-100; default: 65

recovery-critical: Recovery threshold for critical level. Type: numerical value; range: 0-100; default: 85

Requirements on threshold configuration: If the threshold is set as 0, the warning function is disabled. Otherwise, the threshold setting must satisfy the requirement as follows: the warning threshold for minor level<that for major level<that for critical level; the recovery threshold<the warning threshold of corresponding level respectively.

[Description]

Configure the sending and receiving warning threshold and recovery threshold of uplink port, including the warning threshold for 3 levels and recovery threshold for 3 levels. The thresholds are of global configuration, but the warning will be based on the port.

[Example]

Set the warning thresholds and the recovery thresholds for three levels at egress direction of uplink portas 20, 40, 60, and 10, 30, 50 respectively; the warning thresholds and the recovery thresholds for three levels at ingress direction as 15, 70, 90 and 10, 60, 85 respectively:

```
BT(config)# uplink egress util threshold-warning 20 40 60 threshold-recovery
10 30 50
BT(config)# uplink ingress util threshold-warning 15 70 90 threshold-recovery
10 60 85
BT(config)# show running-config | include util threshold
uplink egress util threshold-warning 20 40 60 threshold-recovery 10 30 50
uplink ingress util threshold-warning 15 70 90 threshold-recovery 10 60 85
```

5.2 EQAM Management

5.2.1 clear eqam statistics history

[Command]

clear eqam statistics history

[View]

config view

[Parameter]

N/A

[Description]

This command is used to clear the statistics history information of EQAM performance. To show the related statistics, please refer to the commands "**show eqam statistics history15m**" and "**show eqam statistics history24h**".

[Example]

Clear the statistics history of EQAM performance:

```
BT(config)# clear eqam statistics history BT(config)#
show eqam statistics history24h allIndex RxSpeed
          Time
```

5.2.2 show eqam statistics current

[Command]

show eqam statistics (current | current15m | current24h)

[View]

enable view, config view

[Parameter]

current: EQAM statistics in recent 30 seconds.

current15m: EQAM statistics in the past 15 minutes.

current24h: EQAM statistics in the past 24 hours.

[Description]

This command is used to display EQAM performance statistics.

[Example]

Query EQAM performance statistics in current 30 seconds:

```
BT(config)# show eqam statistics current
Total elapsed time : 30 s
Receive Speed      : 0.000 (kbps)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Total elapsed time	Length of statistic time, in s
Receive Speed	Current receiving rate, in kbps

5.2.3 show eqam statistics history

[Command]

show eqam statistics history15m (*history15m* | **all**)

show eqam statistics history24h (*history24h* |**all**)

[View]

enable view, config view

[Parameter]

history15m: History index. Type: numerical value; range: 1-96

history24h: History index. Type: numerical value; range: 1-30

all: All history statistics.

[Description]

The command "**show eqam statistics history15m**" is used to display the history performance statistics of EQAM every 15 minutes. When the index number is 1, it indicates the history in the latest 15

minutes. Range: 1-96, allows displaying the performance statistics of each 15-minute history in the past 24 hours.

The command " **show eqam statistics history24h**" is used to display the history performance statistics of the uplink port every 24 hours. When the index number is 1, it indicates the history in the latest 24 hours. Range: 1-30, allows displaying the history performance statistics of every day in the past 30 days. To display the statistics of more time, you can view the statistics in the past 15 minutes with command " **show eqam statistics history15m**".

[Example]

Query the first 15-minute history of EQAM:

```
BT(config)# show eqam statistics history15m 1
Index       RxSpeed(kbps)    Time
1           0.000            2019 Jan 01  03:47:14
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Index	History index number
RxSpeed(kbps)	Current receiving rate, in kbps
Time	Recording time

Chapter 6 Channel RF Management

6.1 Basic Management of Downstream Channel

6.1.1 cable downstream annex

[Command]

cable downstream annex (a | b)

cable downstream annex b start-freq *fre-begin* **width-offset** *fre-offset* **interleave** *interleave*

cable downstream annex a start-freq *fre-offset* **width-offset** *fre-offset*

cable downstream *channel-list* **annex b interleave** *interleave*

[View]

cmts view

[Parameter]

a: channel system: European standard; channel bandwidth: fixed 8 MHz

b: channel system: American standard; channel bandwidth: fixed 6 MHz

fre-begin: Downstream channel central frequency. Type: numerical value; range: European standard: (87000000 + bandwidth /2)-(1006000000 - bandwidth /2); American Standard: (54000000+bandwidth/2)-(1002000000-bandwidth/2).

fre-offset: Downstream channel offset. Type: numerical value; range: When configuring annex a: 8000000-29000000; when configuring annex b: 6000000-29000000

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

interleave: American standard interleaving depth. Type: numerical value; range: 128/64/32/16/8

[Description]

This command is used to configure the channel system, including European standard and American standard. For European standard system, the interleaving depth takes the default parameter, which can not be modified, therefore no configuration is required; for American standard system, it requires configuring the parameter of interleaving depth. Switching channel will lead to device restart. If the starting frequency is not specified, all channel frequencies will be restored to the default value. The **cable downstream**

channel-list **Annex B interleave** *interleave* command is registered only when the channel mode is US standard.

[Example]

The downstream channel is configured as a American standard, the starting frequency is 300 Mhz, the frequency interval of each channel is 8 Mhz and the interleaving depth is 16:

```
BT(config-if-cmts-1)# cable downstream annex b start-freq 300000000 width-offset
8000000 interleave 16
Annex type change will request system reboot,continue?(y/n) [n]y
Annex change.
starting pid 6693, tty '': '/bin/sh -l -c "bcm_boot_launcher stop"'
Stopping CMS smd...
smd received Terminate msg!! Terminate all apps and then exit.
Unmounting filesystems...
Sent SIGTERM to all processes
Sent SIGKILL to all processes
Requesting system reboot
```

6.1.2 cable downstream docsis

[Command]

cable downstream *channel-list* **docsis**

[View]

cmts view

[Parameter]

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

This command is used to change the downstream channels to DOCSIS channels from EQAM channels. The downstream channels defaults to DOCSIS channels.

[Example]

Configure downstream channel 3-4 of CMTS as DOCSIS channel:

```
BT(config-if-cmts-1)# cable downstream 3-4 docsis
It will take some time with a large number of CMs,please wait a moment.
BT(config-if-cmts-1)# show running-config verbose | include downstream 3
 no cable downstream 3 shutdown
 cable downstream 3 docsis
```

```
 cable downstream 3 frequency 456000000 modulation qam256 annex a power-level 45.0
BT(config-if-cmts-1)# show running-config verbose | include downstream 4
 no cable downstream 4 shutdown
 cable downstream 4 docsis
 cable downstream 4 frequency 464000000 modulation qam256 annex a power-level 45.0
```

6.1.3 cable downstream eqam

[Command]

cable downstream *channel-list* **eqam**

[View]

cmts view

[Parameter]

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

This command is used to set the downstream channel as EQAM channel. The number of configurable EQAM channels is subject to the specific device.

[Example]

Configure downstream channel 1-2 of CMTS as EQAM channel:

```
BT(config-if-cmts-1)# cable downstream 1-2 eqam
It will take some time with a large number of CMs,please wait a moment.
BT(config-if-cmts-1)# show running-config verbose | include eqam
 cable downstream 1 eqam annex a symbolrate 6952
 cable downstream 2 eqam annex a symbolrate 6952
```

6.1.4 cable downstream frequency

[Command]

cable downstream *channel-id* **frequency** *frequency*

[View]

cmts view

[Parameter]

channel-id: Downstream channel ID. Type: numerical value; range: 1-32

frequency: Downstream channel central frequency. Type: numerical value; range: European standard: (87000000 + bandwidth /2)-(1006000000 - bandwidth /2); American Standard: (54000000+bandwidth/2)-(1002000000-bandwidth/2).

[Description]

This command is used to configure the channel central frequency corresponding to the downstream channel ID.

[Example]

Set the parameters of downstream channel 1 and central frequency 54000000:

```
BT(config-if-cmts-1)# cable downstream 1 frequency 54000000 BT(config-
if-cmts-1)# show running-config | include downstreamno cable
downstream 1 shutdown
 no cable downstream 2 shutdown
 no cable downstream 3 shutdown
 no cable downstream 4 shutdown
 no cable downstream 5 shutdown
 no cable downstream 6 shutdown
 no cable downstream 7 shutdown
 no cable downstream 8 shutdown
 no cable downstream 9 shutdown
 no cable downstream 10 shutdown
 no cable downstream 11 shutdown
 no cable downstream 12 shutdown
 no cable downstream 13 shutdown
 no cable downstream 14 shutdown
 no cable downstream 15 shutdown
 no cable downstream 16 shutdown
 no cable downstream 17 shutdown
 no cable downstream 18 shutdown
 no cable downstream 19 shutdown
 no cable downstream 20 shutdown
 no cable downstream 21 shutdown
 no cable downstream 22 shutdown
 no cable downstream 23 shutdown
 no cable downstream 24 shutdown
 no cable downstream 25 shutdown
 no cable downstream 26 shutdown
 no cable downstream 27 shutdown
 no cable downstream 28 shutdown
 no cable downstream 29 shutdown
 no cable downstream 30 shutdown
```

```
no cable downstream 31 shutdown
no cable downstream 32 shutdown
cable downstream 1 frequency 54000000 modulation qam256 annex a power-level 40.2
cable downstream 2 frequency 448000000 modulation qam256 annex a power-level 40.2
cable downstream 3 frequency 456000000 modulation qam256 annex a power-level 40.2
cable downstream 4 frequency 464000000 modulation qam256 annex a power-level 40.2
cable downstream 5 frequency 472000000 modulation qam256 annex a power-level 40.2
cable downstream 6 frequency 480000000 modulation qam256 annex a power-level 40.2
cable downstream 7 frequency 488000000 modulation qam256 annex a power-level 40.2
cable downstream 8 frequency 496000000 modulation qam256 annex a power-level 40.2
cable downstream 9 frequency 504000000 modulation qam256 annex a power-level 40.2
cable downstream 10 frequency 512000000 modulation qam256 annex a power-level 40.2
cable downstream 11 frequency 520000000 modulation qam256 annex a power-level 40.2
cable downstream 12 frequency 528000000 modulation qam256 annex a power-level 40.2
cable downstream 13 frequency 536000000 modulation qam256 annex a power-level 40.2
cable downstream 14 frequency 544000000 modulation qam256 annex a power-level 40.2
cable downstream 15 frequency 552000000 modulation qam256 annex a power-level 40.2
cable downstream 16 frequency 560000000 modulation qam256 annex a power-level 40.2
cable downstream 17 frequency 568000000 modulation qam256 annex a power-level 40.2
cable downstream 18 frequency 576000000 modulation qam256 annex a power-level 40.2
cable downstream 19 frequency 584000000 modulation qam256 annex a power-level 40.2
cable downstream 20 frequency 592000000 modulation qam256 annex a power-level 40.2
cable downstream 21 frequency 600000000 modulation qam256 annex a power-level 40.2
cable downstream 22 frequency 608000000 modulation qam256 annex a power-level 40.2
cable downstream 23 frequency 616000000 modulation qam256 annex a power-level 40.2
cable downstream 24 frequency 624000000 modulation qam256 annex a power-level 40.2
cable downstream 25 frequency 632000000 modulation qam256 annex a power-level 40.2
cable downstream 26 frequency 640000000 modulation qam256 annex a power-level 40.2
cable downstream 27 frequency 648000000 modulation qam256 annex a power-level 40.2
cable downstream 28 frequency 656000000 modulation qam256 annex a power-level 40.2
cable downstream 29 frequency 664000000 modulation qam256 annex a power-level 40.2
cable downstream 30 frequency 672000000 modulation qam256 annex a power-level 40.2
cable downstream 31 frequency 680000000 modulation qam256 annex a power-level 40.2
cable downstream 32 frequency 688000000 modulation qam256 annex a power-level 40.2
cable load-balance method upstream modem downstream modem
```

6.1.5 cable downstream frequency-batch

[Command]

cable downstream frequency-batch *channel-id channel-num fre-begin fre-offset*

[View]

cmts view

[Parameter]

channel-id: Downstream channel ID. Type: numerical value; range: 1-32

channel-num: The number of channels allocated in batches. Type: numerical value; range: 1-32

fre-begin: Downstream channel central frequency. Type: numerical value; range: European standard: (87000000 + bandwidth /2)-(1006000000 - bandwidth /2); American Standard: (54000000+bandwidth/2)-(1002000000-bandwidth/2).

fre-offset: Downstream channel offset. Type: numerical value; range: 6000000-100000000

[Description]

This command is used to configure begin downstream channel ID, begin frequency, offset frequency, In order to realize batch downstream channel modification.

[Example]

Set the frequency from channel 3:

```
BT(config-if-cmts-1)# cable downstream frequency-batch 3 14 460000000
10000000
It will take some time with a large number of CMs,please wait a moment.
BT(config-if-cmts-1)# show running-config | include downstream
cable downstream 3 frequency 460000000 modulation qam256 annex a power-level 45.0
 cable downstream 4 frequency 470000000 modulation qam256 annex a power-level 45.0
 cable downstream 5 frequency 480000000 modulation qam256 annex a power-level 45.0
 cable downstream 6 frequency 490000000 modulation qam256 annex a power-level 45.0
 cable downstream 7 frequency 500000000 modulation qam256 annex a power-level 45.0
 cable downstream 8 frequency 510000000 modulation qam256 annex a power-level 45.0
 cable downstream 9 frequency 520000000 modulation qam256 annex a power-level 45.0
 cable downstream 10 frequency 530000000 modulation qam256 annex a power-level 45.0
 cable downstream 11 frequency 540000000 modulation qam256 annex a power-level 45.0
 cable downstream 12 frequency 550000000 modulation qam256 annex a power-level 45.0
 cable downstream 13 frequency 560000000 modulation qam256 annex a power-level 45.0
 cable downstream 14 frequency 570000000 modulation qam256 annex a power-level 45.0
 cable downstream 15 frequency 580000000 modulation qam256 annex a power-level 45.0
 cable downstream 16 frequency 590000000 modulation qam256 annex a power-level 45.0
```

6.1.6 cable downstream frequency modulation annex

[Command]

cable downstream *channel-id* **frequency** *frequency* **modulation (qam64 | qam256 | qam1024) annex a power-level** *power*

cable downstream *channel-id* **frequency** *frequency* **modulation (qam64 | qam256 | qam1024) annex b power-level** *power* **interleave** *interleave*

[View]

cmts view

[Parameter]

qam64: Modulation mode of downstream channel

qam256: Modulation mode of downstream channel

qam1024: Modulation mode of downstream channel

a: channel system: European standard; channel bandwidth: fixed 8 MHz

b: channel system: American standard; channel bandwidth: fixed 6 MHz

channel-id: Downstream channel ID. Type: numerical value; range: 1-32

frequency: Downstream channel central frequency. Type: numerical value; range: European standard: (87000000 + bandwidth /2)-(1006000000 - bandwidth /2); American Standard: (54000000+bandwidth/2)-(1002000000-bandwidth/2).

power: Downstream transmission level. Type: numerical value; range: subject to specific device

interleave: American standard interleaving depth. Type: numerical value; range: 128/64/32/16/8

[Description]

This command is used to configure the parameters of downstream channel.

The "**cable downstream** *channel-id* **frequency** *frequency* **modulation (qam64 | qam256 | qam1024) annex a power-level** *power* " command is registered only when the channel format is European standard.

The command "**cable downstream** *channel-id* **frequency** *frequency* **modulation (qam64 | qam256 | qam1024) annex b power-level** *power* **interleave** *interleave* "is registered only when the channel format is American standard.

[Example]

Set the parameters of channel 2:

```
BT(config-if-cmts-1)# cable downstream 2 frequency 448000000 modulationqam256
annex a power-level 42.6
It will take some time with a large number of CMs,please wait a moment.
BT(config-if-cmts-1)# show running-config | include downstream 2
 cable downstream 2 frequency 448000000 modulation qam256 annex a power-level 42.6
```

6.1.7 cable downstream modulation

[Command]

cable downstream *channel-list* **modulation (qam64 | qam256 | qam1024)**

[View]

cmts view

[Parameter]

qam64: Modulation mode of downstream channel

qam256: Modulation mode of downstream channel

qam1024: Modulation mode of downstream channel

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

This command is used to configure the modulation mode of downstream channel.

[Example]

Configure the modulation mode of channel 3 as qam256:

```
BT(config-if-cmts-1)# cable downstream 3 modulation qam256
It will take some time with a large number of CMs,please wait a moment.
BT(config-if-cmts-1)# show running-config | include downstream 3
 no cable downstream 3 shutdown
 cable downstream 3 frequency 456000000 modulation qam256 annex a power-level 45.0
```

6.1.8 cable downstream primary

[Command]

cable downstream *channel-list* **primary**

no cable downstream *channel-list* **primary**

[View]

cmts view

[Parameter]

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

The command "**cable downstream primary**" is used to set a single or multiple downstream channels as the primary channels. All downstream channels in the device default to the primary channel. Prior to Registration, a Primary-Capable Downstream Channel on which the CM has achieved timing lock and successfully received an MDD message containing ambiguity resolution TLVs. After Registration, the channel on which the CM acquires timing from the assigned list of Primary Downstream Channels in the Simplified RCC Encodings.

The command "**no cable downstream primary**" is used to cancel set a single or multiple downstream channels as the primary channels.

[Example]

Set downstream channel 5 as the primary channels.:

```
BT(config-if-cmts-1)# no cable downstream 5 shutdown BT(config-if-
cmts-1)# cable downstream 5 primary BT(config-if-cmts-1)# show
running-config | include 5 primary
 cable downstream 5 primary
```

6.1.9 cable downstream shutdown

[Command]

cable downstream *channel-list* **shutdown**

no cable downstream *channel-list* **shutdown**

[View]

cmts view

[Parameter]

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

The command "**cable downstream shutdown**" is used to disable one or more downstream channels.

The command "**no cable downstream shutdown**" is used to enable one or more downstream channels.

[Example]

Disable the 2nd downstream channel of CMTS:

```
BT(config-if-cmts-1)# show running-config verbose | include downstream 2
 no cable downstream 2 shutdown
 cable downstream 2 docsis
 cable downstream 2 frequency 448000000 modulation qam256 annex a power-level 45.0
BT(config-if-cmts-1)# cable downstream 2 shutdown
It will take some time with a large number of CMs,please wait a moment.
BT(config-if-cmts-1)# show running-config verbose | include downstream 2
 cable downstream 2 shutdown
 cable downstream 2 docsis
 cable downstream 2 frequency 448000000 modulation qam256 annex a power-level 45.0
```

Enable the 2nd downstream channel of CMTS device:

```
BT(config-if-cmts-1)# show running-config verbose | include downstream 2
 cable downstream 2 shutdown
 cable downstream 2 docsis
 cable downstream 2 frequency 448000000 modulation qam256 annex a power-level 45.0
BT(config-if-cmts-1)# no cable downstream 2 shutdown
It will take some time with a large number of CMs,please wait a moment.
BT(config-if-cmts-1)# show running-config verbose | include downstream 2
 no cable downstream 2 shutdown
 cable downstream 2 docsis
 cable downstream 2 frequency 448000000 modulation qam256 annex a power-level 45.0
```

Note:

The default downstream channel is at DOCSIS state.

6.1.10 show cable downstream

[Command]

show cable downstream [*channel-id*]

[View]

enable view, config view, cmts view

[Parameter]

channel-id: Downstream channel ID. Type: numerical value; range: 1-32

[Description]

This command is used to display real-time traffic information of CMTS downstream channels.

[Example]

Display information of downstream channel 1 of CMTS device:

```
BT(config-if-cmts-1)# show cable downstream 1
downstream 1 is up,type is  docsis
Channel utilization interval:180s , Avg channel utilization:1% , Curr Speed:766571
bps
716374969 packets output, 42572581149 bytes, 0 discarded
0 output errors
Total downstream bandwidth: 51287297 bps
Total downstream reserved bandwidth: 0 bps
Worst case latency for low latency queue: 0 usecs
Current Upper limit for worst case latency: 0 usecs
Segments: 0 valid, 0 discarded
```

Note:

CLI is currently not supported EQAM channel traffic statistics.

6.1.11 show cable downstream config

[Command]

show cable downstream config

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the parameter configurations of RF downstream channel of CMTS.

[Example]

Display the parameter configurations of RF downstream channel of CMTS 1:

```
BT(config-if-cmts-1)# show cable downstream config
no cable downstream 1 shutdown
 cable downstream 1 docsis
 no cable downstream 2 shutdown
 cable downstream 2 docsis
 no cable downstream 3 shutdown
 cable downstream 3 docsis
 no cable downstream 4 shutdown
```

```
cable downstream 4 docsis
no cable downstream 5 shutdown
cable downstream 5 docsis
no cable downstream 6 shutdown
cable downstream 6 docsis
no cable downstream 7 shutdown
cable downstream 7 docsis
no cable downstream 8 shutdown
cable downstream 8 docsis
no cable downstream 9 shutdown
cable downstream 9 docsis
no cable downstream 10 shutdown
cable downstream 10 docsis
no cable downstream 11 shutdown
cable downstream 11 docsis
no cable downstream 12 shutdown
cable downstream 12 docsis
no cable downstream 13 shutdown
cable downstream 13 docsis
no cable downstream 14 shutdown
cable downstream 14 docsis
no cable downstream 15 shutdown
cable downstream 15 docsis
no cable downstream 16 shutdown
cable downstream 16 docsis
no cable downstream 17 shutdown
cable downstream 17 docsis
no cable downstream 18 shutdown
cable downstream 18 docsis
no cable downstream 19 shutdown
cable downstream 19 docsis
no cable downstream 20 shutdown
cable downstream 20 docsis
no cable downstream 21 shutdown
cable downstream 21 docsis
no cable downstream 22 shutdown
cable downstream 22 docsis
no cable downstream 23 shutdown
cable downstream 23 docsis
no cable downstream 24 shutdown
cable downstream 24 docsis
no cable downstream 25 shutdown
cable downstream 25 docsis
no cable downstream 26 shutdown
```

```
cable downstream 26 docsis
no cable downstream 27 shutdown
cable downstream 27 docsis
no cable downstream 28 shutdown
cable downstream 28 docsis
no cable downstream 29 shutdown
cable downstream 29 docsis
no cable downstream 30 shutdown
cable downstream 30 docsis
no cable downstream 31 shutdown
cable downstream 31 docsis
no cable downstream 32 shutdown
cable downstream 32 docsis
cable downstream 1 frequency 440000000 modulation qam256 annex a power-level 35.0
cable downstream 2 frequency 448000000 modulation qam256 annex a power-level 35.0
cable downstream 3 frequency 456000000 modulation qam256 annex a power-level 35.0
cable downstream 4 frequency 464000000 modulation qam256 annex a power-level 35.0
cable downstream 5 frequency 472000000 modulation qam256 annex a power-level 35.0
cable downstream 6 frequency 480000000 modulation qam256 annex a power-level 35.0
cable downstream 7 frequency 488000000 modulation qam256 annex a power-level 35.0
cable downstream 8 frequency 496000000 modulation qam256 annex a power-level 35.0
cable downstream 9 frequency 504000000 modulation qam256 annex a power-level 35.0
cable downstream 10 frequency 512000000 modulation qam256 annex a power-level 35.0
cable downstream 11 frequency 520000000 modulation qam256 annex a power-level 35.0
cable downstream 12 frequency 528000000 modulation qam256 annex a power-level 35.0
cable downstream 13 frequency 536000000 modulation qam256 annex a power-level 35.0
cable downstream 14 frequency 544000000 modulation qam256 annex a power-level 35.0
cable downstream 15 frequency 552000000 modulation qam256 annex a power-level 35.0
cable downstream 16 frequency 560000000 modulation qam256 annex a power-level 35.0
cable downstream 17 frequency 568000000 modulation qam256 annex a power-level 35.0
cable downstream 18 frequency 576000000 modulation qam256 annex a power-level 35.0
cable downstream 19 frequency 584000000 modulation qam256 annex a power-level 35.0
cable downstream 20 frequency 592000000 modulation qam256 annex a power-level 35.0
cable downstream 21 frequency 600000000 modulation qam256 annex a power-level 35.0
cable downstream 22 frequency 608000000 modulation qam256 annex a power-level 35.0
cable downstream 23 frequency 616000000 modulation qam256 annex a power-level 35.0
cable downstream 24 frequency 624000000 modulation qam256 annex a power-level 35.0
cable downstream 25 frequency 632000000 modulation qam256 annex a power-level 35.0
cable downstream 26 frequency 640000000 modulation qam256 annex a power-level 35.0
cable downstream 27 frequency 648000000 modulation qam256 annex a power-level 35.0
cable downstream 28 frequency 656000000 modulation qam256 annex a power-level 35.0
cable downstream 29 frequency 664000000 modulation qam256 annex a power-level 35.0
cable downstream 30 frequency 672000000 modulation qam256 annex a power-level 35.0
cable downstream 31 frequency 680000000 modulation qam256 annex a power-level 35.0
```

```
cable downstream 32 frequency 688000000 modulation qam256 annex a power-level 35.0
cable downstream 1 primary
cable downstream 2 primary
cable downstream 3 primary
cable downstream 4 primary
cable downstream 5 primary
cable downstream 6 primary
cable downstream 7 primary
cable downstream 8 primary
cable downstream 9 primary
cable downstream 10 primary
cable downstream 11 primary
cable downstream 12 primary
cable downstream 13 primary
cable downstream 14 primary
cable downstream 15 primary
cable downstream 16 primary
cable downstream 17 primary
cable downstream 18 primary
cable downstream 19 primary
cable downstream 20 primary
cable downstream 21 primary
cable downstream 22 primary
cable downstream 23 primary
cable downstream 24 primary
cable downstream 25 primary
cable downstream 26 primary
cable downstream 27 primary
cable downstream 28 primary
cable downstream 29 primary
cable downstream 30 primary
cable downstream 31 primary
cable downstream 32 primary
```

6.1.12 show cable downstream total

[Command]

show cable downstream total

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display total statistics of downstream channel of CMTS.

[Example]

Display total downstream statistics of 1 CMTS:

```
BT(config-if-cmts-1)# show cable downstream total
21786816 packets output, 1167045709 bytes, 0 discarded
0 output errors
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
packets output	Number of packet sent
bytes	Total bytes transferred
discarded	Number of packet discarded
output errors	Number of error packet sent

6.2 Basic Management of Upstream Channel

6.2.1 cable ranging-poll

[Command]

cable ranging-poll *ranging-poll* **t4-multiplier** *t4-multiplier*

[View]

cmts view

[Parameter]

ranging-poll: Ranging slot time, in ms. Type: numerical value; range: 20000-30000; default: 20000

t4-multiplier: The multiplier of CM periodic ranging timeout T4. Type: numerical value; range: 1-10; default: 4

[Description]

This command is used to configure the ranging slot time and CM periodic ranging timeout T4. In the CM of protocol DOCSIS 3.0 , the parameter *t4-multiplier* can increase the length of Timeout T4, in order to reduce the CPU load of the CMTS device.

[Example]

Configure the ranging slot time as 25000 and CM periodic ranging timeout T4 as 5:

```
BT(config-if-cmts-1)# cable ranging-poll 25000 t4-multiplier 5
BT(config-if-cmts-1)# show running-config verbose | include ranging-pollcable
 ranging-poll 25000 t4-multiplier 5
```

6.2.2 cable upstream channel-mode

[Command]

cable upstream *channel-list* **channel-mode (v3.0 | v2.0)**

[View]

cmts view

[Parameter]

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

v2.0: DOCSIS 2.0(UCD29) mode, default: v2.0 mode

v3.0: DOCSIS 3.0(UCD35) mode

[Description]

This command is used to configure DOCSIS mode supported by the channel. If the channel is configured as V2.0 mode, the channel supports V2.0(UCD29) and V3.0(UCD35); if it is configured as v3.0 mode, it supports only V3.0(UCD35) and doesn't support V2.0(UCD29).

[Example]

Configure the channel mode supported by upstream channel 2 as 3.0:

```
BT(config-if-cmts-1)# cable upstream 2 channel-mode v3.0
BT(config-if-cmts-1)# show running-config verbose | include channel-mode
 cable upstream 1 frequency 9000000 channel-width 3.2M atdma profile-type qpsk
channel-mode v2.0
 cable upstream 2 frequency 15400000 channel-width 6.4M atdma profile-type qam64
channel-mode v3.0
 cable upstream 3 frequency 21800000 channel-width 3.2M atdma profile-type qpsk
channel-mode v2.0
 cable upstream 4 frequency 28200000 channel-width 3.2M atdma profile-type qpsk
channel-mode v2.0
```

6.2.3 cable upstream channel-width

[Command]

cable upstream *channel-list* **channel-width (1.6M | 3.2M | 6.4M)**

[View]

cmts view

[Parameter]

1.6M: Set the frequency bandwidth of upstream channel as 1.6M

3.2M: Set the frequency bandwidth of upstream channel as 3.2M

6.4M: Set the frequency bandwidth of upstream channel as 6.4M

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

[Description]

This command is used to configure the frequency bandwidth setting of upstream channel, which can be set as three kinds of bandwidth: 1.6M, 3.2M and 6.4M, with default as 3.2M.

[Example]

Configure the frequency bandwidth of upstream channel 2 as 1.6M:

```
BT(config-if-cmts-1)# cable upstream 2 channel-width 1.6M
BT(config-if-cmts-1)# show running-config verbose | include channel-width
 cable upstream 1 frequency 9000000 channel-width 3.2M atdma profile-type qpsk
channel-mode v2.0
 cable upstream 2 frequency 15400000 channel-width 1.6M atdma profile-type qam64
channel-mode v3.0
 cable upstream 3 frequency 21800000 channel-width 3.2M atdma profile-type qpsk
channel-mode v2.0
 cable upstream 4 frequency 28200000 channel-width 3.2M atdma profile-type qpsk
channel-mode v2.0
```

6.2.4 cable upstream fragmentation

[Command]

cable upstream fragmentation

no cable upstream fragmentation

[View]

cmts view

[Parameter]

N/A

[Description]

The "**cable upstream fragmentation**" command is used to turn on the upstream fragmentation function by default.

The "**no cable upstream fragmentation**" command is used to turn off the upstream fragmentation function."

[Example]

Turn Off the upstream slicing function of CMTS devices.

```
BT(config-if-cmts-1)# no cable upstream fragmentation BT(config-
if-cmts-1)# show running-config | include fragno cable upstream
fragmentation
```

6.2.5 cable upstream frequency

[Command]

cable upstream *channel-id* **frequency** *frequency*

[View]

cmts view

[Parameter]

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

frequency: Upstream channel central frequency. Type: numerical value; range: (5000000 + bandwidth / 2) - (85000000 - bandwidth / 2)

[Description]

This command is used to configure the channel central frequency corresponding to the upstream channel ID.

The prompt value for central frequency configuration <5000000-85000000> indicates the range of working frequency instead of the configurable central frequency. The range of working frequency is determined jointly by the central frequency and the bandwidth, namely: 5000000 <= the minimum frequency configured - bandwidth / 2 <= the maximum frequency configured + bandwidth / 2 <= 85000000.

[Example]

Set the parameters of upstream channel 2 and central frequency 15400000:

```
BT(config-if-cmts-1)# cable upstream 2 frequency 15400000
BT(config-if-cmts-1)# show running-config | include upstream 2
```

```
 cable upstream 2 frequency 15400000 channel-width 6.4M atdma profile-type qam64
channel-mode v2.0
```

6.2.6 cable upstream frequency-batch

[Command]

cable upstream frequency-batch *channel-id fre-begin* **(1.6M | 3.2M | 6.4M|** *fre-offset***)**

[View]

cmts view

[Parameter]

1.6M: Set the frequency bandwidth of upstream channel as 1.6M

3.2M: Set the frequency bandwidth of upstream channel as 3.2M

6.4M: Set the frequency bandwidth of upstream channel as 6.4M

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

fre-begin: Upstream channel central frequency. Type: numerical value; range: (5000000+bandwidth/2)-(85000000-bandwidth/2)

fre-offset: Upstream channel central frequency. Type: numerical value; range: 1600000-30000000

[Description]

This command is used to configure, begin frequency, offset frequency corresponding to begin upstream channel ID, In order to realize batch upstream channel modification.

[Example]

Set the frequency from channel 1:

```
BT(config-if-cmts-1)# cable upstream frequency-batch 1 20000000 3200000
BT(config-if-cmts-1)# show running-config | include upstream
 no cable upstream 1 shutdown
 no cable upstream 2 shutdown
 cable upstream 1 frequency 20000000 channel-width 3.2M atdma profile-type qpsk
channel-mode v2.0
 cable upstream 2 frequency 23200000 channel-width 3.2M atdma profile-type qpsk
channel-mode v2.0
```

6.2.7 cable upstream frequency channel-width profile-type channel-mode

[Command]

cable upstream *channel-id* **frequency** *frequency* **channel-width (1.6M | 3.2M | 6.4M) atdma profile-type (qpsk | qam16 | qam32 | qam64 | qam256) channel-mode (v3.0 | v2.0)**

[View]

cmts view

[Parameter]

channel-id: Upstream channel ID. Type: numerical value; range: 1-10

frequency: Upstream channel central frequency. Type: numerical value; range: (5000000 + bandwidth / 2) - (85000000 - bandwidth / 2)

1.6M: Set the frequency bandwidth of upstream channel as 1.6M

3.2M: Set the frequency bandwidth of upstream channel as 3.2M, with default as 3.2M

6.4M: Set the frequency bandwidth of upstream channel as 6.4M

atdma: The transmission mode is ATDMA (Advanced Time Division Multiple Access)

qpsk: The modulation mode is QPSK (Quad-Phase Shift Key)

qam16: The modulation mode is QAM16 (Quadrature Amplitude Modulation)

qam32: The modulation mode is QAM32

qam64: The modulation mode is QAM64

qam256: The modulation mode is QAM256

v2.0: DOCSIS 2.0(UCD29) mode, default: v2.0 mode

v3.0: DOCSIS 3.0(UCD35) mode

[Description]

This command is used to configure the parameters of upstream channel, including channel ID, channel central frequency, channel bandwidth, transmission mode, modulation mode and channel mode.

The prompt value for central frequency configuration <5000000-85000000> indicates the range of working frequency instead of the configurable central frequency. The range of working frequency is determined jointly by the central frequency and the bandwidth, namely: 5000000 <= the minimum frequency configured - bandwidth / 2 <= the maximum frequency configured + bandwidth / 2 <= 85000000.

For configuration of channel bandwidth, refer to the section for command line "**cable upstream channel-width**".

For configuration of modulation mode of channel, refer to the section for command line "**cable upstream profile-type**".

For configuration of channel mode, refer to the section for command line "**cable upstream channel-mode**".

[Example]

Set the parameters of upstream channel 2, including central frequency, bandwidth, transmission mode, modulation mode and channel type:

```
BT(config-if-cmts-1)# cable upstream 2 frequency 15400000 channel-width 6.4Matdma profile-type qam64 channel-mode v2.0
BT(config-if-cmts-1)# show running-config | include upstream 2
 cable upstream 2 frequency 15400000 channel-width 6.4M atdma profile-type qam64 channel-mode v2.0
```

6.2.8 cable upstream minislot-size

[Command]

cable upstream *channel-list* **minislot-size** *minislotsize*

[View]

cmts view

[Parameter]

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

minislotsize: minislot size value, type: numerical value; range: 1 | 2 | 4 | 8 | 16 | 32.

[Description]

This command is used to configure the hopping seed value. This function is only used when the channel is in the ATDMA mode.

When the channel width is 6400000 | 3200000 | 1600000, the recommended value of hopping seed is 2 | 4 | 8.

[Example]

Configure the minislot size value of upstream channel 2 as 16:

```
BT(config-if-cmts-1)# cable upstream 4 minislot-size 16
BT(config-if-cmts-1)# show running-config verbose | include minislot-size
 cable upstream 4 minislot-size 16
```

6.2.9 cable upstream pre-equalization

[Command]

cable upstream *channel-list* **pre-equalization (enable | disable)**

[View]

cmts view

[Parameter]

enable: Enable the pre-equalization function

disable: Disable the pre-equalization function

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

[Description]

This command is used to enable or disable the pre-equalization function. This function is used when the channel quality nonlinear distortion occurs, then the device automatically adjusts and balances, reduce the distortion. By default this function is enabled.

[Example]

Disable the pre-equalization function of channel 2:

```
BT(config-if-cmts-1)# cable upstream 2 pre-equalization disable
BT(config-if-cmts-1)# show running-config | include pre-
 cable upstream 2 pre-equalization disable
```

6.2.10 cable upstream profile-type

[Command]

cable upstream *channel-list* **atdma profile-type (qpsk | qam16 | qam32 | qam64 | qam256)**

[View]

cmts view

[Parameter]

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

atdma: The transmission mode is ATDMA (Advanced Time Division Multiple Access)

qpsk: The modulation mode is QPSK (Quad-Phase Shift Key)

qam16: The modulation mode is QAM16 (Quadrature Amplitude Modulation)

qam32: The modulation mode is QAM32

qam64: The modulation mode is QAM64

qam256: The modulation mode is QAM256

[Description]

This command is used to configure the transmission mode and modulation mode of upstream communication mechanism, including two parts: the first part for transmission modes: ATDMA; the second part for modulation modes, with ATDMA modulation modes including: qpsk | qam16 | qam64 | qam256. The default transmission mode is atdma and the default modulation mode is qpsk.

[Example]

Configure the transmission mode of upstream channel 1 as ATDMA and the modulation mode asQAM256:

```
BT(config-if-cmts-1)# cable upstream 1 atdma profile-type qam256
BT(config-if-cmts-1)# show running-config | include upstream 1
 no cable upstream 1 shutdown
 cable upstream 1 frequency 9000000 channel-width 3.2M atdma profile-type qam256
channel-mode v2.0
```

6.2.11 cable upstream shutdown

[Command]

cable upstream *channel-list* **shutdown**

no cable upstream *channel-list* **shutdown**

[View]

cmts view

[Parameter]

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

[Description]

The command "**cable upstream shutdown**" is used to disable one or more upstream channels;

The command "**no cable upstream shutdown**" is used to enable one or more upstream channels.

[Example]

Disable the 2nd upstream channel of CMTS:

```
BT(config-if-cmts-1)# cable upstream 2 shutdown
BT(config-if-cmts-1)# show running-config verbose | include upstream 2
 cable upstream 2 power-level 6.0
 cable upstream 2 data-backoff 2 8
 cable upstream 2 range-backoff 3 6
 cable upstream 2 shutdown
 cable upstream 2 pre-equalization disable
 cable upstream 2 frequency 15400000 channel-width 3.2M atdma profile-type qpsk
channel-mode v2.0
 cable upstream 2 minislot-size 4
 no cable upstream 2 spectrum-group profile
 no cable upstream 2 spectrum-group
 cable upstream 2 prov-attr-mask 00000000
```

6.2.12 show cable upstream

[Command]

show cable upstream [*channel-id***]**

[View]

enable view, config view, cmts view

[Parameter]

channel-id: Upstream channel ID. Range: 1-8

[Description]

This command is used to display real-time traffic information of CMTS upstream channels.

[Example]

Display upstream information of CMTS:

```
BT(config)# show cable upstream 4
upstream 4 is up
Channel utilization interval:10s , Avg channel utilization:0% , Curr Speed:0 bps
0 discarded, 33524798 bytes input
Segments: 0 valid, 0 discarded
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
upstream X is	State of upstream channel. Up for channel enabled, and down for channel disabled
Channel utilization interval	Cycle of channel utilization statistics
Avg channel utilization	Average channel utilization
Curr Speed	Current rate, in bps
discarded	Number of packet discarded
bytes input	Number of byte received
Segments	Data segments, including valid and discarded segments

6.2.13 show cable upstream config

[Command]

show cable upstream config

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the parameter configuration of RF upstream channel of CMTS.

[Example]

Display the parameter configuration of RF upstream channel of CMTS 1:

```
BT(config-if-cmts-1)# show cable upstream config
cable upstream 1 power-level 6.0
 cable upstream 2 power-level 6.0
 cable upstream 3 power-level 6.0
 cable upstream 4 power-level 6.0
 cable upstream 5 power-level 6.0
 cable upstream 6 power-level 6.0
 cable upstream 7 power-level 6.0
 cable upstream 8 power-level 6.0
 no cable upstream 1 shutdown
 no cable upstream 2 shutdown
 no cable upstream 3 shutdown
 no cable upstream 4 shutdown
 no cable upstream 5 shutdown
```

```
 no cable upstream 6 shutdown
 no cable upstream 7 shutdown
 no cable upstream 8 shutdown
 cable upstream 1 data-backoff 2 8
 cable upstream 1 range-backoff 3 6
 cable upstream 2 data-backoff 2 8
 cable upstream 2 range-backoff 3 6
 cable upstream 3 data-backoff 2 8
 cable upstream 3 range-backoff 3 6
 cable upstream 4 data-backoff 2 8
 cable upstream 4 range-backoff 3 6
 cable upstream 5 data-backoff 2 8
 cable upstream 5 range-backoff 3 6
 cable upstream 6 data-backoff 2 8
 cable upstream 6 range-backoff 3 6
 cable upstream 7 data-backoff 2 8
 cable upstream 7 range-backoff 3 6
 cable upstream 8 data-backoff 2 8
 cable upstream 8 range-backoff 3 6
 cable upstream 1 frequency 9000000 channel-width 6.4M atdma profile-type qam64
channel-mode v2.0
 cable upstream 1 pre-equalization enable
 cable upstream 2 frequency 15400000 channel-width 6.4M atdma profile-type qam64
channel-mode v2.0
 cable upstream 2 pre-equalization enable
 cable upstream 3 frequency 21800000 channel-width 6.4M atdma profile-type qam64
channel-mode v2.0
 cable upstream 3 pre-equalization enable
 cable upstream 4 frequency 28200000 channel-width 6.4M atdma profile-type qam64
channel-mode v2.0
 cable upstream 4 pre-equalization enable
 cable upstream 5 frequency 34600000 channel-width 6.4M atdma profile-type qam64
channel-mode v2.0
 cable upstream 5 pre-equalization enable
 cable upstream 6 frequency 41000000 channel-width 6.4M atdma profile-type qam64
channel-mode v2.0
 cable upstream 6 pre-equalization enable
 cable upstream 7 frequency 47400000 channel-width 6.4M atdma profile-type qam64
channel-mode v2.0
 cable upstream 7 pre-equalization enable
 cable upstream 8 frequency 53800000 channel-width 6.4M atdma profile-type qam64
channel-mode v2.0
 cable upstream 8 pre-equalization enable
```

6.2.14 show cable upstream total

[Command]

show cable upstream total

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display total statistics of upstream channel of CMTS in the cmts view.

[Example]

Display the total statistics of upstream channel of CMTS:

```
BT(config-if-cmts-1)# show cable upstream total
0 discarded, 13325010 bytes input
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
discards	Number of discarded packet
bytes input	Total data received, in byte

6.3 Channel Power Level Management

6.3.1 cable downstream power-level

[Command]

cable downstream *channel-list* **power-level** *power*

[View]

cmts view

[Parameter]

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

power: Downstream transmission level. Type: numerical value; range: subject to specific device

[Description]

This command is used to configure the power level of downstream channels, whose range is related to the number of channels enabled. Refer to the section for command "**show cable downstream max-power-level**" and command "**show cable downstream min-power-level**".

[Example]

Configure the level of downstream channel 4 as 43 dBmV:

```
BT(config-if-cmts-1)# cable downstream 4 power-level 43
It will take some time with a large number of CMs, please wait a moment.
BT(config-if-cmts-1)# show running-config | include downstream 4
 no cable downstream 4 shutdown
 cable downstream 4 frequency 464000000 modulation qam256 annex a power-level 43.0
```

6.3.2 cable upstream power-level

[Command]

cable upstream *channel-list* **power-level** *power*

[View]

cmts view

[Parameter]

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

power: Upstream receiving level. Type: numerical value; range: (-13.0) dBmV-23.0 dBmV; default: 6 dBmV

[Description]

The command "**cable upstream** *channel-list* **power-level**" is used to configure the receiving power level of one or more upstream channels. After successful configuration, power on all upstream channels changed, and you can view the channel power level with command "**show cable upstream power-level**".

[Example]

Set the level of upstream channel 2 as 13 dBmV:

```
BT(config-if-cmts-1)# cable upstream 2 power-level 13
Power on all upstream channels changed!
BT(config-if-cmts-1)# show cable upstream power-level
Channel    Power(dBmV)
1          13.0
```

```
2          13.0
3          13.0
4          13.0
5          13.0
6          13.0
7          13.0
8          13.0
```

6.3.3 cable upstream power-level auto-adjust temperature

[Command]

cable upstream power-level auto-adjust temperature

no cable upstream power-level auto-adjust temperature

[View]

cmts view

[Parameter]

N/A

[Description]

The command "**cable upstream power-level auto-adjust temperature**" is used to enable the function of adjusting the upstream receiving level automatically based on the temperature. After enabling it, the value of upstream receiving level varies by temperature, to ensure stable performance of the device. By default, it is disabled.

The command "**no cable upstream power-level auto-adjust temperature**" is used to disable the function of adjusting the upstream receiving level automatically based on the temperature.

[Example]

Enable the function of adjusting the upstream receiving level automatically based on the temperature:

```
BT(config-if-cmts-1)# cable upstream power-level auto-adjust temperature
BT(config-if-cmts-1)# show running-config | include auto-adjust
 cable upstream power-level auto-adjust temperature
```

6.3.4 show cable downstream max-power-level

[Command]

show cable downstream max-power-level

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the corresponding relationship between the number of enabled downstream channels of CMTS and the maximum configurable level.

[Example]

Display the corresponding relationship between the number of enabled downstream channel and the maximum configurable level:

```
BT#          show cable downstream max-power-level
ChnlNum      Power(dBmV)
1            55.5
2            52.5
3            50.2
4            49.0
5            48.0
6            47.3
7            46.8
8            46.5
9            45.2
10           45.0
11           44.7
12           44.1
13           44.0
14           43.7
15           43.3
16           43.0
17           42.9
18           42.1
19           42.0
20           42.0
21           41.8
22           41.8
23           41.4
24           41.3
25           41.0
26           40.9
27           40.8
28           40.8
29           40.5
```

```
30          40.3
31          40.3
32          40.2
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
ChnlNum	Number of enabled downstream channel
Power(dBmV)	Maximum configurable downstream channel level, in dBmV

Note:

The range of configurable level is related both the number of enabled channel and the type of device. The above display indicates the corresponding relationship only on a type of device.

6.3.5 show cable downstream min-power-level

[Command]

show cable downstream min-power-level

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the corresponding relationship between the number of enabled downstream channels of CMTS and the minimum configurable level.

[Example]

Display the corresponding relationship between the number of enabled downstream channel and the minimum configurable level:

```
BT#         show cable downstream min-power-level
 ChnlNum     Power(dBmV)
1           24.0
2           21.0
3           18.5
4           17.5
5           16.5
6           15.5
7           15.0
```

```
8           15.0
9           14.5
10          13.5
11          13.0
12          12.5
13          12.5
14          12.0
15          12.0
16          12.0
17          12.0
18          12.0
19          12.0
20          12.0
21          12.0
22          12.0
23          12.0
24          12.0
25          12.0
26          12.0
27          12.0
28          12.0
29          12.0
30          12.0
31          12.0
32          12.0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
ChnlNum	Number of enabled downstream channel
Power(dBmV)	Minimum configurable downstream channel level, in dBmV

Note:

The range of configurable level is related both the number of enabled channel and the type of device. The above display indicates the corresponding relationship only on a type of device.

6.3.6 show cable upstream power-level

[Command]

show cable upstream power-level

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the upstream channel receiving power level of the CMTS.

[Example]

Display the upstream receiving level of 1 CMTS:

```
BT(config-if-cmts-1)# show cable upstream power-level
Channel    Power(dBmV)
1          6.0
2          6.0
3          6.0
4          6.0
5          6.0
6          6.0
7          6.0
8          6.0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Channel	Upstream channel ID
Power(dBmV)	Channel level, in dBmV

6.4 Channel Quality Management

6.4.1 cable upstream signal-quality real-time snmp-data

[Command]

cable upstream signal-quality real-time snmp-data

no cable upstream signal-quality real-time snmp-data

[View]

config view

[Parameter]

N/A

[Description]

The command "**cable upstream signal-quality real-time snmp-data**" is used to enable real-time acquisition of upstream signal quality parameter through SNMP. By default, the real-time acquisition is enabled.

The command "**no cable upstream signal-quality real-time snmp-data**" is used to disable real-time acquisition of upstream signal quality parameter through SNMP.

[Example]

Display the configuration of monitoring parameter threshold of current upstream channel in the configview.

```
BT(config)# cable upstream signal-quality real-time snmp-data
BT(config)# show running-config verbose | include snmp-data
 cable upstream signal-quality real-time snmp-data
```

6.4.2 cable upstream signal-quality record

[Command]

cable upstream signal-quality record
no cable upstream signal-quality record

[View]

config view, cmts view

[Parameter]

N/A

[Description]

The command "**cable upstream signal-quality record**" is used to enable the function of recording upstream channel quality parameter history. After enabling it, the device will record the upstream channel quality parameter history in the memory. By default, it is disabled.

The command "**no cable upstream signal-quality record**" is used to disable the function of recording the history data.

[Example]

Enable the function of recording upstream channel quality parameter history

```
BT(config-if-cmts-1)# cable upstream signal-quality record
BT(config-if-cmts-1)# show running-config verbose | include signal-quality
 cable upstream signal-quality record
```

6.4.3 cable upstream signal-quality query-period

[Command]

cable upstream signal-quality query-period *interval*

no cable upstream signal-quality query-period

[View]

config view

[Parameter]

interval: Cycle for polling of channel quality parameter, in s; range: 5-86400; default: 180

[Description]

The command "**cable upstream signal-quality query-period**" is used to configure globally the cycle for polling of channel quality parameter. After successful configuration, all enabled upstream channels will implement quality parameter polling by this cycle.

The command "**no cable upstream signal-quality query-period**" is used to restore the default cycle for polling of channel quality parameter.

[Example]

Configure the cycle for polling of upstream channel quality parameter as 100 s

```
BT(config)# cable upstream signal-quality query-period 100
BT(config)# show running-config verbose | include query-periodcable
upstream signal-quality query-period 100
```

6.4.4 cable scqam upstream-spectrum data-mode

[Command]

cable scqam upstream-spectrum data-mode (average | peak-hold | real-time)

[View]

cmts view

[Parameter]

average: Take the average value for spectrum data.

peak-hold: Take the largest hold value for spectrum data.

real-time: Take the real-time value for spectrum data.

[Description]

This command is used to configure the recording mode corresponding to the data when acquiring the spectrum data. The default is “real-time”.

[Example]

Configure to acquire the average spectrum value:

```
BT(config-if-cmts-1)# cable scqam upstream-spectrum data-mode average
BT(config-if-cmts-1)# show running-config verbose | include data-mode
 cable scqam upstream-spectrum data-mode average
```

6.4.5 cable upstream threshold-warning threshold-recovery

[Command]

cable upstream snr threshold-warning *warning-snr* **threshold-recovery** *recovery-snr*

cable upstream (correcteds | uncorrectables) threshold-warning *warning* **threshold-recovery** *recovery*

[View]

config view, cmts view

[Parameter]

snr: Upstream channel SNR

correcteds: Correctable code of upstream channel

uncorrectables: Uncorrectable code of upstream channel

warning-snr: SNR warning threshold. Type: numerical value; range: 1.0-100.0; default: 26.0

recovery-snr: SNR recovery threshold. Type: numerical value; range: 1.0-100.0; default: 27.0

warning: Warning threshold of error-correcting code and error-uncorrecting code. Type: numerical value; range: 1-2147483647; default: 150

recovery: Recovery threshold of error-correcting code and error-uncorrecting code. Type: numerical value; range: 1-2147483647; default: 100

[Description]

This command is used to configure the warning threshold and the recovery threshold of some a monitoring parameter.

[Example]

Set SNR warning threshold as 21.0, SNR recovery threshold as 28.0; warning threshold of error- correcting code as 200, its recovery threshold as 100; warning threshold of error-uncorrecting code as 180 and its recovery threshold as 120:

```
BT(config-if-cmts-1)# cable upstream snr threshold-warning 21.0 threshold-recovery
28.0
BT(config-if-cmts-1)# cable upstream correcteds threshold-warning 200
threshold-recovery 100
BT(config-if-cmts-1)# cable upstream uncorrectable threshold-warning 180
threshold-recovery 120
BT(config-if-cmts-1)# show running-config verbose | include threshold-warning
 cable upstream snr threshold-warning 21.0 threshold-recovery 28.0
 cable upstream correcteds threshold-warning 200 threshold-recovery 100
 cable upstream uncorrectables threshold-warning 180 threshold-recovery 120
```

6.4.6 clear cable upstream signal-quality record

[Command]

clear cable upstream signal-quality record

[View]

config view, cmts view

[Parameter]

N/A

[Description]

This command is used to clear the history record on upstream channel quality parameter of the device. For enabling the upstream channel quality parameter history, refer to the section for command "**cable upstream signal-quality record**".

[Example]

Clear the history record on upstream channel quality parameter recorded in the device

```
BT(config-if-cmts-1)# clear cable upstream signal-quality record BT(config-
if-cmts-1)# show cable upstream 1 signal-quality history 1MAC Address
0024.684a.0003                  UpstreamChannel 1    History Records:
-------------------------------------------------------------------------------------------------------
    RecID    SNR              Unerrors         Correcteds       Uncorrectables    Time
```

6.4.7 show cable upstream signal-quality

[Command]

show cable upstream signal-quality

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display upstream channel signal quality of CMTS.

[Example]

Display the upstream signal quality of 1 CMTS:

```
BT(config-if-cmts-1)# show cable upstream signal-quality
Channel   Contention    Unerrored    Corrected    Uncorrectable   Upstream    Mirco(dB)
          Intervals     Codewords    Codewords    Codewords       SNR         Reflection
1         0             59421        0            0               0.0         0
2         0             0            0            0               0.0         0
3         0             0            0            0               0.0         0
4         0             108046       0            0               40.4        0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Channel	Upstream channel ID
Contention Intervals	Contention interval
Unerrored Codewords	Number of error-free code received by the channel
Corrected Codewords	Number of error-correctable code received by the interface
Uncorrectable Codewords	Number of error-uncorrectable code received by the interface
Upstream SNR	SNR
Mirco(dB) Reflection	Micro-reflection

6.4.8 show cable upstream signal-quality history

[Command]

show cable upstream *channel-id* **signal-quality history (***history* **| bad)**

show cable upstream *channel-id* **signal-quality history** *history-begin history-end*

[View]

enable view, config view, cmts view

[Parameter]

bad: Poor signal quality history

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

history: History ID. Type: numerical value; range: 1-240

history-begin: Start history ID. Type: numerical value; range: 1-240

history-end: End history ID. Type: numerical value; range: 1-240

[Description]

The command "**show cable upstream signal-quality history bad**" is used to display the poor signal quality history of some an upstream channel in the latest 24 hours.

The command "**show cable upstream signal-quality history** *history*" is used to display a quality parameter history of some an upstream channel. Those marked with arrow ahead are entries of poor signal quality data.

The command "**show cable upstream signal-quality history** *history-begin history-end*" is used to display the quality parameter history of some an upstream channel in a period of time. Those marked with arrow ahead are entries of poor signal quality data.

[Example]

Display the quality parameter history of upstream channel 1 with record ID as 1-2

```
BT(config)# show cable upstream 1 signal-quality history 1 2
MAC Address 0024.6850.100f   UpstreamChannel 1    History Records:
-------------------------------------------------------------------------------

    RecID   SNR      Unerrors   Correcteds  Uncorrectables  Time
    1       0.00     0          0           0               2019 Jan 01  00:16:06
->  2       0.00     0          0           0               2019 Jan 01  00:06:05
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CMTS device
UpstreamChannel	Upstream channel of CMTS
RecID	History data ID
SNR	Upstream SNR, in dB
Unerrors	Error-free code
Correcteds	Error-correctable code
Uncorrectables	Error-uncorrectable code
Time	Recording time of history data

6.4.9 show cable upstream signal-quality monitor config

[Command]

show cable upstream signal-quality monitor config

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the threshold configuration of current upstream channel monitoring parameter.

[Example]

Display the threshold configuration of current upstream channel monitoring parameter in the configview

```
BT(config)# show cable upstream signal-quality monitor config
MAC Address      0024.6850.100f
                   threshold-warning    threshold-recovery
SNR                26.0                 27.0
Correcteds         500                  300
Uncorrectables     400                  200
```

- In the example, the command echo parameters are explained in the following table:

Parameter	Description
MAC Address	MAC address of CMTS device
SNR	Upstream SNR
Correcteds	Error-correctable code
Uncorrectables	Error-uncorrectable code
threshold-warning	Warning threshold
threshold-recovery	Recovery threshold

6.4.10 show cable scqam upstream-spectrum

[Command]

show cable scqam upstream-spectrum (channel-width-1.6M | channel-width-3.2M | channel-width-6.4M)

show cable scqam upstream-spectrum *freq-start freq-end freq-interval*

[View]

cmts view

[Parameter]

channel-width-1.6M: upstream channel bandwidth interval as 1.6M

channel-width-3.2M: upstream channel bandwidth interval as 3.2M

channel-width-6.4M: upstream channel bandwidth interval as 6.4M

freq-start: Start frequency, in Hz. Type: numerical value; range: 5000000-86920000

freq-end: End frequency, in Hz. Type: numerical value; range: 5000000-86920000

freq-interval: frequency interval, in Hz. Type: numerical value; range: 20000-1000000

Requirements on frequency configuration: when *freq-start < freq-end*, (*freq-end- freq-start) / freq-interval* shall be in a reasonable range,and the *freq-interval* must be an integer multiple of 20000 Hz or *freq-start = freq-end*.

[Description]

show cable scqam upstream-spectrum (channel-width-1.6M | channel-width-3.2M | channel-width-6.4M): This command is used to display the signal intensity of upstream channel noise by a certain interval.

show cable scqam upstream-spectrum *freq-start freq-end freq-interval:* This command is used to display the upstream spectrum noise information by start frequency, end frequency and frequency interval.

[Example]

Display the noise signal intensity of upstream spectrum of CMTS by every 6.4M bandwidth:

```
BT(config-if-cmts-1)# show cable scqam upstream-spectrum channel-width-6.4M
FREQUENCY  NOISE-LEVEL at channel-width 6400000
CenterFreq(Hz)    AVG(dBmv)    MIN(dBmv/Hz)        MAX(dBmv/Hz)
5000000           -48.4        -49.0/5020000       -33.3/5240000
11400000          -48.9        -49.0/8199999       -39.3/8400000
17800000          -48.3        -49.0/14600000      -36.3/18880000
24200000          -49.0        -49.0/21000000      -49.0/21000000
30600000          -49.0        -49.0/27400000      -39.3/30720000
37000000          -49.0        -49.0/33800000      -49.0/33800000
43400000          -48.8        -49.0/40200000      -28.2/40960000
49800000          -49.0        -49.0/46600000      -49.0/46600000
56200000          -49.0        -49.0/53000000      -49.0/53000000
62600000          -49.0        -49.0/59400000      -49.0/59400000
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
CenterFreq(Hz)	Channel central frequency, in Hz
AVG(dBmv)	Average noise signal, in dBmv
MIN(dBmv/Hz)	Minimum noise signal and local frequency, in dBmv and Hz respectively
MAX(dBmv/Hz)	Maximum noise signal and local frequency, in dBmv and Hz respectively

Display the noise intensity of CMTS with upstream start frequency as 5000000 Hz, end frequency as8190000 Hz, and frequency interval as 1000000 Hz:

```
BT(config-if-cmts-1)# show cable scqam upstream-spectrum 5000000 8190000100000
|offset 0      100     200   300    400    500    600    700    800    900KHz
freq base
5000KHz|-46.1---56.5---56.7---56.9---56.9---56.9---56.3---56.9---56.5---56.0(dBmV)---
6000KHz|-47.5  -56.8  -46.5  -56.4  -56.3  -46.8  -56.3  -47.3  -56.8  -46.2(dBmV)
7000KHz|-56.6  -55.9  -57.5  -56.5  -55.6  -46.8  -43.4  -43.1  -57.5  -56.5(dBmV)
8000KHz|-56.6  -46.6                                                    (dBmV)
Frequency 5000000Hz to 8190000Hz at 100000Hz contains 32 sample points.
```

6.5 EQAM Channel RF Management

6.5.1 eqam channel original-network-id

[Command]

eqam channel *channel-list* **original-network-id** *network-id*

[View]

eqam template view

[Parameter]

channel-list: EQAM channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

network-id: original network ID, type: numerical value; range: 0-65535. Default: channel ID.

[Description]

This command is used to configure the original network ID of EQAM channel.

[Example]

Configure the original network ID of EQAM channel 32 as 1000:

```
BT(config-if-cmts-1)# eqam channel 32 original-network-id 1000
BT(config-if-cmts-1)# show running-config | include original-network-id
```

```
 eqam channel 32 tsid-offset 1000 qam-group-name "BEIJING-HAIDIAN" qam-manager vod
original-network-id 1000 pat-interval 100 pmt-interval 100 sdv-switch disable sdv-
port-start 1
```

6.5.2 eqam channel pat-interval

[Command]

eqam channel *channel-list* **pat-interval** *pat-interval*

[View]

eqam template view

[Parameter]

channel-list: EQAM channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

pat-interval: pat interval, in milliseconds. type: numerical value; range: 0 | 100-1000. Default: 100.

[Description]

This command is used to configure the PAT table sending interval in the EQAM template view.

[Example]

Configure the PAT table sending interval of EQAM channel 32 as 500:

```
BT(config-if-cmts-1)# eqam channel 32 pat-interval 500
BT(config-if-cmts-1)# show running-config | include pat-interval
 eqam channel 32 tsid-offset 1000 qam-group-name "BEIJING-HAIDIAN" qam-manager vod
original-network-id 2000  pat-interval 500 pmt-interval 100 sdv-switch disable sdv-
port-start 1
```

6.5.3 eqam channel pmt-interval

[Command]

eqam channel *channel-list* **pmt-interval** *pmt-interval*

[View]

eqam template view

[Parameter]

channel-list: EQAM channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

pmt-interval: pmt interval, in milliseconds. type: numerical value; range: 0 | 100-1000. Default: 100.

[Description]

This command is used to configure the PMT table sending interval in the EQAM template view.

[Example]

Configure the PMT table sending interval of EQAM channel 32 as 600:

```
BT(config-if-cmts-1)# eqam channel 32 pmt-interval 600
BT(config-if-cmts-1)# show running-config | include pmt-interval
 eqam channel 32 tsid-offset 1000 qam-group-name "BEIJING-HAIDIAN" qam-manager vod
original-network-id 2000  pat-interval 500 pmt-interval 600 sdv-switch disable sdv-
port-start 1
```

6.5.4 eqam channel qam-group-name

[Command]

eqam channel *channel-list* **qam-group-name** *gpnm*

[View]

eqam template view

[Parameter]

channel-list: EQAM channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

gpnm: QAM group name, in milliseconds. Type: string; range: 1-63 characters, defult: qam_group_%d(%d means channel ID)

[Description]

This command is used to configure the QAM group name in the EQAM template view.

[Example]

Configure the QAM group name of EQAM channel 32 as BEIJING-HAIDIAN:

```
BT(config-if-cmts-1)# eqam channel 32 qam-group-name BEIJING-HAIDIAN
BT(config-if-cmts-1)# show running-config | include qam-group-name
```

```
 eqam channel 32 tsid-offset 1000 qam-group-name "BEIJING-HAIDIAN" qam-manager vod
original-network-id 2000  pat-interval 100 pmt-interval 100 sdv-switch disable sdv-
port-start 1
```

6.5.5 eqam channel qam-manager

[Command]

eqam channel *channel-list* **qam-manager (vod | broadcast)**

[View]

eqam template view

[Parameter]

vod | broadcast: QAM manager type of the channel.

channel-list: EQAM channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

This command is used to configure the QAM manager type in the EQAM template view.

[Example]

Set the QAM manager type of the channel 32 as vod:

```
BT(config-if-cmts-1)# eqam channel 32 qam-manager vod
BT(config-if-cmts-1)# show running-config verbose | include qam-manager
 eqam channel 32 tsid-offset 1000 qam-group-name "BEIJING-HAIDIAN" qam-manager vod
original-network-id 2000  pat-interval 100 pmt-interval 100 sdv-switch disable sdv-
port-start 1
```

6.5.6 eqam channel sdv-port-start

[Command]

eqam channel *channel-list* **sdv-port-start** *sdv-port-start*

[View]

eqam template view

[Parameter]

channel-list: EQAM channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

sdv-port-start: SDV port start value. type: numerical value; range: 1-65535. Default: 1.

[Description]

This command is used to configure the SDV port start value in the EQAM template view.

[Example]

Configure the SDV port start value of EQAM channel 32 as 10:

```
BT(config-if-cmts-1)# eqam channel 32 sdv-port-start 10
BT(config-if-cmts-1)# show running-config | include sdv-port-start
 eqam channel 32 tsid-offset 1000 qam-group-name "BEIJING-HAIDIAN" qam-manager vod
original-network-id 2000  pat-interval 100 pmt-interval 100 sdv-switch disable sdv-
port-start 10
```

6.5.7 eqam channel sdv-switch

[Command]

eqam channel *channel-list* **sdv-switch (enable | disable)**

[View]

eqam template view

[Parameter]

enable | disable: SDV function state.

channel-list: EQAM channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

This command is used to configure the SDV function state in the EQAM template view. It can be configured as enable and disable states, the default is disable.

[Example]

Set the SDV function state of the channel 32 as enable:

```
BT(config-if-cmts-1)# eqam channel 32 sdv-switch enable
BT(config-if-cmts-1)# show running-config verbose | include sdv-switch
```

```
 eqam channel 32 tsid-offset 1000 qam-group-name "BEIJING-HAIDIAN" qam-manager vod
original-network-id 2000  pat-interval 100 pmt-interval 100 sdv-switch enable sdv-
port-start 1
```

6.5.8 eqam channel tsid-offset

[Command]

eqam channel *channel-id* **tsid-offset** *tsid-offset*

[View]

eqam template view

[Parameter]

channel-id: EQAM channel ID, Type: numerical value; range: 1-32.

tsid-offset: TSID offset value. type: numerical value; range: 0-65535. Default: channel ID.

[Description]

This command is used to configure the TSID offset value in the EQAM template view.

[Example]

Configure the TSID offset value of EQAM channel 32 as 3000:

```
BT(config-if-cmts-1)# eqam channel 32 tsid-offset 3000
BT(config-if-cmts-1)# show running-config | include tsid-offset
 eqam channel 32 tsid-offset 3000 qam-group-name "BEIJING-HAIDIAN" qam-manager vod
original-network-id 2000  pat-interval 100 pmt-interval 100 sdv-switch disable sdv-
port-start 10
```

6.5.9 eqam channel tsid-offset qam-group-name qam-manager original-network-id pat-interval pmt-interval sdv-switch sdv-port-start

[Command]

eqam channel *channel-list* **tsid-offset** *tsid-offset* **qam-group-name** *gpnm* **qam-manager (vod | broadcast) original-network-id** *network-id* **pat-interval** *pat-interval* **pmt-interval** *pmt-interval* **sdv-switch (enable | disable) sdv-port-start** *sdv-port-start*

[View]

eqam template view

[Parameter]

vod | broadcast: QAM manager type of the channel.

enable | disable: SDV function state.

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

tsid-offset: SDV port start value. type: numerical value; range: 0-65535. Default: channel ID.

gpnm: QAM group name, in milliseconds. Type: string; range: 1-63 characters, defult: qam_group_%d(%d means channel ID)

network-id: original network ID, type: numerical value; range: 0-65535. Default: channel ID.

pat-interval: pat interval, in milliseconds. type: numerical value; range: 0 | 100-1000. Default: 100.

pmt-interval: pmt interval, in milliseconds. type: numerical value; range: 0 | 100-1000. Default: 100.

sdv-port-start: SDV port start value. type: numerical value; range: 1-65535. Default: 1.

[Description]

This command is used to configure the EQAM channel-level service-related configuration in the EQAM profile view, including the channel QAM manager type, PAT table sending interval, PMT table sending interval, QAM group name, SDV port starting value, and TSID offset value.

[Example]

Configure the channel-level service-related configuration of EQAM channel 32:

```
BT(config-if-cmts-1)# eqam channel 32 tsid-offset 1000 qam-group-name BEIJING-HAIDIAN qam-manager vod original-network-id 2000 pat-interval 100 pmt-interval 100 sdv-switch disable sdv-port-start 1
BT(config-if-cmts-1)# show running-config | include tsid-offset
 eqam channel 32 tsid-offset 1000 qam-group-name BEIJING-HAIDIAN qam-manager vod original-network-id 2000 pat-interval 100 pmt-interval 100 sdv-switch disable sdv-port-start 1
```

6.5.10 eqam tsid-start tsid-step

[Command]

eqam tsid-start *tsid-start* **tsid-step** *tsid-step*

[View]

eqam template view

[Parameter]

tsid-start: TSID offset value batch modification start value.type: numerical value; range: 0-65535.

tsid-step: TSID offset value batch modification step value. type: numerical value; range: 0-65535.

[Description]

This command is used to configure the TSID offset value batch modification start value and the TSID offset value batch modification step value in the EQAM template view.

[Example]

Configure the TSID offset value batch modification start value of Eqam channel 32 as 1000,TSID offset value batch modification step value as 10:

```
BT(config-if-cmts-1)# eqam tsid-start 1000 tsid-step 10
```

6.5.11 eqam downstream eqam annex

[Command]

cable downstream *channel-list* **eqam annex a symbolrate (6952 | 6875 | 6900)**

cable downstream *channel-list* **eqam annex b**

[View]

cmts view

[Parameter]

a: channel system: European standard; channel bandwidth: fixed 8 MHz

b: channel system: American standard; channel bandwidth: fixed 6 MHz

6952 | 6875 | 6900: Symbol rate of European standard, with default as 6952

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

This command is used to configure the parameters of EQAM channel, including configuring the channel as EQAM channel, selecting European or American standard channel system, and selecting a symbol rate optional in case of European standard, which is among (6952|6875|6900).

[Example]

Set the European standard symbol rate of channel 8 as 6900:

```
BT(config-if-cmts-1)# cable downstream 8 eqam annex a symbolrate 6900
It will take some time with a large number of CMs,please wait a moment.
```

```
BT(config-if-cmts-1)# show running-config verbose | include eqam annex
 cable downstream 8 eqam annex a symbolrate 6900
```

6.5.12 eqam batch-mapping channel

[Command]

eqam batch-mapping channel *channel-id* **mapping-start** *mapping-id-start* **mapping-num** *mapping-num* **src-ip-start** *src-ipv4-start* **src-ip-step** *src-ipv4-step* **dst-ip-start** *dst-ipv4-start* **dst-ip-step** *dst-ipv4-step* **udp-start** *dst-port-start* **udp-step** *dst-port-step* **stream-type (mpts | data)**

eqam batch-mapping channel *channel-id* **mapping-start** *mapping-id-start* **mapping-num** *mapping-num* **src-ip-start** *src-ipv4-start* **src-ip-step** *src-ipv4-step* **dst-ip-start** *dst-ipv4-start* **dst-ip-step** *dst-ipv4-step* **udp-start** *dst-port-start* **udp-step** *dst-port-step* **stream-type (spts | datar) in-pn-start** *in-program-start* **in-pn-step** *in-program-step* **out-pn-start** *out-program-start* **out-pn-step** *out-program-step* **pmv-start** *pmv-start* **pmv-step** *pmv-step*

no eqam mapping all

[View]

eqam template view

[Parameter]

mpts: Transparent transmission mode, supports CPU analysis PSI, does not support PID automatic mapping, supports PID static mapping, does not support CPU rebirth PSI.

data: Transparent transmission mode, does not support CPU analysis PSI, does not support PID automatic mapping, supports PID static mapping, does not support CPU rebirth PSI.

spts: Filter mode, support CPU analysis PSI, support PID automatic mapping, does not support PID static mapping, support CPU rebirth PSI.

datar: Transparent transmission mode, support CPU analysis PSI, support PID automatic mapping, does not support PID static mapping, support CPU rebirth PSI.

channel-id: Downstream channel ID, type: numerical value; range: 1-32.

mapping-id-start: Program stream mapping ID start value.type: numerical value; range: 1-32.

mapping-num: Program stream mapping number.type: numerical value; range: 1-32.

src-ipv4-start: Program stream mapping source IP address start value, only supports IPv4 address, dotted decimal type; range: 0.0.0.0 | legal unicast address.

src-ipv4-step: Step value of program stream mapping source IP address . type: numerical value; range: 0-255.

dst-ipv4-start: Start value of program stream mapping destination IP address, only supports IPv4 address, dotted decimal type; range: 0.0.0.0 | legal multicast address.

dst-ipv4-step: Program stream mapping destination IP address step value. type: numerical value; range: 0-255.

dst-port-start: Start value of UDP destination port . type: numerical value; range: 0-65535.

dst-port-step: Step value of UDP destination port. type: numerical value; range: 0-65535.

in-program-start: Start value of stream input program. type: numerical value; range: 0-65535.

in-program-step: Step value of stream input program. type: numerical value; range: 0-65535.

out-program-start: Start value of stream output program. type: numerical value; range: 1-65535.

out-program-step: Step value of stream output program. type: numerical value; range: 0-65535.

pmv-start: Start value of channel PID mapping PMV . type: numerical value; range: 1-510.

pmv-step: Step value of channel PID mapping PMV. type: numerical value; range: 0-510.

Note:

1. The EQAM program stream mapping configuration defaults to none, requiring users to manually create them one by one. A program stream map contains several configuration parameters. When a parameter value is not explicitly specified, the newly created program stream map will use the default value of the parameter.
2. When the source IP address of the program stream map is 0.0.0.0, the identifier does not care about the source IP address of the EQAM TS stream.
3. When the destination IP address of the program stream mapping is 0.0.0.0, the identifier is matched using the EQAM service IP as its destination IP address.
4. When the input program value is 0, the identifier selects the first set of programs included in the input TS stream.
5. The PID mapping rules for EQAM TS flows are:

PMT PID = (Program Stream Mapping PMV + 1)* 16

VIDEO PID = PMT PID + 1

AUDIO PID = VIDEO PID + N (N is the first audio, indexed from 0)

PRIVATE PID = AUDIO PID(N) + M (N is the first audio, indexing from 0. M is the first private PID, starting from 0.)

PCR PID = PRIVATE PID(M) or VIDEO PID

6. EQAM TS stream forwarding mode:

Transparent transmission mode: Query the PID mapping table in the forwarding core of the device, If the mapping table data exists, the mapping is performed. If the mapping table data does not exist, the mapping is not performed, and then the packet is forwarded.

Filter mode: Query the PID mapping table in the forwarding core of the device, and then map and forward it. If not, discard it. If the mapping table data exists, the packet is forwarded. If the mapping table data does not exist, the packet is discarded.

[Description]

The command "**eqam batch-mapping channel**" is used to create a program stream map in batches based on the specified channel.

The command "**no eqam mapping**" is used to delete the program stream mapping configuration.

[Example]

Create 32 program stream maps in batches on EQAM channel 32:

```
BT(config-if-eqam-template-1)# eqam batch-mapping channel 32 mapping-start 1 mapping-num 32 src-ip-start 0.0.0.0 src-ip-step 0 dst-ip-start 0.0.0.0 dst-ip-step 0 udp-start 10000 udp-step 1 stream-type spts in-pn-start 0 in-pn-step 0 out-pn-start 1 out-pn-step 1 pmv-start 1 pmv-step 1
BT(config-if-eqam-template-1)# show running-config
 eqam channel 32 tsid-offset 1 qam-group-name "qam_group_32" qam-manager vod original-network-id 32  pat-interval 100 pmt-interval 100 sdv-switch disable sdv-port-start 1
 eqam channel 32 mapping 1  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10000 stream-type spts in-pn 0 out-pn 1 pmv 1
 eqam channel 32 mapping 2  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10001 stream-type spts in-pn 0 out-pn 2 pmv 2
 eqam channel 32 mapping 3  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10002 stream-type spts in-pn 0 out-pn 3 pmv 3
 eqam channel 32 mapping 4  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10003 stream-type spts in-pn 0 out-pn 4 pmv 4
 eqam channel 32 mapping 5  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10004 stream-type spts in-pn 0 out-pn 5 pmv 5
 eqam channel 32 mapping 6  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10005 stream-type spts in-pn 0 out-pn 6 pmv 6
 eqam channel 32 mapping 7  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10006 stream-type spts in-pn 0 out-pn 7 pmv 7
 eqam channel 32 mapping 8  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10007 stream-type spts in-pn 0 out-pn 8 pmv 8
```

```
 eqam channel 32 mapping 9  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10008 stream-type spts
in-pn 0 out-pn 9 pmv 9
 eqam channel 32 mapping 10  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10009 stream-type spts
in-pn 0 out-pn 10 pmv 10
 eqam channel 32 mapping 11  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10010 stream-type spts
in-pn 0 out-pn 11 pmv 11
 eqam channel 32 mapping 12  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10011 stream-type spts
in-pn 0 out-pn 12 pmv 12
 eqam channel 32 mapping 13  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10012 stream-type spts
in-pn 0 out-pn 13 pmv 13
 eqam channel 32 mapping 14  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10013 stream-type spts
in-pn 0 out-pn 14 pmv 14
 eqam channel 32 mapping 15  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10014 stream-type spts
in-pn 0 out-pn 15 pmv 15
 eqam channel 32 mapping 16  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10015 stream-type spts
in-pn 0 out-pn 16 pmv 16
 eqam channel 32 mapping 17  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10016 stream-type spts
in-pn 0 out-pn 17 pmv 17
 eqam channel 32 mapping 18  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10017 stream-type spts
in-pn 0 out-pn 18 pmv 18
 eqam channel 32 mapping 19  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10018 stream-type spts
in-pn 0 out-pn 19 pmv 19
 eqam channel 32 mapping 20  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10019 stream-type spts
in-pn 0 out-pn 20 pmv 20
 eqam channel 32 mapping 21  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10020 stream-type spts
in-pn 0 out-pn 21 pmv 21
 eqam channel 32 mapping 22  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10021 stream-type spts
in-pn 0 out-pn 22 pmv 22
 eqam channel 32 mapping 23  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10022 stream-type spts
in-pn 0 out-pn 23 pmv 23
 eqam channel 32 mapping 24  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10023 stream-type spts
in-pn 0 out-pn 24 pmv 24
 eqam channel 32 mapping 25  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10024 stream-type spts
in-pn 0 out-pn 25 pmv 25
 eqam channel 32 mapping 26  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10025 stream-type spts
in-pn 0 out-pn 26 pmv 26
 eqam channel 32 mapping 27  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10026 stream-type spts
in-pn 0 out-pn 27 pmv 27
 eqam channel 32 mapping 28  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10027 stream-type spts
in-pn 0 out-pn 28 pmv 28
 eqam channel 32 mapping 29  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10028 stream-type spts
in-pn 0 out-pn 29 pmv 29
 eqam channel 32 mapping 30  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10029 stream-type spts
in-pn 0 out-pn 30 pmv 30
```

```
 eqam channel 32 mapping 31  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10030 stream-type spts
in-pn 0 out-pn 31 pmv 31
 eqam channel 32 mapping 32  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10031 stream-type spts
in-pn 0 out-pn 32 pmv 32
```

6.5.13 eqam bind

[Command]

eqam bind eqam-template *eqam-id* **service-ip** *service-ipv4 service-ipv4-mask* **tsid-base** *tsid-base* **[vlan** *vlan-id***]**

no eqam bind

[View]

cmts view

[Parameter]

eqam-id: EQAM template ID. It is fixed as 1.

service-ipv4: EQAM service IP address, only supports IPv4 address, dotted decimal type; range: 0.0.0.0 | legal unicast address.

service-ipv4-mask: EQAM service mask, dotted decimal type; range: 0.0.0.0-255.255.255.255; default: 0.0.0.0.

tsid-base: TSID base value, type: numerical value; range: 0-65535, default: 0.

vlan-id: Service VLAN ID, type: numerical value; range: 1-4094.

Note:

1. The TSID offset value and the TSID base value when the EQAM template is applied will be added together to form the final TSID value on the channel.
2. After binding an EQAM profile, you can use the **eqam service-ip** and **eqam tsid-base** commands to modify the service VLAN and TSID base value configuration.
3. As long as there is multicast related configuration in the template, whether it is bound or not, the corresponding multicast stream will be recognized as EQAM stream after it comes in, but unicast stream will be recognized as EQAM stream only after binding.

[Description]

This command is used to apply an EQAM profile on the CMTS and configure the service IP, service VLAN and TSID base values.

[Example]

Apply EQAM profile 1 to the CMTS and set the service IP to 172.16.50.177 255.255.255.0, the service VLAN to 20, and the TSID base value to 10000:

```
BT(config-if-eqam-template-1)# eqam bind eqam-template 1 service-ip
172.16.50.177 255.255.255.0 tsid-base 10000 vlan 20
BT(config-if-eqam-template-1)# show running-config | include eqam bind
 eqam bind eqam-template 1 service-ip 172.16.50.177 255.255.255.0 tsid-base 10000
vlan 20
```

6.5.14 eqam service-ip

[Command]

eqam service-ip *service-ipv4 service-ipv4-mask* **[vlan** *vlan-id***]**

[View]

cmts view

[Parameter]

service-ipv4: EQAM service IP address, only supports IPv4 address, dotted decimal type; range: 0.0.0.0 | legal unicast address. Default: 0.0.0.0.

service-ipv4-mask: EQAM service mask, dotted decimal type; range: 0.0.0.0-255.255.255.255; default: 0.0.0.0.

vlan-id: Service VLAN ID, type: numerical value; range: 1-4094.

[Description]

This command is used to configure the service IP in the CMTS to adjust the service IP after configuring the eqam bind command.

[Example]

Adjust the service IP address as 172.16.50.77 255.255.255.0:

```
BT(config-if-cmts-1)# eqam service-ip 172.16.50.77 255.255.255.0
BT(config-if-cmts-1)# show running-config | include service-ip
 eqam bind eqam-template 1 service-ip 172.16.50.77 255.255.255.0 tsid-base 10000
```

6.5.15 eqam tsid-base

[Command]

eqam tsid-base *tsid-base*

[View]

cmts view

[Parameter]

tsid-base: TSID base value, type: numerical value; range: 0-65535.

[Description]

This command is used to configure the service IP in the CMTS to adjust the TSID base value after configuring the eqam bind command.

[Example]

Adjust the TSID base value as 5000:

```
BT(config-if-cmts-1)# eqam tsid-base 5000
BT(config-if-cmts-1)# show running-config | include tsid-base
 eqam bind eqam-template 1 service-ip 172.16.50.77 tsid-base 5000
```

6.5.16 qam channel mapping

[Command]

eqam channel *channel-id* **mapping** *mapping-id* **(enable | disable)**

eqam channel *channel-id* **mapping** *mapping-id* **src-ip** *src-ipv4* **dst-ip** *dst-ipv4* **udp** *dst-port* **stream-type (mpts | data)**

eqam channel *channel-id* **mapping** *mapping-id* **src-ip** *src-ipv4* **dst-ip** *dst-ipv4* **udp** *dst-port* **stream-type (spts | datar) in-pn** *in-program* **out-pn** *out-program* **pmv** *pmv-value*

eqam channel *channel-id* **mapping** *mapping-id* **stream-type (mpts | data) udp** *dst-port*

eqam channel *channel-id* **mapping** *mapping-id* **stream-type (spts | datar) udp** *dst-port* **out-pn** *out-program* **pmv** *pmv-value*

eqam channel *channel-id* **mapping** *mapping-id* **dst-ip** *dst-ipv4*

eqam channel *channel-id* **mapping** *mapping-id* **in-pn** *in-program*

eqam channel *channel-id* **mapping** *mapping-id* **out-pn** *out-program*

eqam channel *channel-id* **mapping** *mapping-id* **pmv** *pmv-value*

eqam channel *channel-id* **mapping** *mapping-id* **src-ip** *src-ipv4*

eqam channel *channel-id* **mapping** *mapping-id* **udp** *dst-port*

eqam channel *channel-id* **mapping** *mapping-id* **pid-map** *pid-origin pid-mapped*

no eqam channel *channel-id* **mapping** *mapping-id* **pid-map** *pid-origin*

no eqam channel *channel-id* **mapping (all |** *mapping-id***)**

no eqam mapping all

[View]

cmts view

[Parameter]

mpts: Transparent transmission mode, supports CPU analysis PSI, does not support PID automatic mapping, supports PID static mapping, does not support CPU rebirth PSI.

data: Transparent transmission mode, does not support CPU analysis PSI, does not support PID automatic mapping, supports PID static mapping, does not support CPU rebirth PSI.

spts: Filter mode, support CPU analysis PSI, support PID automatic mapping, does not support PID static mapping, support CPU rebirth PSI.

datar: Transparent transmission mode, support CPU analysis PSI, support PID automatic mapping, does not support PID static mapping, support CPU rebirth PSI.

channel-id: Downstream channel ID, type: numerical value; range: 1-32.

mapping-id: Program stream mapping ID. type: numerical value; range: 1-32.

src-ipv4: Program stream mapping source IP address start value, only supports IPv4 address, dotted decimal type; range: 0.0.0.0 | legal unicast address.

dst-ipv4: Program stream mapping destination IP address, only supports IPv4 address, dotted decimal type; range: 0.0.0.0 | legal multicast address.

dst-por: UDP destination port . type: numerical value; range: 0-65535.

in-program: Stream input program. type: numerical value; range: 0-65535, default: 0.

out-program: Stream output program. type: numerical value; range: 1-65535, default: program stream mapping.

pmv-value: Channel PID mapping PMV . type: numerical value; range: 1-510, default: program stream mapping.

pid-origin: Origin PID value, type: numerical value; range: 0-8191.

pid-mapped: Mapped PID value, type: numerical value; range: 0-8191.

[Description]

The command "**eqam channel mapping (enable | disable)**" is used to enable or disable a specific program stream mapping in the eqam template view.

The command "**eqam batch-mapping channel**" is used to create a program stream mapping based on the channel in the eqam template view, and configure specific parameters of the program stream

mapping, including the program stream mapping source IP address, the program stream mapping destination IP address, the UDP destination port number, and the program stream type (The stream type defaults to data mode) and other parameters.

The command "**eqam channel mapping pid-map**" is used to configure the PID mapping in the specified program stream mapping in the eqam template view. This command only applies when the program stream type is MPTS and data mode.

The command "**no eqam channel mapping**" is used to delete the program stream mapping configuration.

The command "**no eqam channel mapping pid-map**" is used to delete the PID mapping in the specified program stream in the EQAM template view. This command only applies when the program stream type is MPTS and data mode.

[Example]

Creating a program stream map on the Eqam channel 32:

```
BT(config-if-eqam-template-1)# eqam channel 32 mapping 1 src-ip 0.0.0.0 dst-ip
0.0.0.0 udp 10000 stream-type spts in-pn 0 out-pn 1 pmv 1
BT(config-if-eqam-template-1)# show running-config
 eqam channel 32 mapping 1  src-ip 0.0.0.0 dst-ip 0.0.0.0 udp 10000 stream-type spts
in-pn 0 out-pn 1 pmv 1
```

6.5.17 eqam igmp-version

[Command]

eqam igmp-version *version-id*

[View]

eqam template view

[Parameter]

version-id: IGMP version ID, type: numerical value; range: 2-3, default:2.

[Description]

This command is used to configure the IGMP version supported by the EQAM profile. It can support IGMP v2 and IGMP v3. By default, IGMP v2 is supported.

[Example]

Configure the IGMP version as 3:

```
BT(config-if-eqam-template-1)# eqam igmp-version 3
BT(config-if-eqam-template-1)# show running-config | include igmp-version
 eqam igmp-version 3
```

6.5.18 eqam jitter-tolerance

[Command]

eqam jitter-tolerance *version-id*

[View]

eqam template view

[Parameter]

jitter: EQAM network jitter tolerance threshold, in millisecond, type: numerical value; range: 1-1000, default:500.

[Description]

This command is used to configure the EQAM network jitter tolerance threshold.

[Example]

Configure the EQAM network jitter tolerance threshold as 600 ms:

```
BT(config-if-eqam-template-1)# eqam jitter-tolerance 600
BT(config-if-eqam-template-1)# show running-config | include jitter-tolerance
 eqam jitter-tolerance 600
```

6.5.19 eqam vlan-check

[Command]

eqam vlan-check (enable | disable)

[View]

eqam template view

[Parameter]

enable: Enable the VLAN chenk function.

disable: Disable the VLAN chenk function.

[Description]

This command is used to enable or disable the VLAN chenk function. The EQAM VLAN security check function is disabled by default.

[Example]

Enable the VLAN chenk function:

```
BT(config-if-eqam-template-1)# eqam vlan-check enable
BT(config-if-eqam-template-1)# show running-config | include vlan-check
 eqam vlan-check enable
```

Note:

The EQAM VLAN security check function is used to check whether the VLAN information of the EQAM TS received by the device is consistent with the configuration. If not, the EQAM TS stream data is discarded.

The service VLAN configuration of the EQAM takes place in the application phase of the EQAM template and CMTS binding.

6.5.20 interface eqam template

[Command]

interface eqam template *eqam-id*

[View]

config view

[Parameter]

eqam-id: EQAM template ID. It is fixed as 1.

[Description]

This command is used to enter the eqam template view from the config view.

[Example]

Enter the eqam template view from the config view:

```
BT(config)# interface eqam template 1
BT(config-if-eqam-template-1)#
```

6.5.21 show eqam stream-info

[Command]

show eqam stream-info [channel *channel-id***]**

[View]

cmts view

[Parameter]

channel-id: Downstream channel ID, type: numerical value; range: 1-32.

[Description]

This command is used to display status information of the program stream of the CMTS device.

[Example]

Display the status information of the program stream:

```
BT(config-if-cmts-1)# show eqam stream-info
ID    Type   Src-IP             Dst-IP              Oper Analyse PMT-PID
Pro-number  Rate(bps)          Video-PID   Audio-PID           PCR-PID
30:1  MPEG2  172.16.2.36:49957  172.16.50.177:5000  Y     Y        4096->32
1->1        1617100->1617100  256->33     257/-- -> 34/--     256->33
32:1  MPEG2  172.16.2.36:64612  172.16.50.177:8000  Y     N        1280->1280
5->5        0->0              1281->1281  1282/-- -> 1282/--  1281->1281
Total counter:     2
Analysed counter:  1
Active counter:    2
```

- In the example, the command echo parameters are explained in the following table:

Parameter	Description
ID	Mapping information of the channel. The format is channel ID: mapping ID such as 32:1 indicates the first mapping on channel 32
Type	EQAM TS stream video type, the device supports MPEG1, MPEG2, H264, MPEG4, AVS, H265
Src-IP	Source IPv4 address and source UDP port of the EQAM TS stream
Dst-IP	Destination IPv4 address and destination UDP port of the EQAM TS stream
Oper	Operation status of EQAM TS stream, Y: enable, N:disable
Analyse	EQAM TS analysis completed mark, Y: analysis completed, N: analysis not completed
PMT-PID	EQAM TS mapping before mapping to mapped PMT ID
Pro-number	EQAM TS mapping to the mapped program number, when only multiple sets of programs are included, only the last program number is displayed.
Rate(bps)	Input rate and output rate of EQAM TS stream
Video-PID	EQAM TS stream mapping to the mapped video PID
Audio-PID	Before the EQAM TS stream maps to the mapped audio PID, when there are 2 audios, the "->" is the 2 PIDs before the mapping, and the "->" is the mapped 2 PIDs.
PCR-PID	PCR PID of before EQAM TS mapping to mapped EQAM TS.

6.5.22 show eqam stream-info summary

[Command]

show eqam stream-info summary

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to display traffic statistics of EQAM TS based on CMTS.

[Example]

Display the traffic statistics of EQAM TS:

```
BT(config-if-cmts-1)# show eqam stream-info summary
I/F     total    Analysed   input-rate(bps)   output-rate(bps)
C1      2        1          7581362           7581362
Total: 1
```

- In the example, the command echo parameters are explained in the following table:

Parameter	Description
I/F	CMTS device number
total	The total number of EQAM TS found
Analysed	Total number of EQAM TS stream analysis completed
input-rate(bps)	EQAM TS stream input rate total
output-rate(bps)	EQAM TS stream output rate total

6.6 OFDM Channel RF Management

6.6.1 cable ofdm-downstream cyclic-prefix rolloff-period

[Command]

cable ofdm-downstream *channel-list* **cyclic-prefix (192tsd | 256tsd | 512tsd | 768tsd | 1024tsd) rolloff-period (0tsd | 64tsd | 128tsd | 192tsd | 256tsd)**

[View]

cmts view

[Parameter]

192tsd | 256tsd | 512tsd | 768tsd | 1024tsd: Cyclic prefix, default: 512tsd.

0tsd | 64tsd | 128tsd | 192tsd | 256tsd: Rolloff period, default: 128tsd.

channel-list: OFDM downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 193-193. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers.

[Description]

This command is used to configure the cyclic prefix and the rolloff period of OFDM downstream channel. The rolloff period must less than the cyclic prefix.

[Example]

Configure the cyclic prefix as 192tsd and the rolloff period as 64tsd:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 cyclic-prefix 192tsd rolloff-period
64tsd
BT(config-if-cmts-1)# show running-config verbose | include ofdm-downstream
193 cyclic-prefix
 cable ofdm-downstream 193 cyclic-prefix 192tsd rolloff-period 64tsd
```

6.6.2 cable ofdm-downstream exclusion-band

[Command]

cable ofdm-downstream *channel-id* **exclusion-band** *start-freq end-freq*

no cable ofdm-downstream *channel-id* **exclusion-band (** *start-freq* **| all)**

[View]

cmts view

[Parameter]

channel-id: OFDM downstream channel ID. Type: numerical value; range: 193-193.

start-freq: Start frequency, in Hz. Type: numerical value; range: 108000000-1218000000.

end-freq : End frequency, in Hz. Type: numerical value; range: 108000000-1218000000.

all: Refers to all channel excluded bandwidth configurations.

[Description]

The command "**cable ofdm-downstream exclusion-band**" is used to configure the exclusion band of OFDM downstream channel.

The command "**no cable ofdm-downstream exclusion-band**" is used to delete the exclusion band of OFDM downstream channel.

[Example]

Configure the exclusion band as 660000000 - 662000000:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 exclusion-band 660000000
662000000
BT(config-if-cmts-1)# show running-config verbose | include ofdm-downstream
193 exc
 cable ofdm-downstream 193 exclusion-band 660000000 662000000
```

6.6.3 cable ofdm-downstream lower-frequency upper-frequency

[Command]

cable ofdm-downstream *channel-id* **lower-frequency** *lower-freq* **upper-frequency** *upper-freq*

[View]

cmts view

[Parameter]

channel-id: OFDM downstream channel ID. Type: numerical value; range: 193-193.

lower-freq: Lower frequency, in Hz. Type: numerical value; range: 108000000-1218000000.

upper-freq: Upper frequency, in Hz. Type: numerical value; range: 108000000-1218000000.

[Description]

This command is used to configure the lower frequency and the upper frequency of OFDM downstream channel. The lower frequency must more than the *subcarrier-zero-frequency* + 6.4M Hz. The minimum bandwidth is 24M Hz and the maximum bandwidth is 192M Hz.

[Example]

Configure the lower frequency as 198000000 Hz and the upper frequency as 258000000 Hz:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 lower-frequency 198000000
upper-frequency 258000000
BT(config-if-cmts-1)# show cable ofdm-downstream 193 config
Channel ID                     : 193
Admin Status                   : disable
Lower Edge Frequency(Hz)       : 198000000
Upper Edge Frequency(Hz)       : 258000000
PLC Frequency(Hz)              : 214000000
Subcarrier Zero Frequency(Hz)  : 191600000
Subcarrier Spacing Type        : 50k
Cyclic Prefix                  : 512tsd
Rolloff Period                 : 128tsd
```

```
Time Interleave Depth          : 16
Ncp Modulation Type            : qam16
Output power(dBmV)             : 20.0
Profile List                   : 0-1
Is primary channel             : Yes
```

6.6.4 cable ofdm-downstream ncp-modulation

[Command]

cable ofdm-downstream *channel-list* **ncp-modulation (qpsk | qam16 | qam64)**

[View]

cmts view

[Parameter]

qpsk | qam16 | qam64: NCP modulation.

channel-list: OFDM downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 193-193. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers.

[Description]

This command is used to configure the NCP modulation of OFDM downstream channel. The default NCP modulation is QAM16.

[Example]

Configure the NCP modulation as QAM64:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 ncp-modulation qam64
BT(config-if-cmts-1)# show running-config verbose | include 193 ncp
 cable ofdm-downstream 193 ncp-modulation qam64
```

6.6.5 cable ofdm-downstream power-level

[Command]

cable ofdm-downstream *channel-list* **power-level** *power-level*

[View]

cmts view

[Parameter]

channel-list: OFDM downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 193-193. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers.

power-level: Power level of OFDM downstream channel list, in dBmV. Type: numerical value; range: 17.0-60.0.

[Description]

This command is used to configure the power level of OFDM downstream channel.

[Example]

Configure the power level as 25 dBmV:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 power-level 25
BT(config-if-cmts-1)# show running-config verbose | include ofdm-downstream
193 power
 cable ofdm-downstream 193 power-level 25.0
```

6.6.6 cable ofdm-downstream plc-frequency

[Command]

cable ofdm-downstream *channel-id* **plc-frequency** *plc-freq*

[View]

cmts view

[Parameter]

channel-id: OFDM downstream channel ID. Type: numerical value; range: 193-193.

plc-freq: PLC frequency of OFDM downstream channel list, in Hz. Type: numerical value; range: 108000000-1218000000.

[Description]

This command is used to configure the PLC frequency of OFDM downstream channel, PLC frequency must be an integer multiple of 1M Hz. The default is the starting frequency of the corresponding channel + 16MHz, the bandwidth is fixed to 6MHz

[Example]

Configure the PLC frequency as 280000000 Hz:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 plc-frequency 280000000
BT(config-if-cmts-1)# show running-config verbose | include cable ofdm-
downstream 193 subcarrier-zero-frequency
```

```
cable ofdm-downstream 193 subcarrier-zero-frequency 191600000 lower-frequency
198000000 upper-frequency 320000000 plc-frequency 280000000
```

6.6.7 cable ofdm-downstream primary

[Command]

cable ofdm-downstream *channel-list* **primary**

no cable ofdm-downstream *channel-list* **primary**

[View]

cmts view

[Parameter]

channel-list: OFDM downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 193-193. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers.

[Description]

The command "**cable ofdm-downstream primary**" is used to set a single or multiple downstream channels as the primary channels. Prior to Registration, a Primary-Capable Downstream Channel on which the CM has achieved timing lock and successfully received an MDD message containing ambiguity resolution TLVs. After Registration, the channel on which the CM acquires timing from the assigned list of Primary Downstream Channels in the Simplified RCC Encodings.

The command "**no cable ofdm-downstream primary**" is used to cancel set a single or multiple downstream channels as the primary channels.

[Example]

Cancel set OFDM downstream channel 193 as the primary channels:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 shutdown BT(config-
if-cmts-1)# no cable ofdm-downstream 193 primary BT(config-if-cmts-
1)# show cable ofdm-downstream 193 configChannel ID   : 193
Admin Status                    : disable
Lower Edge Frequency(Hz)        : 660000000
Upper Edge Frequency(Hz)        : 684000000
PLC Frequency(Hz)               : 666000000
Subcarrier Zero Frequency(Hz)  : 650000000
Subcarrier Spacing Type         : 50k
Cyclic Prefix                   : 256tsu
Rolloff Period                  : 64tsu
Time Interleave Depth           : 16
```

```
Ncp Modulation Type            : qam16
Output power(dBmV)             : 20.0
Profile List                   : 0-1
Is primary channel             : No
```

6.6.8 cable ofdm-downstream profile

[Command]

cable ofdm-downstream *channel-id* **profile** *profile-id* **default-modulation (qam16 | qam64 | qam128 | qam256 | qam512 | qam1024 | qam2048 | qam4096)**

cable ofdm-downstream *channel-id* **profile** *profile-id* **subcarrier** *start-freq end-freq* **(qam16 | qam64 | qam128 | qam256 | qam512 | qam1024 | qam2048 | qam4096)**

no cable ofdm-downstream *channel-id* **profile** *profile-id* **subcarrier** *start-freq*

no cable ofdm-downstream *channel-id* **profile (** *profile-id* **| all)**

[View]

cmts view

[Parameter]

qam16 | qam64 | qam128 | qam256 | qam512 | qam1024 | qam2048 | qam4096: Modulation mode.

channel-id: OFDM downstream channel ID. Type: numerical value; range: 193-193.

profile-id: Profile ID. Type: numerical value; range: 0-15; default: 0-1.

start-freq: Start frequency, in Hz. Type: numerical value; range: 108000000-1218000000.

end-freq : End frequency, in Hz. Type: numerical value; range: 108000000-1218000000.

[Description]

The command "**cable ofdm-downstream profile default-modulation**" is used to configure the default modulation of profile of OFDM downstream channel.

The command "**cable ofdm-downstream profile subcarrier**" is used to configure the default modulation of profile of OFDM downstream channel.

The command "**no cable ofdm-downstream profile subcarrier**" is used to delete the specified profile for the OFDM downstream channel.

The command "**no cable ofdm-downstream profile** *profile-id*" is used to delete the specified profile for the OFDM downstream channel.

The command "**no cable ofdm-downstream profile all**" is used to delete all the profile for the OFDM downstream channel.

[Example]

Disable the profile 0 as qam64 of OFDM downstream channel 193:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 profile 0 default-modulationqam64
BT(config-if-cmts-1)# show running-config verbose | include ofdm-downstream
193 profile 0
 cable ofdm-downstream 193 profile 0 default-modulation qam64
```

6.6.9 cable ofdm-downstream profile-list

[Command]

cable ofdm-downstream *channel-id* **profile-list** *profile-list*

[View]

cmts view

[Parameter]

channel-id: OFDM downstream channel ID. Type: numerical value; range: 193-193.

profile-list: Profile list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 0-15. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers.

[Description]

This command is used to configure the profile list of OFDM downstream channel.

[Example]

Configure the profile list as 1 of OFDM downstream channel 193:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 profile-list 1
BT(config-if-cmts-1)# show running-config verbose | include ofdm-downstream
193 profile-list
 cable ofdm-downstream 193 profile-list 0-1
```

6.6.10 cable ofdm-downstream shutdown

[Command]

cable ofdm-downstream *channel-list* **shutdown**

no cable ofdm-downstream *channel-list* **shutdown**

[View]

cmts view

[Parameter]

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 193-193. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers.

[Description]

The command "**cable ofdm-downstream shutdown**" is used to disable one or more downstream channels.

The command "**no cable ofdm-downstream shutdown**" is used to enable one or more downstream channels. After the channel is enabled, the default channel will be DOCSIS channel.

[Example]

Enable the 2nd downstream channel of CMTS device:

```
BT(config-if-cmts-1)# no cable ofdm-downstream 193 shutdown
BT(config-if-cmts-1)# show running-config verbose | include ofdm-downstream
193 shutdown
 no cable ofdm-downstream 193 shutdown
```

6.6.11 cable ofdm-downstream subcarrier-spacing

[Command]

cable ofdm-downstream *channel-id* **subcarrier-spacing (25k | 50k)**

[View]

cmts view

[Parameter]

25k | 50k: Subcarrier spacing.

channel-id: OFDM downstream channel ID. Type: numerical value; range: 193-193.

[Description]

This command is used to configure the subcarrier spacing of OFDM downstream channel. The carrier spacing can be configured as 25K and 50K, defaulting to 50K Hz.

[Example]

Configure the subcarrier spacing as 25K Hz of OFDM downstream channel 193:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 subcarrier-spacing 25k
BT(config-if-cmts-1)# show running-config verbose | include ofdm-downstream
193 subcarrier-spacing
 cable ofdm-downstream 193 subcarrier-spacing 25k
```

6.6.12 cable ofdm-downstream subcarrier-zero-frequency

[Command]

cable ofdm-downstream *channel-id* **subcarrier-zero-frequency** *subcar0-freq*

[View]

cmts view

[Parameter]

channel-id: OFDM downstream channel ID. Type: numerical value; range: 193-193.

subcar0-freq: Subcarrier zero frequency, in Hz. Type: numerical value; range: 101600000-1218000000.

[Description]

This command is used to configure the subcarrier zero frequency of OFDM downstream channel. The *subcar0-freq* must be an integer multiple of the carrier interval and the *subcar0-freq* <= (*start-freq* -6.4M Hz).

[Example]

Configure the subcarrier zero frequency as 652000000 Hz of OFDM downstream channel 193:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 subcarrier-zero-frequency
652000000
BT(config-if-cmts-1)# show running-config verbose | include ofdm-downstream
193 subcarrier-zero-frequency
cable ofdm-downstream 193 subcarrier-zero-frequency 652000000 lower-frequency
660000000 upper-frequency 684000000 plc-frequency 666000000
```

6.6.13 cable ofdm-downstream subcarrier-zero-frequency lower-frequency upper-frequency plc-frequency

[Command]

cable ofdm-downstream *channel-id* **subcarrier-zero-frequency** *subcar0-freq* **lower-frequency** *lower-freq* **upper-frequency** *upper-freq* **plc-frequency** *plc-freq*

[View]

cmts view

[Parameter]

channel-id: OFDM downstream channel ID. Type: numerical value; range: 193-193.

subcar0-freq: Subcarrier zero frequency, in Hz. Type: numerical value; range: 101600000-1218000000.

lower-freq: Lower frequency, in Hz. Type: numerical value; range: 108000000-1218000000.

upper-freq: Upper frequency, in Hz. Type: numerical value; range: 108000000-1218000000.

plc-freq: PLC frequency of OFDM downstream channel list, in Hz. Type: numerical value; range: 108000000-1218000000.

[Description]

This command is used to configure the subcarrier zero frequency, lower frequency, upper frequency and PLC frequency of OFDM downstream channel. The *subcar0-freq* must be an integer multiple of the carrier interval and the *subcar0-freq* <= (*start-freq* -6.4M Hz).

[Example]

Configure the subcarrier zero frequency as 191600000 Hz, lower frequency as 198000000 Hz, upper frequency as 258000000 Hz, PLC frequency as 214000000 Hz of OFDM downstream channel 193:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 subcarrier-zero-frequency
191600000 lower-frequency 198000000 upper-frequency 258000000 plc-frequency 214000000
BT(config-if-cmts-1)# show cable ofdm-downstream 193 config
Channel ID                        : 193
Admin Status                      : disable
Lower Edge Frequency(Hz)          : 198000000
Upper Edge Frequency(Hz)          : 258000000
PLC Frequency(Hz)                 : 214000000
Subcarrier  Zero  Frequency(Hz)   :  191600000
Subcarrier Spacing Type  : 50k
Cyclic Prefix                     : 512tsd
Rolloff Period                    : 128tsd
Time Interleave Depth             : 16
Ncp Modulation Type               : qam16
Output power(dBmV)                : 20.0
Profile List                      : 0-1
Is primary channel                : Yes
```

6.6.14 cable ofdm-downstream time-interleave

[Command]

cable ofdm-downstream *channel-list* **time-interleave** *time-inter*

[View]

cmts view

[Parameter]

channel-list: OFDM downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 193-193. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers.

time-inter : Time interleave. Type: numerical value; range: 1-16(when the subcarrier spacing is 25K Hz); range: 1-32(when the subcarrier spacing is 50K Hz).

[Description]

This command is used to configure the time interleave of OFDM downstream channel.

[Example]

Configure the time interleave as 10 of OFDM downstream channel 193:

```
BT(config-if-cmts-1)# cable ofdm-downstream 193 time-interleave 10
BT(config-if-cmts-1)# show running-config verbose | include ofdm-downstream
193 time-interleave
 cable ofdm-downstream 193 time-interleave 10
```

6.6.15 show cable ofdm-downstream

[Command]

show cable ofdm-downstream [*channel-id***]**

[View]

cmts view

[Parameter]

channel-id: OFDM downstream channel ID, type: numerical value; range: 193-193.

[Description]

This command is used to display the real-time traffic information of OFDM downstream channel.

[Example]

Disable the real-time traffic information of OFDM downstream channel 193:

```
BT(config-if-cmts-1)# show cable ofdm-downstream 193 config
ofdm-downstream 193 is down
Total ofdm-downstream bandwidth: 342000000 bps
Total ofdm-downstream reserved bandwidth: 0 bps
```

```
Avg channel utilization:0% , Curr Speed:0 bps
```

6.6.16 show cable ofdm-downstream config

[Command]

show cable ofdm-downstream *channel-id* **config**

[View]

cmts view

[Parameter]

channel-id: OFDM downstream channel ID, type: numerical value; range: 193-193.

[Description]

This command is used to display the basic parameter configuration of OFDM downstream channel.

[Example]

Disable the basic parameter configuration of OFDM downstream channel 193:

```
BT(config-if-cmts-1)# show cable ofdm-downstream 193 config
Channel ID                      : 193
Admin Status                    : disable
Lower Edge Frequency(Hz)        : 660000000
Upper Edge Frequency(Hz)        : 684000000
PLC Frequency(Hz)               : 666000000
Subcarrier Zero Frequency(Hz)  : 650000000
Subcarrier Spacing Type         : 50k
Cyclic Prefix                   : 256tsu
Rolloff Period                  : 64tsu
Time Interleave Depth           : 16
Ncp Modulation Type             : qam16
Output power(dBmV)              : 20.0
Profile List                    : 0-1
Is primary channel              : No
```

6.6.17 show cable ofdm-downstream exclusion-band

[Command]

show cable ofdm-downstream *channel-id* **exclusion-band**

[View]

cmts view

[Parameter]

channel-id: OFDM downstream channel ID, type: numerical value; range: 193-193.

[Description]

This command is used to display the exclusion band configuration of OFDM downstream channel.

[Example]

Disable the exclusion band of OFDM downstream channel 193:

```
BT(config-if-cmts-1)# show cable ofdm-downstream 193 exclusion-band
Channel ID              :  193
Start Frequency(Hz)     : 682000000
End Frequency (Hz)      : 684000000
```

6.6.18 show cable ofdm-downstream profile

[Command]

show cable ofdm-downstream *channel-id* **profile (***profile-id* **| all)**

[View]

cmts view

[Parameter]

all: All profile.

channel-id: OFDM downstream channel ID, type: numerical value; range: 193-193.

profile-id: Profile ID, type: numerical value; range: 0-15.

[Description]

This command is used to display the profile configuration of OFDM downstream channel.

[Example]

Disable the profile of OFDM downstream channel 193:

```
BT(config-if-cmts-1)# show cable ofdm-downstream 193 profile
Channel ID               : 193
Profile ID               : 0
Default Modulation Type  : qam256
```

6.7 Multi-profile Management

6.7.1 cable ofdm-downstream rxmer-poll-interval

[Command]

cable ofdm-downstream rxmer-poll-interval *interval-in-seconds*

no cable ofdm-downstream rxmer-poll-interva

[View]

cmts view

[Parameter]

interval-in-seconds: polling period. Type: numerical value; range: 0 | 10-86400s, default: 600s, 0 identification function is off.

[Description]

Configure the RxMER training cycle of CM on OFDM channel.

[Example]

The RxMER training cycle of CM configured on OFDM channel is 300s.

```
BT(config-if-cmts-1)# cable ofdm-downstream  rxmer-poll-interval 300
BT(config-if-cmts-1)# show running-config | include rxmer-poll-interval
 cable ofdm-downstream rxmer-poll-interval 300
BT(config-if-cmts-1)#
```

6.7.2 cable ofdm-downstream multi-profile protect-power

[Command]

cable ofdm-downstream multi-profile protect-power *protect-power-value*

no cable ofdm-downstream multi-profile protect-power

[View]

cmts view

[Parameter]

protect-power-value: protect-power threshold. Type: numerical value; range: 0-5 dB, default: 1.0 dB.

[Description]

Configure the protect-power threshold of CM's multi profile function on OFDM channel.

[Example]

Configure CM multi profile function on OFDM channel, and the threshold value of protect power is 1.5:

```
BT(config-if-cmts-1)# cable ofdm-downstream multi-profile protect-power 1.5
BT(config-if-cmts-1)# show running-config | include  protect-power
 cable ofdm-downstream multi-profile protect-power 1.5
BT(config-if-cmts-1)#
```

6.7.3 cable ofdm-downstream multi-profile recommand-age

[Command]

cable ofdm-downstream multi-profile recommand-age *recommand-age-time*

no cable ofdm-downstream multi-profile recommand-age

[View]

cmts view

[Parameter]

recommand-age-time: Recommended profile aging time., Type: numerical value; range: 0 | 10-86400s, default: 1800s (i.e. 30 minutes), 0 is not aging.

[Description]

Configure CM recommendation profile aging time on OFDM channel.

[Example]

Configure CM to recommend profile aging time of 300s on OFDM channel:

```
BT(config-if-cmts-1)# cable ofdm-downstream multi-profile recommand-age 300
BT(config-if-cmts-1)# show running-config | include recommand-age
 cable ofdm-downstream multi-profile recommand-age 300
BT(config-if-cmts-1)#
```

6.7.4 cable ofdm-downstream multi-profile unfit-age

[Command]

cable ofdm-downstream multi-profile unfit-age *unfit-age-time*

no cable ofdm-downstream multi-profile unfit-age

[View]

cmts view

[Parameter]

unfit-age-time: Unfit profile aging time. Type: numerical value; range: 0|10-86400, default: 600s (i.e. 10 minutes), 0 is not aging.

[Description]

Configure CM unfit profile aging time on OFDM channel.

[Example]

Configure CM unfit profile aging time to 300s on OFDM channel.

```
BT(config-if-cmts-1)# cable ofdm-downstream multi-profile unfit-age 300
BT(config-if-cmts-1)# show running-config | include unfit-age
 cable ofdm-downstream multi-profile unfit-age 300
BT(config-if-cmts-1)#
```

6.7.5 cable ofdm-downstream multi-profile downgrade

[Command]

cable ofdm-downstream multi-profile downgrade (enable|disable)

no cable ofdm-downstream multi-profile downgrade

[View]

cmts view

[Parameter]

enable: Configure CM to turn on the downgrade profile function on the OFDM channel.

disable: Configure CM to disable the downgrade profile function on OFDM channel.

[Description]

Configure the switch of CM's downgrade profile function on OFDM channel, which is enabled by default.

[Example]

Enable CM to downgrade profile function on OFDM channel:

```
BT(config-if-cmts-1)# cable ofdm-downstream multi-profile downgrade enable
BT(config-if-cmts-1)# show running-config verbose | include downgrade
 cable ofdm-downstream multi-profile downgrade enable
BT(config-if-cmts-1)#
```

6.7.6 cable ofdm-downstream multi-profile

[Command]

cable ofdm-downstream multi-profile (enable|disable)

no cable ofdm-downstream multi-profile

[View]

cmts view

[Parameter]

enable: Configure CM to dynamically select profile enable on OFDM channel.

disable: Configure CM to dynamically select profile disable on OFDM channel.

[Description]

Configure CM to dynamically select profile enable or disable on OFDM channel, default to disable.

[Example]

Configure CM to dynamically select profile enable on OFDM channel:

```
BT(config-if-cmts-1)# cable ofdm-downstream multi-profile enable
BT(config-if-cmts-1)# show running-config verbose | include enable
 cable ofdm-downstream multi-profile enable
BT(config-if-cmts-1)#
```

6.7.7 cable ofdm-downstream multi-profile qam-threshold

[Command]

cable ofdm-downstream multi-profile qam-threshold *qam-order rxmer-value*

no cable ofdm-downstream multi-profile *qam-order*

[View]

cmts view

[Parameter]

qam-order: Downstream channel modulation mode, enumeration type, range: qam16|qam64|qam128|qam256|qam512| qam1024|qam2048|qam4096.

rxmer-value: RxMER threshold, Type: numerical value; range: 5~100.0 dB, default:

Modulation mode	Default
qam16	15 dB
qam64	21 dB
qam128	24 dB
qam256	27 dB
qam512	30.5dB

Modulation mode	Default
qam1024	34 dB
qam2048	37 dB
qam4096	41 dB

[Description]

Configure the RxMER threshold of CM multi profile function on OFDM channel.

[Example]

The threshold value of QAM4096 on OFDM channel is 50.

```
BT(config-if-cmts-1)# cable ofdm-downstream multi-profile qam-thresholdqam4096
50
BT(config-if-cmts-1)# show running-config verbose | include qam-threshold
 cable ofdm-downstream multi-profile qam-threshold qam4096 50
BT(config-if-cmts-1)#
```

6.8 Spectrum Management

6.8.1 cable spectrum-group

[Command]

cable spectrum-group (enable | disable)

cable spectrum-group *group-id* **[(enable | disable)]**

no cable spectrum-group *group-id*

[View]

config view

[Parameter]

enable: Enable the spectrum function

disable: Disable the spectrum function

group-id: Spectrum-group ID. Type: numerical value; range: 1-32

[Description]

The command "**cable spectrum-group (enable | disable)**" is used to enable or disable the global spectrum function. The spectrum function of the system will not take effect until it is enabled. Otherwise, the spectrum function of the system is disabled. By default, it is disabled.

The command "**cable spectrum-group** *group-id*" is used to create the spectrum-group. By default, the successfully-created spectrum-group is enabled.

The command "**no cable spectrum-group** *group-id*" is used to delete the spectrum-group and its configuration.

The command "**cable spectrum-group** *group-id* **(enable | disable)**" is used to enable or disable the spectrum function. To enable or disable the function, it requires creating the spectrum-group first.

[Example]

Enable the spectrum-group function and apply upstream channel 1 of CMTS to spectrum-group 1:

```
BT(config)# cable spectrum-group enable
BT(config)# cable spectrum-group 1 BT(config)#
interface cmts 1
BT(config-if-cmts-1)# cable upstream 1 spectrum-group 1
BT(config-if-cmts-1)# exit BT(config)# show
cable spectrum-group 1spectrum group 1 config:
--------------------------------------------------------------------------------------------
 administration status: enable
 hop method: snr
 hop minimum interval: 600s
 channel snr threshold(1,2): 20.0dB,15.0dB
channel fec correctable threshold(1,2): 0%,0%
channel fec uncorrectable threshold(1,2): 0%,0%
 channel range-loss threshold: 20
 hop policy: modulation
 hop limit: unlimited
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
--------------------------------------------------------------------------------------------
spectrum group 1 application info:
cmts                      upstream channels
--------------------------------------------------------------------------------------------
0024.684a.0003            1
```

Note:

The frequency-hop check can be triggered only after the global spectrum function and spectrum-group function are enabled and the **cable upstream spectrum-group** is applied on the channel simultaneously.

6.8.2 cable spectrum-group limit

[Command]

cable spectrum-group *group-id* **limit** *limit*

cable spectrum-group *group-id* **limit unlimited**

no cable spectrum-group *group-id* **limit**

[View]

config view

[Parameter]

unlimited: Maximum times of frequency-hop on each channel allowed by the spectrum group is unlimited.

group-id: spectrum-group ID. Type: numerical value; range: 1-32

limit: Maximum times of frequency-hop on each channel allowed by the spectrum group. Type: numerical value; range: 1-65535; default: unlimited

[Description]

The command "**cable spectrum-group limit**" is used to configure the maximum times of frequency-hop on each channel allowed by the spectrum group. To configure this command, it requires disabling the frequency-hop check first. After successful configuration, enable the frequency-hop check again.

The command "**no cable spectrum-group limit**" and the command "**cable spectrum-group limit unlimited**" are used to restore the maximum times of frequency-hop on each channel allowed by the spectrum group to the default value, i.e, unlimited.

[Example]

Configure the maximum times of frequency-hop on each channel allowed by spectrum group 1 as 100:

```
BT(config)# cable spectrum-group 1 disable
BT(config)# cable spectrum-group 1 limit 100
BT(config)# cable spectrum-group 1 enable
BT(config)# show running-config verbose | include spectrum-group 1 limit
 cable spectrum-group 1 limit 100 BT(config)#
show cable spectrum-group 1spectrum group 1
config:
-------------------------------------------------------------------------------------------
 administration status: enable
 hop method: snr
 hop minimum interval: 600s
```

```
 channel snr threshold(1,2): 20.0dB,15.0dB
channel fec correctable threshold(1,2): 0%,0%
channel fec uncorrectable threshold(1,2): 0%,0%
 channel range-loss threshold: 20
 hop policy: modulation
 hop limit: 100
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
-----------------------------------------------------------
spectrum group 1 application info:
cmts                    upstream channels
-----------------------------------------------------------
0024.684a.0003          1
```

Note:

To configure this command, it requires disabling the frequency-hop check first. After successful execution of this command, enable the frequency-hop check again. The frequency-hop check can be triggered only after the global spectrum function is enabled, the "**cable spectrum-group**" is enabled and the "**cable upstream spectrum-group**" is applied on the channel simultaneously.

6.8.3 cable spectrum-group max-history

[Command]

cable spectrum-group max-history *max-history*

no cable spectrum-group max-history

[View]

config view

[Parameter]

max-history: Maximum number of spectrum history entries supported by the channel. Type: numerical value; range: 1-64; default: 16

[Description]

The command "**cable spectrum-group max-history**" is used for global configuration of the maximum number of spectrum history entries supported by the channel. If exceeding the maximum number of history entries, the old records will be covered by new entries.

The command "**no cable spectrum-group max-history**" is used to restore the default maximum number of spectrum history entries supported by the channel.

[Example]

Configure the maximum number of frequency-hop history entries as 20 in the config view

```
BT(config)# cable spectrum-group max-history 20 BT(config)#
show running-config | include max-historycable spectrum-
group max-history 20
BT(config)# show cable spectrum-group
spectrum group global configration:
--------------------------------------------------------------------------
 administration status: enable
 maximum hop history record: 20
 hop recover time limit: 1800s
 Created spectrum group: 1
```

6.8.4 cable spectrum-group method

[Command]

cable spectrum-group *group-id* **method snr**

no cable spectrum-group *group-id* **method**

[View]

config view

[Parameter]

snr: Channel SNR + FEC ratio-based spectrum mode

group-id: spectrum-group ID. Type: numerical value; range: 1-32

[Description]

The command "**cable spectrum-group method**" is used to configure the frequency-hop mode of spectrum-group. Currently only SNR mode is supported. The default frequency-hop mode of successfully-created spectrum-group is SNR. To configure this command, it requires disabling the frequency-hop check first. After successful configuration, enable the frequency-hop check again.

The command "**no cable spectrum-group method**" is used to restore the default frequency-hop mode of the spectrum group.

[Example]

Configure the frequency-hop mode of spectrum-group 1 as SNR

```
BT(config)# cable spectrum-group 1 disable BT(config)# cable
spectrum-group 1 method snr BT(config)# cable spectrum-group 1
enable BT(config)# show running-config verbose | include method snr
```

```
 cable spectrum-group 1 method snr BT(config)#
show cable spectrum-group 1spectrum group 1
config:
--------------------------------------------------------------------------------------------
 administration status: enable
 hop method: snr
 hop minimum interval: 600s
 channel snr threshold(1,2): 20.0dB,15.0dB
channel fec correctable threshold(1,2): 0%,0%
channel fec uncorrectable threshold(1,2): 0%,0%
channel range-loss threshold: 20
 hop policy: modulation
 hop limit: 100
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
-----------------------------------------------------------------
spectrum group 1 application info:
cmts                    upstream channels
-----------------------------------------------------------------
0024.684a.0003          1
```

Note:

To configure this command, it requires disabling the frequency-hop check first. After successful execution of this command, enable the frequency-hop check again. The frequency-hop check can be triggered only after the global spectrum function is enabled, the "**cable spectrum-group**" is enabled and the "**cable upstream spectrum-group**" is applied on the channel simultaneously.

6.8.5 cable spectrum-group min-interval

[Command]

cable spectrum-group *group-id* **min-interval** *interval*

no cable spectrum-group *group-id* **min-interval**

[View]

config view

[Parameter]

group-id: spectrum-group ID. Type: numerical value; range: 1-32

interval: The minimum interval between two frequency hops, in second. Type: numerical value; range: 25-604800; default: 600

[Description]

The command "**cable spectrum-group min-interval**" is used to configure the minimum frequency-hop interval of spectrum group. To configure this command, it requires disabling the frequency-hop check first. After successful configuration, enable the frequency-hop check again.

The command "**no cable spectrum-group min-interval**" is used to restore the default minimum frequency-hop interval of the spectrum group.

[Example]

Configure the minimum frequency-hop interval of spectrum group 1 as 35 s in the config view

```
BT(config)# cable spectrum-group 1 disable BT(config)#
cable spectrum-group 1 min-interval 35BT(config)# cable
spectrum-group 1 enable
BT(config)# show running-config verbose | include min-interval
 cable spectrum-group 1 min-interval 35
BT(config)# show cable spectrum-group 1
spectrum group 1 config:
-------------------------------------------------------------------------------------------
administration status: enable
hop method: snr
hop minimum interval: 35s
channel snr threshold(1,2): 20.0dB,15.0dB
channel fec correctable threshold(1,2): 0%,0%
channel fec uncorrectable threshold(1,2): 0%,0%
channel range-loss threshold: 20
hop policy: modulation
hop limit: 100
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
-----------------------------------------------------------------
spectrum group 1 application info:
cmts                    upstream channels
-----------------------------------------------------------------
0024.6851.0044          1
```

Note:

To configure this command, it requires disabling the frequency-hop check first. After successful execution of this command, enable the frequency-hop check again. The frequency-hop check can be triggered only after the global spectrum function is enabled, the "**cable spectrum-group**" is enabled and the "**cable upstream spectrum-group**" is applied on the channel simultaneously.

6.8.6 cable spectrum-group policy

[Command]

cable spectrum-group *group-id* **policy (frequency | width | modulation) (frequency | width | modulation) [(frequency|width|modulation)]**

cable spectrum-group *group-id* **policy (frequency | width | modulation | freq-width)**

no cable spectrum-group *group-id***policy**

[View]

config view

[Parameter]

frequency: Frequency-hop policy, based on central frequency

width: Frequency-hop policy, based on bandwidth

modulation: Frequency-hop policy, based on modulation mode

freq-width: Frequency-hop policy, based on central frequency and bandwidth, with bandwidth preferred

group-id: spectrum-group ID. Type: numerical value; range: 1-32

[Description]

The command "**cable spectrum-group policy**" is used to configure the frequency-hop policy of spectrum group. After successful configuration, all channels applying this spectrum group will implement the frequency hop according to this policy. Device configure the various combinations according to the parameters to achieve the purpose of the signal to noise ratio adjustment of the channel. The default frequency-hop policy of the successfully-created spectrum group is "modulation". To configure this command, it requires disabling the frequency-hop check first. After successful configuration, enable the frequency-hop check again.

The command "**no cable spectrum-group policy**" is used to restore the frequency-hop policy of spectrum group to the default value.

[Example]

Configure the frequency-hop policy of spectrum group 1 as frequency and width

```
BT(config)# cable spectrum-group 1 policy frequency width
BT(config)# show running-config verbose | include policy
 cable spectrum-group 1 policy frequency width
 cable privacy eae-policy disable-enforcement
BT(config)# show cable spectrum-group 1
```

```
spectrum group 1 config:
--------------------------------------------------------------------------------------------
 administration status: enable
 hop method: snr
 hop minimum interval: 600s
 channel snr threshold(1,2): 20.0dB,15.0dB
 channel fec correctable threshold(1,2): 0%,0%
 channel fec uncorrectable threshold(1,2): 0%,0%
 channel range-loss threshold: 20
 hop policy: frequency width
 hop limit: unlimited
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
------------------------------------------------------------
spectrum group 1 application info:
cmts                    upstream channels
```

Note:

To configure this command, it requires disabling the frequency-hop check first. After successful execution of this command, enable the frequency-hop check again. The frequency-hop check can be triggered only after the global spectrum function is enabled, the "**cable spectrum-group**" is enabled and the "**cable upstream spectrum-group**" is applied on the channel simultaneously.

6.8.7 cable spectrum-group threshold snr

[Command]

cable spectrum-group *group-id* **threshold snr** *snr1 snr2*

no cable spectrum-group *group-id* **threshold snr**

[View]

config view

[Parameter]

group-id: spectrum-group ID. Type: numerical value; range: 1-32

snr1: channel SNR threshold 1, in dB. Type: numerical value; range: 1.0-100.0; default: 20

snr2: channel SNR threshold 2, in dB. Type: numerical value; range: 1.0-100.0; default: 15

[Description]

The command "**cable spectrum-group threshold snr**" is used to configure channel SNR threshold 1 and channel SNR threshold 2 of the spectrum group. After successful configuration, all channels applying this spectrum group will trigger the frequency hop by SNR threshold. The frequency-hop mode as follows: when SNR threshold 1 is triggered, the modulation mode will implement frequency hop to the first backup mode; when SNR threshold 2 (when the frequency-hop policy parameter is modulation, the modulation mode participates in the adjustment and the threshold works) is triggered, the modulation mode will implement frequency hop to the second backup mode. For configuration of spectrum policy, refer to the section for command "**cable spectrum-group policy**". For configuration of backup modulation mode of the channel, refer to the section for command "**cable upstream spectrum-group profile**".

The command "**no cable spectrum-group threshold snr**" is used to restore the default channel SNR thresholds of spectrum group.

[Example]

Configure the SNR threshold of spectrum group 1 as 25.1 19.1 in the config view

```
BT(config)# cable spectrum-group 1 disable BT(config)# cable
spectrum-group 1 threshold snr 25.1 19.1BT(config)# cable
spectrum-group 1 enable
BT(config)# show running-config verbose | include threshold snr
 cable spectrum-group 1 threshold snr 25.1 19.1
BT(config)# show cable spectrum-group 1
spectrum group 1 config:
-------------------------------------------------------------------------------------------
administration status: enable
hop method: snr
hop minimum interval: 35s
channel snr threshold(1,2): 25.1dB,19.1dB
channel fec correctable threshold(1,2): 0%,0%
channel fec uncorrectable threshold(1,2): 0%,0%
channel range-loss threshold: 20
hop policy: modulation
hop limit: 100
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
-----------------------------------------------------------------
spectrum group 1 application info:
cmts                    upstream channels
-----------------------------------------------------------------
0024.6851.0044          1
```

Note:

1. To configure this command, it requires disabling the frequency-hop check first. After successful execution of this command, enable the frequency-hop check again. The frequency-hop check can be triggered only after the global spectrum function is enabled, the "**cable spectrum-group**" is enabled and the "**cable upstream spectrum-group**" is applied on the channel simultaneously.
2. The frequency hop can be triggered only after SNR threshold and FEC threshold are satisfied simultaneously; for configuration of FEC threshold, refer to the section for command "**cable spectrum-group threshold fec**".
3. When the frequency-hop policy is modulation, threshold 1 and threshold 2 work simultaneously; in case of any other policy, only threshold 1 works. For configuration of frequency-hop policy, refer to the section for command "**cable spectrum-group policy**".

6.8.8 cable spectrum-group threshold fec

[Command]

cable spectrum-group *group-id* **threshold fec (correct | uncorrect)** *fec1 fec2*

no cable spectrum-group *group-id* **threshold fec (correct | uncorrect)**

[View]

config view

[Parameter]

correct: FEC error-correctable code

uncorrect: FEC error-uncorrectable code

group-id: spectrum-group ID. Type: numerical value; range: 1-32

fec1: FEC threshold 1, in %; if it is configured as 0, don't participate in any inspection. Type: numerical value; range: 0-100; default: 0

fec2: FEC threshold 2, in %; if it is configured as 0, don't participate in any inspection. Type: numerical value; range: 0-100; default: 0

Requirements on FEC parameter configuration: if *fec1* and *fec2* are not 0, *fec1*<*fec2*; else don't participate in any inspection.

[Description]

The command "**cable spectrum-group threshold fec**" is used to configure channel FEC threshold 1 and channel FEC threshold 2 of the spectrum group. After successful configuration, all channels applying this spectrum group will trigger the frequency hop by the threshold. The frequency-hop mode as follows: when error-correctable threshold 1 is triggered, the modulation mode will implement frequency

hop to the first backup mode; when error-correctable threshold 2 (when the frequency-hop policy parameter is modulation, the modulation mode participates in the adjustment and the threshold works) is triggered, the modulation mode will implement frequency hop to the second backup mode. For configuration of spectrum policy, refer to the section for command "**cable spectrum-group policy**". For configuration of backup modulation mode of the channel, refer to the section for command "**cable upstream spectrum-group profile**".

The command "**no cable spectrum-group threshold fec**" is used to restore the default channel FEC threshold 1 and the default channel FEC threshold 2 of spectrum group respectively.

[Example]

Configure FEC error-correctable threshold of spectrum group 1 as 15%, 20% in the config view:

```
BT(config)# cable spectrum-group 1 disable
BT(config)# cable spectrum-group 1 threshold fec correct 15 20
BT(config)# cable spectrum-group 1 enable
BT(config)# show running-config verbose | include threshold fec correct
cable spectrum-group 1 threshold fec correct 15 20
BT(config)# show cable spectrum-group 1 spectrum
group 1 config:
-------------------------------------------------------------------------------------------
administration status: enable
hop method: snr
hop minimum interval: 35s
channel snr threshold(1,2): 25.1dB,19.1dB
channel fec correctable threshold(1,2): 15%,20%
channel fec uncorrectable threshold(1,2): 0%,0%
channel range-loss threshold: 20
hop policy: modulation
hop limit: 100
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
-----------------------------------------------------------------
spectrum group 1 application info:
cmts                    upstream channels
-----------------------------------------------------------------
0024.6851.0044          1
```

Note:

1. To configure this command, it requires disabling the frequency-hop check first. After successful execution of this command, enable the frequency-hop check again. The frequency-hop check can be triggered only after the global spectrum function is enabled, the "**cable spectrum-group**" is enabled and the "**cable upstream spectrum-group**" is applied on the channel simultaneously.

2. The frequency hop can be triggered only after SNR threshold and FEC threshold are satisfied simultaneously; for configuration of SNR threshold, refer to the section for command "**cable spectrum-group threshold snr**".
3. When the frequency-hop policy is modulation, threshold 1 and threshold 2 work simultaneously; in case of any other policy, only threshold 1 works. For configuration of frequency-hop policy, refer to the section for command "**cable spectrum-group policy**".

6.8.9 cable spectrum-group frequency

[Command]

cable spectrum-group *group-id* **frequency** *fre-id frequency* **width (1.6M | 3.2M | 6.4M) [***power***]**

no cable spectrum-group *group-id* **frequency** *fre-id*

[View]

config view

[Parameter]

1.6M: The maximum channel bandwidth used by the member central frequency is 1.6M

3.2M: The maximum channel bandwidth used by the member central frequency is 3.2M

6.4M: The maximum channel bandwidth used by the member central frequency is 6.4M

group-id: spectrum-group ID. Type: numerical value; range: 1-32

fre-id: Member central frequency ID. Type: numerical value; range: 1-16

frequency: Upstream channel bandwidth of the member central frequency, in Hz; range: (5000000+bandwidth/2)-(85000000-bandwidth/2)

power: Optional receiving level of the member central frequency, in dBmV. Type: numerical value; range: (-14.0)-14.0

[Description]

The command "**cable spectrum-group frequency**" is used to configure the member central frequency of spectrum group. All channels applying this spectrum group will select a frequency from the member central frequencies in the spectrum group to implement the frequency hop. By default, the successfully-created spectrum group excludes the member central frequency. When creating a member central frequency, if no receiving level is specified, no modification to this value will be made. This command will take effect only after the frequency-hop policy parameter is configured as frequency | freq-width. For configuration of frequency-hop policy, refer to the section for command "**cable spectrum-group policy**".

The command "**no cable spectrum-group frequency**" is used to delete the information of member central frequency of the specified spectrum group.

[Example]

Configure the member central frequency 1 of spectrum group 1 as 35000000 Hz 3.2M bandwidth and the receiving level as 7.5 dBmV

```
BT(config)# cable spectrum-group 1 disable
BT(config)# cable spectrum-group 1 frequency 1 35000000 width 3.2M 7.5
BT(config)# cable spectrum-group 1 enable
BT(config)# show running-config verbose | include group 1 frequencycable
spectrum-group 1 frequency 1 35000000 width 3.2M 7.5 BT(config)# show
cable spectrum-group 1
spectrum group 1 config:
--------------------------------------------------------------------------------------------
administration status: enable
hop method: snr
hop minimum interval: 35s
channel snr threshold(1,2): 25.1dB,19.1dB
channel fec correctable threshold(1,2): 15%,20%
channel fec uncorrectable threshold(1,2): 0%,0%
channel range-loss threshold: 20
hop policy: modulation
hop limit: 100
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
-------------------------------------------------------------
1          35000000      3.2M          7.5
spectrum group 1 application info:
cmts                    upstream channels
-------------------------------------------------------------
0024.6851.0044          1
```

Note:

To configure this command, it requires disabling the frequency-hop check first. After successful execution of this command, enable the frequency-hop check again. The frequency-hop check can be triggered only after the global spectrum function is enabled, the "**cable spectrum-group**" is enabled and the "**cable upstream spectrum-group**" is applied on the channel simultaneously.

6.8.10 cable upstream spectrum-group

[Command]

cable upstream *channel-id* **spectrum-group** *group-id*

no cable upstream *channel-id* **spectrum-group**

[View]

cmts view

[Parameter]

channel-id: Upstream channel ID, type: numerical value; range: 1-8.

group-id: spectrum-group ID. Type: numerical value; range: 1-32

[Description]

The command "**cable upstream spectrum-group**" is used to apply the spectrum group on the channel. By default, no spectrum group is applied on the channel.

The command "**no cable upstream spectrum-group**" is used to delete the spectrum group from the channel. For deleting all applications, refer to the section for command "clear cable spectrum-group apply".

[Example]

Apply spectrum group 1 on upstream channel 1:

```
BT(config-if-cmts-1)# cable upstream 1 spectrum-group 1
BT(config-if-cmts-1)# show running-config verbose | include spectrum-group 1
 cable upstream 1 spectrum-group 1
```

6.8.11 cable upstream spectrum-group profile

[Command]

cable upstream *channel-id* **spectrum-group profile atdma (qam16 | qam32 | qam64 | qpsk)**

cable upstream *channel-id* **spectrum-group profile atdma (qam16 | qam32 | qam64) (qpsk | qam16 | qam32)**

no cable upstream *channel-id* **spectrum-group profile**

[View]

cmts view

[Parameter]

qpsk: The modulation mode is QPSK (Quad-Phase Shift Key)

qam16: The modulation mode is QAM16 (Quadrature Amplitude Modulation)

qam32: The modulation mode is QAM32

qam64: The modulation mode is QAM64

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

[Description]

The command " **cable upstream** *channel-id* **spectrum-group profile atdma (qam16 | qam32 | qam64 | qpsk)**" is used to configure the modulation mode in ATDMA on the channel.

The command " **cable upstream** *channel-id* **spectrum-group profile atdma (qam16 | qam32 | qam64) (qpsk | qam16 | qam32)**" is used to configure standby modulation mode 1 and 2 on channel in ATDMA mode. When the channel parameter threshold reaches the conditions for triggering, the channel will implement frequency hop according to the configuration. By default, there's no standby modulation mode on the channel. It is recommended to configure the first second alternate modulation mode at the same time. After configuring them at the same time, the functional robustness is better than configuring only the first spare modulation mode and not configuring the standby modulation mode.

Configure the channel parameter thresholds, including SNR threshold with command "**cable spectrum-group threshold snr**"; error-correctable code threshold with command "**cable spectrum-group threshold fec correct**"; error-uncorrectable code threshold with command "**cable spectrum-group threshold fec uncorrect**".

The command "**no cable upstream spectrum-group profile**" is used to cancel the standby modulation mode on the channel.

[Example]

Create a dual-backup modulation mode- qam16 qpsk on upstream channel 1 in ATDMA mode

```
BT(config-if-cmts-1)# cable upstream 1 spectrum-group profile atdma qam16qpsk
```

6.8.12 cable upstream spectrum-group reset-to-static

[Command]

cable upstream *channel-id* **spectrum-group reset-to-static**

[View]

cmts view

[Parameter]

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

[Description]

This command is used to restore the hopped channel parameters back to the static channel parameters. The parameters include channel frequency, bandwidth, power level and modulation mode.

[Example]

Restore the hopped channel 1 parameters back to the static channel 1 parameters :

```
BT(config-if-cmts-1)# cable upstream 1 spectrum-group reset-to-static
```

6.8.13 clear cable upstream spectrum-group history

[Command]

clear cable upstream *channel-id* **spectrum-group history**

[View]

cmts view

[Parameter]

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

[Description]

This command is used to clear the specified channel hopping history records.

[Example]

Clear the upstream channel 1 hopping history records:

```
BT(config-if-cmts-1)# clear cable upstream 1 spectrum-group history
BT(config-if-cmts-1)# show cable upstream 1 spectrum-group history upstream
channel 1 's spectrum group hops history information:
Total spectrum hop history number: 0
```

6.8.14 clear cable spectrum-group apply

[Command]

clear cable spectrum-group *group-id* **apply**

[View]

config view

[Parameter]

group-id: spectrum-group ID. Type: numerical value; range: 1-32

[Description]

This command is used to delete all applications of the spectrum group. For configuration and deletion of a single application, refer to the section for command line "**cable upstream spectrum-group**".

[Example]

Clear the applications of spectrum group 1

```
BT(config)# show cable spectrum-group 1
spectrum group 1 config:
-------------------------------------------------------------------------------------------
administration status: disable
hop method: snr
hop minimum interval: 35s
channel snr threshold(1,2): 25.1dB,19.1dB
channel fec correctable threshold(1,2): 15%,20%
channel fec uncorrectable threshold(1,2): 0%,0%
channel range-loss threshold: 20
hop policy: modulation
hop limit: 100
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
-------------------------------------------------------------
1         35000000      3.2M          7.5
spectrum group 1 application info:
cmts                    upstream channels
-------------------------------------------------------------
0024.6851.0044          1
BT(config)# clear cable spectrum-group 1 apply
BT(config)# show cable spectrum-group 1 spectrum
group 1 config:
-------------------------------------------------------------------------------------------
administration status: disable
hop method: snr
hop minimum interval: 35s
channel snr threshold(1,2): 25.1dB,19.1dB
channel fec correctable threshold(1,2): 15%,20%
channel fec uncorrectable threshold(1,2): 0%,0%
channel range-loss threshold: 20
hop policy: modulation
hop limit: 100
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
-------------------------------------------------------------
1         35000000      3.2M          7.5
spectrum group 1 application info:
cmts                    upstream channels
```

6.8.15 show cable spectrum-group

[Command]

show cable spectrum-group [*group-id*]

[View]

enable view

[Parameter]

group-id: spectrum-group ID. Type: numerical value; range: 1-32

[Description]

The command "**show cable spectrum-group**" is used to display global configuration information of spectrum function and the created spectrum group.

The command "**show cable spectrum-group** *group-id*" is used to display the configurations and application information of the specified spectrum group.

[Example]

Display global configuration information of spectrum group and the created spectrum group

```
BT(config)# show cable spectrum-group
spectrum group global configuration:
------------------------------------------------------------------------
administration status: enable
maximum hop history record: 20
hop recover time limit: 1800s
 Created spectrum group: 1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
administration status	Status of global spectrum switch: enable/disable
maximum hop history record	Maximum number of spectrum records
hop recover time limit	Frequency-hop limit of the channel
Created spectrum group	Created spectrum group ID

Display the configurations and application information of spectrum group

```
BT(config-if-cmts-1)# show cable spectrum-group 1
spectrum group 1 config:
-------------------------------------------------------------------------------------------
administration status: disable
hop method: snr
```

```
hop minimum interval: 35s
channel snr threshold(1,2): 25.1dB,19.1dB
channel fec correctable threshold(1,2): 15%,20%
channel fec uncorrectable threshold(1,2): 0%,0%
channel range-loss threshold: 20
hop policy: modulation
hop limit: 100
spectrum group 1 member frequency:
Index     frequency     maxWidth      power
------------------------------------------------------------
1         35000000      3.2M          7.5
spectrum group 1 application info:
cmts                    upstream channels
------------------------------------------------------------
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
administration status	Status of spectrum-group switch: enable/disable
hop method	Spectrum mode
hop minimum interval	Minimum spectrum interval
channel snr threshold(1,2)	SNR frequency-hop threshold
channel fec correctable threshold(1,2)	Error-correctable frequency-hop threshold
channel fec uncorrectable threshold(1,2)	Error-uncorrectable frequency-hop threshold
hop policy	Spectrum policy
hop limit	Limit on spectrum times
spectrum group 1 member frequency	Spectrum member central frequency, including member central frequency ID, central frequency, max. bandwidth and level.
spectrum group 1 application info	Information of spectrum group applied on the channel, including MAC address and upstream channel ID of the device.

6.8.16 show cable upstream spectrum-group

[Command]

show cable upstream [*channel-id***] spectrum-group**

[View]

enable view, cmts view, config view

[Parameter]

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

[Description]

The command "**show cable upstream spectrum-group**" is used to display the current spectrum group configuration information on upstream channels.

The command "**show cable upstream** *channel-id* **spectrum-group**" is used to display the automatic frequency hopping configuration information and state information on specified upstream channel.

[Example]

Display the spectrum group configuration information on upstream channels:

```
BT(config-if-cmts-1)# show cable upstream spectrum-group
upstream channel's current using freqency,width,modulation and power:
-----------------------------------------------------------------------------------------
 cable upstream 1 frequency 9000000 channel-width 3200000 atdma profile-type qpsk
power-level 6.0
 cable upstream 2 frequency 15400000 channel-width 3200000 atdma profile-type qpsk
power-level 6.0
 cable upstream 3 frequency 21800000 channel-width 3200000 atdma profile-type qpsk
power-level 6.0
 cable upstream 4 frequency 28200000 channel-width 3200000 atdma profile-type qpsk
power-level 6.0
```

Display the spectrum configuration and status of upstream channel 1

```
BT(config-if-cmts-1)# show cable upstream 1 spectrum-group
channel's spectrum group configuration:
-------------------------------------------------------------------------
spectrum group id: 0
spectrum group backup profile-type:qam16 qpsk
channel's spectrum group status information:
-------------------------------------------------------------------------
current center frequency: 20000000 Hz
current width: 1.6MHz
current modulation: qam256
current receive power: 1.0 dBmV
current channel snr: ---
current channel correctable code rate: ---
current channel uncorrectable code rate: ---
channel range-loss threshold: 20
current channel good count: 0
current channel bad count: 0
total hop count: 0
current used member frequency:
last hop time:  ---
last recovery hop time:  ---
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
spectrum group id	Spectrum group applied on the device channel
spectrum group backup profile-type	Modulation frequency hop group backup
current center frequency	Member central frequency of current channel
current width	Bandwidth of current channel
current modulation	Modulation mode of current channel
current input power	Receiving level of current channel
current channel snr	Current channel SNR, in dB
current channel correctable code rate	Current error-correctable code, in %
current channel uncorrectable code rate	Current error-uncorrectable code, in %
current channel good count	Number of good quality records of current channel
current channel bad count	Number of poor quality records of current channel
total hop count	Total number of frequency hop of current channel
current used member frequency	Members of the frequencies currently in use
last hop time	The last frequency-hop time of current channel
last recovery hop time	The last frequency-hop recovery time of current channel

6.8.17 show cable upstream spectrum-group history

[Command]

show cable upstream *channel-id* **spectrum-group history**

[View]

enable view, config view, cmts view

[Parameter]

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

[Description]

This command is used to display the spectrum history of the specified upstream channel.

[Example]

Display the spectrum history of upstream channel 1

```
BT(config-if-cmts-1)# show cable upstream 1 spectrum-group history
upstream channel 1 's spectrum group hops history information:
@@@----------------------------------------------------------------------------------------------------------------
Index groupId policy profile(1st,2nd) limit
1 1 frequency qam16 qpsk unlimited
          lastHop:2019 Jan 02 05:39:13
          lastRecovery: ---
          40000000 1600000 qam64 7.5 41.8 0 0 0 0 3 1
```

```
            used member frequency: 1
Total spectrum hop history number: 1
```

Note:

In the echoing correct uncorrect refers to the increase percentage of codeword between the two polls period.

6.9 Bonding Group Configuration

6.9.1 bonding-group prov-attr-mask

[Command]

bonding-group prov-attr-mask *prov-attr-mask*

no bonding-group prov-attr-mask

[View]

ds bonding group view, us bonding group view

[Parameter]

prov-attr-mask: the attribute mask of a bonding group, hexadecimal value format, value range: 80000000-FFFFFFFF, default value: 80000000

[Description]

The command "**bonding-group prov-attr-mask**" is used to configure the bonding group attribute mask.

The command "**no bonding-group prov-attr-mask**" is used to restore the default bonding group attribute mask.

[Example]

When there is a channel, any change in the attribute mask of a bonding group will cause the cable modem to restart; when there is no channel, any change in the attribute mask of a bonding group will not cause the cable modem to restart.

```
BT(config)# interface us bonding-group 1 BT(config-if-us-
bonding-group1)# show running-configbonding-groupprov-attr-
mask 80000000
BT(config-if-us-bonding-group1)# bonding-group prov-attr-mask 8555aaaa
Not need to reset cable modems for no channels in Bonding Group.
BT(config-if-us-bonding-group1)# show running-config bonding-
groupprov-attr-mask 8555aaaa
```

```
BT(config-if-us-bonding-group1)# no bonding-group prov-attr-mask
Not need to reset cable modems for no channels in Bonding Group.
BT(config-if-us-bonding-group1)# show running-config bonding-
groupprov-attr-mask 80000000
BT(config-if-us-bonding-group1)# cable upstream 1,4
The cable modem may reset to enforce the configuration.
BT(config-if-us-bonding-group1)# show running-config
bonding-groupprov-attr-mask 80000000
cable upstream 1,4
BT(config-if-us-bonding-group1)# bonding-group prov-attr-mask 8555aaaa
The cable modem may reset to enforce the configuration.
BT(config-if-us-bonding-group1)# show running-config
bonding-groupprov-attr-mask 8555aaaa
cable upstream 1,4
BT(config-if-us-bonding-group1)# no bonding-group prov-attr-mask
The cable modem may reset to enforce the configuration.
```

Note:

When configuring the bonding group attribute mask, if the bonding group channel is empty or if all the bonding group channels are closed, the cable modem will not restart, and the user will receive a prompt that there is no need to restart the cable modem. If there is a channel in the bonding group and not all channels are closed, the cable modem may restart (cable modems that have been configured with the service flow attribute mask or those that come with its own cable modem configuration will restart).

6.9.2 cable bonding-group multicast

[Command]

cable bonding-group multicast

no cable bonding-group multicast

[View]

ds bonding group view

[Parameter]

N/A

[Description]

The command "**cable bonding-group multicast**" is used to configure the binding group to be multicast-specific. After the configuration, the channel in the bonding group can only transmit multicast traffic.

The command "**no cable bonding-group multicast**" is used to restore the bonding group for all traffic sharing.

[Example]

Configure the binding group to be multicast-specific.

```
BT(config-if-ds-bonding-group1)# cable bonding-group multicast BT(config-if-ds-bonding-group1)# show running-config | include multicastcable bonding-group multicast
```

6.9.3 cable bonding-group threshold

[Command]

cable bonding-group threshold overload *overload* **overflow** *overflow*

[View]

ds bonding group view

[Parameter]

overload: Overload threshold of the bonding group, in Mbps, type: numerical value, range: 0-1000, default value: 30

overflow: Overflow threshold of the bonding group, in Mbps, type: numerical value, range: 0-1000, default value: 6K

[Description]

This command is used to configure the overload threshold and overflow threshold of a bonded group (check the value periodically). This configuration will be used as the basis for whether a new multicast group is added to the binding group or whether the existing multicast group needs to be removed from the binding group.

When a multicast group joins a bonding group, the multicast-dedicated binding group is used preferentially. When the real-time traffic does not exceed the traffic threshold, the real-time traffic takes precedence to the dedicated binding group with the lowest traffic. When real-time traffic exceeds the traffic threshold, real-time traffic preferentially enters the shared binding group with the lowest traffic. The sharing group does not have to consider the overtravel threshold.

When the dedicated bonding group traffic exceeds the overflow threshold, the multicast group with the least CM is transferred to the sharing group and the alarm is reported. If the shared bonding group traffic exceeds the overflow threshold, only the alarm is reported.

[Example]

Configure the overload threshold as 60Mbps and overflow threshold as 90Mbps:

```
BT(config-if-ds-bonding-group1)# cable bonding-group threshold overload 60
overflow 90
BT(config-if-ds-bonding-group1)# show running-config | include overload
cable bonding-group threshold overload 60 overflow 90
```

6.9.4 cable docsis30-voice downstream attr-mask

[Command]

cable docsis30-voice downstream req-attr-mask *req-attr-mask* **forb-attr-mask** *forb-attr-mask*

no cable docsis30-voice downstream attr-mask

[View]

config view

[Parameter]

req-attr-mask: Voice service required attribute mask, hexadecimal value format, value range: 00000000-7FFFFFFF, default value: 00000000

forb-attr-mask: Voice service forbidden attribute mask, hexadecimal value format, value range: 00000000-7FFFFFFF, default value: 00000000

[Description]

The command "**cable docsis30-voice downstream attr-mask**" is used to configure the voice service attribute mask. The *req-attr-mask* and the *forb-attr-mask* can not be both 1 in the same bit.

The command "**no cable docsis30-voice downstream attr-mask**" is used to restore the voice service attribute mask as the default.

[Example]

Configure the voice service required attribute mask as 5555aaaa, forbidden attribute mask as aaaa5555:

```
BT(config)# show running-config verbose | include docsis30
cable docsis30-voice upstream req-attr-mask 00000000 forb-attr-mask 00000000
cable docsis30-voice downstream req-attr-mask 00000000 forb-attr-mask 00000000
BT(config)# cable docsis30-voice downstream req-attr-mask 5555aaaa forb-attr-mask
aaaa5555
BT(config)# show running-config verbose | include docsis30
cable docsis30-voice upstream req-attr-mask 00000000 forb-attr-mask 00000000
cable docsis30-voice downstream req-attr-mask 5555aaaa forb-attr-mask aaaa5555
```

6.9.5 cable docsis30-voice upstream attr-mask

[Command]

cable docsis30-voice upstream req-attr-mask *req-attr-mask* **forb-attr-mask** *forb-attr-mask*

no cable docsis30-voice upstream attr-mask

[View]

config view

[Parameter]

req-attr-mask: Voice service required attribute mask, hexadecimal value format, value range: 00000000-7FFFFFFF, default value: 00000000

forb-attr-mask: Voice service forbidden attribute mask, hexadecimal value format, value range: 00000000-7FFFFFFF, default value: 00000000

[Description]

The command "**cable docsis30-voice upstream attr-mask**" is used to configure the voice service attribute mask. The *req-attr-mask* and the *forb-attr-mask* can not be both 1 in the same bit.

The command "**no cable docsis30-voice upstream attr-mask**" is used to restore the voice service attribute mask as the default.

[Example]

Configure the voice service required attribute mask as 11111111, forbidden attribute mask as 22222222:

```
BT(config)# show running-config verbose | include docsis30
cable docsis30-voice upstream req-attr-mask 00000000 forb-attr-mask 00000000
cable docsis30-voice downstream req-attr-mask 00000000 forb-attr-mask 00000000
BT(config)# cable docsis30-voice upstream req-attr-mask 11111111 forb-attr-mask
22222222
BT(config)# show running-config verbose | include docsis30
cable docsis30-voice upstream req-attr-mask 11111111 forb-attr-mask 22222222
cable docsis30-voice downstream req-attr-mask 00000000 forb-attr-mask 00000000
```

6.9.6 cable downstream

[Command]

cable downstream *channel-list*

no cable downstream *channel-list*

[View]

ds bonding group view

[Parameter]

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

The command "**cable downstream**" is used to add a downstream bonding group channel.

The command "**no cable downstream**" is used to delete a downstream bonding group channel.

[Example]

Add channel 1, 2, 3, 4, 6, and 9 to downstream bonding group 1:

```
BT(config)# interface ds bonding-group 1 BT(config-if-ds-
bonding-group1)# show running-configbonding-groupprov-attr-
mask 80000000
BT(config-if-ds-bonding-group1)# cable downstream 1-4,6,9
The cable modem may reset to enforce the configuration.
BT(config-if-ds-bonding-group1)# show running-config
bonding-groupprov-attr-mask 80000000
cable downstream 1-4,6,9
```

Note:

Changes made to the channel during a bonding group configuration may cause the cable modem to restart (cable modems that have been configured with the service flow attribute mask or those that come with its own cable modem configuration will restart). The cable modem will not restart during the channel configuration for the bonding group if there are existing channels in the bonding group and only closed channels would be deleted.

6.9.7 cable downstream prov-attr-mask

[Command]

cable downstream *channel-list* **prov-attr-mask** *prov-attr-mask*

no cable downstream *channel-list* **prov-attr-mask**

[View]

cmts view

[Parameter]

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

prov-attr-mask: the attribute mask of a bonding group, hexadecimal value format, value range: 00000000-7FFFFFFF, default value: 00000000

[Description]

The command "**cable downstream prov-attr-mask**" is used to configure the attribute mask of the downstream channel.

The command "**no cable downstream prov-attr-mask**" is used to restore the attribute mask of the downstream channel as the default.

[Example]

Configure and restore the attribute mask of the downstream channel. Configure the attribute mask as 45454545 of the downstream channel 1,2,3,4,8,9; and restore the attribute mask of the downstream channel 2,3,4,9 as the default:

```
BT(config)# interface cmts 1
BT(config-if-cmts-1)# show running-config verbose | include prov-attr-mask
cable upstream 1 prov-attr-mask 00000000
cable upstream 2 prov-attr-mask 00000000
cable upstream 3 prov-attr-mask 00000000
cable upstream 4 prov-attr-mask 00000000
cable downstream 1 prov-attr-mask 00000000
cable downstream 2 prov-attr-mask 00000000
cable downstream 3 prov-attr-mask 00000000
cable downstream 4 prov-attr-mask 00000000
cable downstream 5 prov-attr-mask 00000000
cable downstream 6 prov-attr-mask 00000000
cable downstream 7 prov-attr-mask 00000000
cable downstream 8 prov-attr-mask 00000000
cable downstream 9 prov-attr-mask 00000000
cable downstream 10 prov-attr-mask 00000000
cable downstream 11 prov-attr-mask 00000000
cable downstream 12 prov-attr-mask 00000000
cable downstream 13 prov-attr-mask 00000000
cable downstream 14 prov-attr-mask 00000000
cable downstream 15 prov-attr-mask 00000000
cable downstream 16 prov-attr-mask 00000000
BT(config-if-cmts-1)# cable downstream 1-4,8,9 prov-attr-mask 45454545
```

```
The cable modem may reset to enforce the configuration.
BT(config-if-cmts-1)# show running-config | include prov-attr-mask
cable downstream 1 prov-attr-mask 45454545
cable downstream 2 prov-attr-mask 45454545
cable downstream 3 prov-attr-mask 45454545
cable downstream 4 prov-attr-mask 45454545
cable downstream 8 prov-attr-mask 45454545
cable downstream 9 prov-attr-mask 45454545
BT(config-if-cmts-1)# no cable downstream 2-4,9 prov-attr-mask
The cable modem may reset to enforce the configuration.
BT(config-if-cmts-1)# show running-config | include prov-attr-mask
cable downstream 1 prov-attr-mask 45454545
cable downstream 8 prov-attr-mask 45454545
```

6.9.8 cable upstream

[Command]

cable upstream *channel-list*

no cable upstream *channel-list*

[View]

us bonding group view

[Parameter]

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

The command "**cable upstream**" is used to add an upstream bonding group channel.

The command "**no cable downstream**" is used to delete an upstream bonding group channel.

[Example]

Add channel 1, 2 to upstream bonding group 1:

```
BT(config)# interface us bonding-group 1 BT(config-if-us-
bonding-group1)# show running-configbonding-groupprov-attr-
mask 80000000
BT(config-if-us-bonding-group1)# cable upstream 1-2
The cable modem may reset to enforce the configuration.
BT(config-if-us-bonding-group1)# show running-config
bonding-groupprov-attr-mask 80000000
```

```
cable upstream 1-2
```

Note:

Changes made to the channel during a bonding group configuration may cause the cable modem to restart (cable modems that have been configured with the service flow attribute mask or those that come with its own cable modem configuration will restart). The cable modem will not restart during the channel configuration for the bonding group if there are existing channels in the bonding group and only closed channels would be deleted.

6.9.9 cable upstream prov-attr-mask

[Command]

cable upstream *channel-list* **prov-attr-mask** *prov-attr-mask*

no cable upstream *channel-list* **prov-attr-mask**

[View]

cmts view

[Parameter]

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

prov-attr-mask: the attribute mask of a bonding group, hexadecimal value format, value range: 00000000-7FFFFFFF, default value: 00000000

[Description]

The command "**cable upstream prov-attr-mask**" is used to configure the attribute mask of the upstream channel.

The command "**no cable upstream prov-attr-mask**" is used to restore the attribute mask of the upstream channel as the default.

[Example]

Configure and restore the attribute mask of the upstream channel. Configure the attribute mask as 22222222 of the upstream channel 1, 3; and restore the attribute mask of the upstream channel 2,3,4,9 as the default:

```
BT(config)# interface cmts 1
BT(config-if-cmts-1)# show running-config verbose | include prov-attr-mask
cable upstream 1 prov-attr-mask 00000000
cable upstream 2 prov-attr-mask 00000000
```

```
cable upstream 3 prov-attr-mask 00000000
cable upstream 4 prov-attr-mask 00000000
cable downstream 1 prov-attr-mask 00000000
cable downstream 2 prov-attr-mask 00000000
cable downstream 3 prov-attr-mask 00000000
cable downstream 4 prov-attr-mask 00000000
cable downstream 5 prov-attr-mask 00000000
cable downstream 6 prov-attr-mask 00000000
cable downstream 7 prov-attr-mask 00000000
cable downstream 8 prov-attr-mask 00000000
cable downstream 9 prov-attr-mask 00000000
cable downstream 10 prov-attr-mask 00000000
cable downstream 11 prov-attr-mask 00000000
cable downstream 12 prov-attr-mask 00000000
cable downstream 13 prov-attr-mask 00000000
cable downstream 14 prov-attr-mask 00000000
cable downstream 15 prov-attr-mask 00000000
cable downstream 16 prov-attr-mask 00000000
BT(config-if-cmts-1)# cable upstream 1,3 prov-attr-mask 22222222
The cable modem may reset to enforce the configuration.
BT(config-if-cmts-1)# show running-config | include prov-attr-mask
cable upstream 1 prov-attr-mask 22222222
cable upstream 3 prov-attr-mask 22222222
BT(config-if-cmts-1)# no cable upstream 3 prov-attr-mask
The cable modem may reset to enforce the configuration.
BT(config-if-cmts-1)# show running-config | include prov-attr-mask
cable upstream 1 prov-attr-mask 22222222
```

6.9.10 interface bonding-group

[Command]

interface (us | ds) bonding-group *bdg-id*

no interface (us | ds) bonding-group *bdg-id*

[View]

config view

[Parameter]

us: Upstream bonding group

ds: Downstream bonding group

bdg-id: Bonding group ID, numeric type, range: 1-65535

[Description]

The command "**interface bonding-group**" is used to create the upstream or downstream bonding group with default attributes, and to enter the bonding group view; the default attribute mask of a bonding group is 80000000, and the channel list is empty.

The command "**no interface bonding-group**" is used to delete upstream or downstream bonding group.

[Example]

Create an upstream bonding group with default attributes, and the bonding group ID is 1:

```
BT(config)# interface us bonding-group 1 BT(config-if-us-
bonding-group1)# show running-configbonding-groupprov-attr-
mask 80000000
```

Note:

1. When a bonding group is created, the cable modem will not restart and the user will not receive any prompt for restart.
2. When a bonding group is deleted, if there are existing channels in the bonding group and not all the channels are closed, the cable modem may restart (cable modems that have been configured with the service flow attribute mask or those that come with its own cable modem configuration will restart). The cable modem will not restart if there is no existing channel in the bonding group or if all the channels in the bonding group are closed.

6.9.11 show cable downstream bonding-group load

[Command]

show cable downstream bonding-group load

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the dynamic load of all downstream bonding groups in the current CMTS device. This helps users monitor the real-time traffic of the bonded group and plan for multicast programs.

[Example]

Display the dynamic load of all downstream bonding groups:

```
BT(config)# show cable downstream bonding-group load
BondingGroup   Capacity(Kbps)   DynamicLoad(Kbps)   Loaded%   ChannelList
1              206092           95270               46        61-64
2              206092           86400               41        57-60
3              206092           180611              88        53-56
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
BondingGroup	Bonding group ID
Capacity(Kbps)	Capacity of bonding group
DynamicLoad(Kbps)	Dynamic load
Loaded%	Dynamic load as a percentage of bonding group capability
ChannelList	Channel list of bonding group

6.9.12 show cable downstream channel-set

[Command]

show cable downstream channel-set

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the downstream channel-set information on the current cmts device. The downstream channel-set defines a set of downstream channels. These channel sets may be associated with channel bonding groups, MD-DS-SGs, MD-CM-SGs, or any other channel set that the CMTS may derive from other CMTS processes. When the channel set ID is 1-255, it corresponds to the single channel of the device. When the channel set ID is 4097, it corresponds to the MD-US-SG and MD-DS-SG channel sets in the MAC domain. When the channel set ID is greater than 4098, it corresponds to the channel set bound by the CM in MTC and MRC modes.

[Example]

View the downstream channel-set information:

```
BT(config)# show cable downstream channel-set
I/F      ChannelSet   Downstream
         ID           ChannelList
C1       1            1
C1       2            2
```

```
C1          3               3
C1          4               4
C1          5               5
C1          6               6
C1          7               7
C1          8               8
C1          9               9
C1          10              10
C1          11              11
C1          12              12
C1          13              13
C1          14              14
C1          15              15
C1          16              16
C1          17              17
C1          18              18
C1          19              19
C1          20              20
C1          21              21
C1          22              22
C1          23              23
C1          24              24
C1          25              25
C1          26              26
C1          27              27
C1          28              28
C1          29              29
C1          30              30
C1          31              31
C1          32              32
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
I/F	CMTS ID
ChannelSet ID	Channel set ID
Downstream ChannelList	Downstream channel list

6.9.13 show cable upstream channel-set

[Command]

show cable upstream channel-set

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the upstream channel-set information on the current cmts device. The upstream channel-set defines a set of upstream channels. These channel sets may be associated with channel bonding groups, MD-DS-SGs, MD-CM-SGs, or any other channel set that the CMTS may derive from other CMTS processes. When the channel set ID is 1-255, it corresponds to the single channel of the device. When the channel set ID is 4097, it corresponds to the MD-US-SG and MD-DS-SG channel sets in the MAC domain. When the channel set ID is greater than 4098, it corresponds to the channel set bound by the CM in MTC and MRC modes.

[Example]

View the upstream channel-set information:

```
BT(config)# show cable upstream channel-set
I/F       ChannelSet   Upstream
          ID           ChannelList
C1        1            1
C1        2            2
C1        3            3
C1        4            4
C1        5            5
C1        6            6
C1        7            7
C1        8            8
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
I/F	CMTS ID
ChannelSet ID	Channel set ID
Upstream ChannelList	Upstream channel list

6.9.14 show interface bonding-group all

[Command]

show interface bonding-group all

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the information on all the current upstream and downstream bonding groups, for example, the channel list and bonding group attribute mask.

[Example]

View the information on all bonding groups:

```
BT(config)# show interface bonding-group all
!
interface us bonding-group 1
bonding-groupprov-attr-mask 80000000
cable upstream 1,4
exit
!
interface us bonding-group 2
bonding-groupprov-attr-mask ffffffff
cable upstream 3
exit
!
interface ds bonding-group 1
bonding-groupprov-attr-mask 80000000
cable downstream 1-3,6,9
exit
!
interface ds bonding-group 2
bonding-groupprov-attr-mask ffff0000
cable downstream 7
exit
```

6.10 Service Class Management

6.10.1 cable service-class name

[Command]

cable service-class name *name*

no cable service-class name *name*

cable service-class name *name* **(upstream | downstream)**

[View]

config view

[Parameter]

upstream | downstream: Service flow direction.

name : Service class name. Type: string; range: 1-15 characters.

[Description]

The command "**cable service-class name**" is used to create a service class.

The command "**no cable service-class name**" is used to delete a service class.

The command "**cable service-class name** *name* **(upstream | downstream)**" is used to configure the service flow direction of the service class.

[Example]

Create service class name as service class:

```
BT(config)# cable service-class name service-1 BT(config)#
show running-config | include service-classcable service-class
name service-1
cable service-class name service-1 upstream
```

Note:

1. Parameter name does not support modification, only support the creation and deletion.;
2. By default, create the upstream service class.

6.10.2 cable service-class name activity-timeout

[Command]

cable service-class name *name* **activity-timeout** *activity-timeout*

no cable service-class name *name* **activity-timeout**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

activity-timeout: Timeout value of activity service flow, in seconds. Type: numerical value; range: 0-65535; default: 0.

[Description]

The command "**cable service-class name activity-timeout** " is used to configure timeout value of activity service flow. When configured to 0, it indicates that there is no restriction on the timeout time of the active service flow.

The command "**no cable service-class name activity-timeout** " is used to restore the default timeout value of activity service flow.

[Example]

Configure timeout value of activity service flow as 43 s:

```
BT(config)# cable service-class name service-1 activity-timeout 43
BT(config)# show running-config | include activity-timeout
cable service-class name service-1 activity-timeout 43
```

6.10.3 cable service-class name admitted-timeout

[Command]

cable service-class name *name* **admitted-timeout** *admitted-timeout*

no cable service-class name *name* **admitted-timeout**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

admitted-timeout: Timeout value of admitted service flow, in seconds. Type: numerical value; range: 0-65535; default: 200.

[Description]

The command "**cable service-class admitted-timeout**" is used to configure timeout value of activity service flow. When configured to 0, it indicates that there is no restriction on the timeout value of the admitted service flow.

The command "**no cable service-class name admitted-timeout**" is used to restore the default timeout value of admitted service flow.

[Example]

Configure timeout value of admitted service flow as 99 s:

```
BT(config)# cable service-class name service-1 admitted-timeout 99
BT(config)# show running-config | include admitted-timeout
cable service-class name service-1 admitted-timeout 99
```

6.10.4 cable service-class name aggr-attr-mask

[Command]

cable service-class name *name* **aggr-attr-mask** *aggr-attr-mask*

no cable service-class name *name* **admitted-timeout**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

aggr-attr-mask: Aggregate attributes mask. Type: numerical value; range: 0-0xffffffff; default: 0x00000000.

[Description]

The command "**cable service-class aggr-attr-mask**" is used to configure aggregate attributes mask of service class. When the configuration is 0x00000000, the aggregation attribute mask does not take effect.

The command "**no cable service-class name aggr-attr-mask**" is used to restore the default aggregation attribute mask.

[Example]

Configure the aggregation attribute mask as 0x000000ff:

```
BT(config)# cable service-class name service-1 aggr-attr-mask 0x000000ff
BT(config)# show running-config | include aggr-attr-mask
cable service-class name service-1 aggr-attr-mask 0x000000ff
```

6.10.5 cable service-class name conten-req-backoff-win

[Command]

cable service-class name *name* **conten-req-backoff-win** *conten-req-backoff-win*

no cable service-class name *name* **conten-req-backoff-win**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

conten-req-backoff-win: Competitive request backoff window multiplier. Type: numerical value; range: 4-12; default: 8.

[Description]

The command "**cable service-class conten-req-backoff-win**" is used to configure competitive request backoff window multiplier of service class. When the configuration is 8, the competitive request backoff window multiplier does not take effect.

The command "**no cable service-class name conten-req-backoff-win**" is used to restore the default competitive request backoff window multiplier.

[Example]

Configure the competitive request backoff window multiplier as 6:

```
BT(config)# cable service-class name service-1 conten-req-backoff-win 6
BT(config)# show running-config | include conten-req-backoff-win
cable service-class name service-1 conten-req-backoff-win 6
```

6.10.6 cable service-class name dscp-overwrite

[Command]

cable service-class name *name* **dscp-overwrite** *dscp-overwrite*

no cable service-class name *name* **dscp-overwrite**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

dscp-overwrite: IP service type DSCP override value. Type: numerical value; range: 0-63.

[Description]

The command "**cable service-class dscp-overwrite**" is used to configure IP service type DSCP override value of service class.

The command "**no cable service-class name dscp-overwrite**" is used to restore the default IP service type DSCP override value, When restore the default IP service type DSCP override value, the IP service type DSCP override value does not take effect.

[Example]

Configure the IP service type DSCP override value as 3:

```
BT(config)# cable service-class name service-1 dscp-overwrite 3
BT(config)# show running-config | include dscp-overwrite
cable service-class name service-1 dscp-overwrite 3
```

6.10.7 cable service-class name dsid-resequence

[Command]

cable service-class name *name* **dsid-resequence (resequencing-dsid | no-resequencing-dsid)**

no cable service-class name *name* **dsid-resequence**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

resequencing-dsid: Identify that CMTS must associate the business process with resequencing DSID when the service flow is assigned to a downstream binding group.

no-resequencing-dsid: dentify CMTS not to associate this service process with resequencing DSID.

[Description]

The command "**cable service-class dsid-resequence**" is used to configure whether the resequencing DSID of the service class is valid. The default is resequencing-dsid. This command applies only to DOCSIS 3.0 downlink service flow operations. This parameter is not applicable to the upstream DOCSIS QoS parameter set, so in this case, its value is reported as resequencing-dsid..

The command "**no cable service-class name dsid-resequence**" is used to restore whether the resequencing DSID of the service class is valid as the default value..

[Example]

Configuration When a service flow is assigned to a downlink binding group, CMTS associates the business process with the resequencing DSID:

```
BT(config)# cable service-class name service-1 dsid-resequence resequencing-dsid
BT(config)# show running-config verbose | include dsid-resequence
cable service-class name service-1 dsid-resequence resequencing-dsid
```

6.10.8 cable service-class name extra-alloc-bandwidth

[Command]

cable service-class name *name* **extra-alloc-bandwidth** *extra-alloc-bandwidth*

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 2-16 characters.

extra-alloc-bandwidth: Configured active allocation bandwidth value, Type: numerical value, unit: kbps, range: 0-8000; default: 0.

[Description]

This command is used to configure the bandwidth value of the active bandwidth allocation function. The default value is 0.

When the value is 0, the bandwidth is not allocated actively.

[Example]

Configuration active allocation bandwidth value is 4000:

```
BT(config)# cable service-class name test extra-alloc-bandwidth 4000
```

6.10.9 cable service-class name extra-alloc-interval

[Command]

cable service-class name *name* **extra-alloc-interval** *extra-alloc-interval*

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 2-16 characters.

extra-alloc-interval: Configured time interval for active bandwidth allocation. Type: numerical value, unit: us, range: 500-4000, default: 1000.

[Description]

This command is used to configure the allocation interval of the active bandwidth allocation function.

[Example]

The allocation interval for configuring the active bandwidth allocation function is 2000.

```
BT(config)# cable service-class name test extra-alloc-interval 2000
```

6.10.10 cable service-class name extra-alloc-timeout

[Command]

cable service-class name *name* **extra-alloc-timeout** *extra-alloc-timeout*

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 2-16 characters.

extra-alloc-timeout: Timeout to stop active bandwidth allocation. Type: numerical value, unit: 0|60-65535 (0 means no stop), unit: s, default: 60.

[Description]

This command is used to configure the timeout period for stopping the active bandwidth allocation. If there is no traffic beyond this time, the active bandwidth allocation will be stopped. A timeout of 0 means no stop.

[Example]

The timeout for configuring to stop active bandwidth allocation is 600s.

```
BT(config)# cable service-class name test extra-alloc-timeout 600
```

6.10.11 cable service-class name forb-attr-mask

[Command]

cable service-class name *name* **forb-attr-mask** *forb-attr-mask*

no cable service-class name *name* **forb-attr-mask**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

forb-attr-mask: Forbidden attribute mask. Type: numerical value; range: 0-0xffffffff; default: 0x00000000.

[Description]

The command "**cable service-class forb-attr-mask**" is used to configure forbidden attribute mask of service class. When the configuration is 0x00000000, the forbidden attribute mask does not take effect.

The command "**no cable service-class name forb-attr-mask**" is used to restore the default forbidden attribute mask.

[Example]

Configure the forbidden attribute mask as 0x00000001:

```
BT(config)# cable service-class name service-1 forb-attr-mask 0x00000001
BT(config)# show running-config | include forb-attr-mask
cable service-class name service-1 forb-attr-mask 0x00000001
```

6.10.12 cable service-class name grant-interval

[Command]

cable service-class name *name* **grant-interval** *grant-interval*

no cable service-class name *name* **grant-interval**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

grant-interval: Nominal grant interval, in μs. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class grant-interval**" is used to configure nominal grant interval of service class. Nominal grant interval means the nominal time interval between consecutive data grant opportunities for a service flow. This command support only to the upstream traffic and the scheduling type is UGS-AD, RTPS service flow.

The command "**no cable service-class name grant-interval**" is used to restore the default grant interval.

[Example]

Configure the grant interval as 844348 μs:

```
BT(config)# cable service-class name service-1 grant-interval 844348
BT(config)# show running-config | include grant-interval
cable service-class name service-1 grant-interval 844348
```

6.10.13 cable service-class name grant-jitter

[Command]

cable service-class name *name* **grant-jitter** *grant-interval*

no cable service-class name *name* **grant-jitter**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

grant-interval: Nominal grant interval, in µs. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class grant-jitter**" is used to configure nominal grant interval of service class. Nominal grant interval means the nominal time interval between consecutive data grant opportunities for a service flow. This command support only to the upstream traffic and the scheduling type is UGS-AD, RTPS service flow.

The command "**no cable service-class name grant-jitter**" is used to restore the default nominal grant interval.

[Example]

Configure the nominal grant interval as 23019 µs:

```
BT(config)# cable service-class name service-1 grant-jitter 23019
BT(config)# show running-config | include grant-jitter
cable service-class name service-1 grant-jitter 23019
```

6.10.14 cable service-class name grants-per-interval

[Command]

cable service-class name *name* **grants-per-interval** *grants-per-interval*

no cable service-class name *name* **grants-per-interval**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

grants-per-interval: Grants per interval. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class grants-per-interval**" is used to configure grant per interval of service class. This command support only to the upstream traffic and the scheduling type is UGS-AD, RTPS service flow. For UGS services, this parameter value indicates the actual number of data grants within each nominal grant interval. For UGS-AD services, this parameter indicates the maximum number of activation grants per nominal grant interval.

The command "**no cable service-class name grants-per-interval**" is used to restore the default grants per interval.

[Example]

Configure the grants-per-interval as 43:

```
BT(config)# cable service-class name service-1 grants-per-interval 43
BT(config)# show running-config | include grants-per-interval
cable service-class name service-1 grants-per-interval 43
```

6.10.15 cable service-class name grant-size

[Command]

cable service-class name *name* **grant-size** *grant-size*

no cable service-class name *name* **grant-size**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

grant-size: Grant size, in byte. Type: numerical value; range: 0-65535; default: 0.

[Description]

The command "**cable service-class grant-size**" is used to configure grant size of service class. This command support only to the upstream traffic and the scheduling type is UGS-AD, RTPS service flow.

The command "**no cable service-class name grant-size**" is used to restore the default grants size.

[Example]

Configure the grants size as 999 byte:

```
BT(config)# cable service-class name service-1 grant-size 999
BT(config)# show running-config | include grant-size
cable service-class name service-1 grant-size 999
```

6.10.16 cable service-class name max-burst

[Command]

cable service-class name *name* **max-burst** *max-burst*

no cable service-class name *name* **max-burst**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

grant-size: Grant size, in byte. Type: numerical value; range: 0-65535; default: 0.

[Description]

The command "**cable service-class max-burst**" is used to configure max burst of service class.

The command "**no cable service-class name max-burst**" is used to restore the default grants size.

[Example]

Configure the max burst as 32543 byte:

```
BT(config)# cable service-class name service-1 max-burst 32543
BT(config)# show running-config | include max-burst
cable service-class name service-1 max-burst 32543
```

6.10.17 cable service-class name max-concat-burst

[Command]

cable service-class name *name* **max-concat-burst** *max-concat-burst*

no cable service-class name *name* **max-concat-burst**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

max-concat-burst: Max concat burst size, in byte. Type: numerical value; range: 0-65535; default: 1522.

[Description]

The command "**cable service-class max-concat-burst**" is used to configure max concat burst of service class. When the value is 0, the max burst is not limited. This command not support to the downstream traffic and the scheduling type is UGS, UGS-AD service flow.

The command "**no cable service-class name max-concat-burst** " is used to restore the max concat burst size.

[Example]

Configure the max concat burst as 5436:

```
BT(config)# cable service-class name service-1 max-concat-burst 5436
BT(config)# show running-config | include max-concat-burst
cable service-class name service-1 max-concat-burst 5436
```

6.10.18 cable service-class name max-rate

[Command]

cable service-class name *name* **max-rate** *max-rate*

no cable service-class name *name* **max-rate**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

max-rate: Max sustained rate, in bps. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class max-rate**" is used to configure max sustained rate of service class. When the value is 0, the max rate is not limited.

The command "**no cable service-class name max-rate**" is used to restore the max sustained rate.

[Example]

Configure the max sustained rate as 3211111 bps:

```
BT(config)# cable service-class name service-1 max-rate 3211111
BT(config)# show running-config | include max-rate
cable service-class name service-1 max-rate 3211111
```

6.10.19 cable service-class name max-latency

[Command]

cable service-class name *name* **max-latency** *max-latency*

no cable service-class name *name* **max-latency**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

max-latency: Max latency, in µs. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class max-latency**" is used to configure max latency of service class. When the value is 0, the max latency is not limited. This command support only to the downstream traffic.

The command "**no cable service-class name max-latency**" is used to restore the max latency.

[Example]

Configure the max latency as 324 µs:

```
BT(config)# cable service-class name service-1 max-latency 324
BT(config)# show running-config | include max-latency
cable service-class name service-1 max-latency 324
```

6.10.20 cable service-class name min-packet-size

[Command]

cable service-class name *name* **min-packet-size** *min-packet*

no cable service-class name *name* **min-packet-size**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

min-packet: Min packet size, in byte. Type: numerical value; range: 0-65535; default: 0.

[Description]

The command "**cable service-class min-packet-size**" is used to configure min packet size of service class. When the value is 0, the min packet size is not limited.

The command "**no cable service-class name min-packet-size**" is used to restore the min packet size.

[Example]

Configure the min packet size as 100 byte:

```
BT(config)# cable service-class name service-1 min-packet-size 100
BT(config)# show running-config | include min-packet-size
cable service-class name service-1 min-packet-size 100
```

6.10.21 cable service-class name min-rate

[Command]

cable service-class name *name* **min-rate** *min-rate*

no cable service-class name *name* **min-rate**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

min-rate: Min rate, in bps. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class min-rate**" is used to configure min reserved rate of service class. When the value is 0, the min rate is not limited.

The command "**no cable service-class name min-rate**" is used to restore the min reserved rate.

[Example]

Configure the min reserved rate as 23 bps:

```
BT(config)# cable service-class name service-1 min-rate 23
```

```
BT(config)# show running-config | include min-rate
cable service-class name service-1 min-rate 23
```

6.10.22 cable service-class name peak-rate

[Command]

cable service-class name *name* **peak-rate** *peak-rate*

no cable service-class name *name* **min-packet-size**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

peak-rate: Peak rate, in bps. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class peak-rate**" is used to configure peak rate of service class. When the value is 0, the peak rate is not limited.

The command "**no cable service-class name peak-rate**" is used to restore the peak rate.

[Example]

Configure the peak rate as 3453647 bps:

```
BT(config)# cable service-class name service-1 peak-rate 3453647
BT(config)# show running-config | include peak-rate
cable service-class name service-1 peak-rate 3453647
```

6.10.23 cable service-class name req-multiplier

[Command]

cable service-class name *name* **req-multiplier** *peak-rate*

no cable service-class name *name* **req-multiplier**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

req-multiplier: Reqest multiplier. Type: numerical value; range: 1 | 2 | 4 | 8 | 16; default: 4.

[Description]

The command "**cable service-class req-multiplier**" is used to configure reqest multiplier of service class.

The command "**no cable service-class name req-multiplier**" is used to restore the reqest multiplier.

[Example]

Configure the reqest multiplier as 16:

```
BT(config)# cable service-class name service-1 req-multiplier 16
BT(config)# show running-config | include req-multiplier
cable service-class name service-1 req-multiplier 16
```

6.10.24 cable service-class name poll-interval

[Command]

cable service-class name *name* **poll-interval** *peak-rate*

no cable service-class name *name* **poll-interval**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

req-multiplier: Nominal Polling Interval, in µs. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class poll-interval**" is used to configure nominal polling interval of service class. The value of this parameter specifies the nominal interval (in units of microseconds) between successive unicast request opportunities for this Service Flow on the upstream channel. This parameter is typically suited for RealTime and Non-Real-Time Polling Service.

The command "**no cable service-class name poll-interval**" is used to restore the nominal polling interval.

[Example]

Configure the nominal polling interval as 645 µs:

```
BT(config)# cable service-class name service-1 poll-interval 645
```

```
BT(config)# show running-config | include poll-interval
cable service-class name service-1 poll-interval 645
```

6.10.25 cable service-class name poll-jitter

[Command]

cable service-class name *name* **poll-jitter** *poll-jitter*

no cable service-class name *name* **poll-jitter**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

poll-jitter: Tolerated Poll Jitter, in µs. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class poll-jitter**" is used to configure tolerated polling jitter of service class. The values in this parameter specifies the maximum amount of time that the unicast request interval may be delayed from the nominal periodic schedule (measured in microseconds) for this Service Flow.

The command "**no cable service-class name poll-jitter**" is used to restore the tolerated polling jitter.

[Example]

Configure the tolerated polling jitteras 666 µs:

```
BT(config)# cable service-class name service-1 poll-jitter 666
BT(config)# show running-config | include poll-jitter
cable service-class name service-1 poll-jitter 666
```

6.10.26 cable service-class name req-attr-mask

[Command]

cable service-class name *name* **req-attr-mask** *req-attr-mask*

no cable service-class name *name* **req-attr-mask**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

req-attr-mask: Request attribute mask. Type: numerical value; range: 0-0xffffffff; default: 0x00000000.

[Description]

The command "**cable service-class req-attr-mask**" is used to configure request attribute mask of service class. When the configuration is 0x00000000, the request attribute mask does not take effect.

The command "**no cable service-class name forb-attr-mask**" is used to restore the default request attribute mask.

[Example]

Configure the request attribute mask as 0xfffffff0:

```
BT(config)# cable service-class name service-1 req-attr-mask 0xfffffff0
BT(config)# show running-config | include req-attr-mask
cable service-class name service-1 req-attr-mask 0xfffffff0
```

6.10.27 cable service-class name req-trans-policy

[Command]

cable service-class name *name* **req-trans-policy** *req-trans-policy*

no cable service-class name *name* **req-trans-policy**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

req-trans-policy: Request/ transmit policy. Type: numerical value; range: 0-0xffffffff; default: 0x00000000.

[Description]

The command "**cable service-class req-trans-policy**" is used to configure request/ transmit policy of service class. For different scheduling types, the request/ transmit policy requirements are different: when the scheduling type is RTPS, UGS, UGS-AD, bit0 to bit4, the policy must all be 1; when the scheduling types is NRTPS, BE, bit0 to bit2 the policy must all be 0.

The command "**no cable service-class name req-trans-policy**" is used to restore the default request attribute mask.

[Example]

Configure the request/ transmit policy as 0xf4:

```
BT(config)# cable service-class name service-1 req-trans-policy 0xf4
BT(config)# show running-config | include req-trans-policy
cable service-class name service-1 req-trans-policy 0xf4
```

6.10.28 cable service-class name priority

[Command]

cable service-class name *name* **priority** *priority*

no cable service-class name *name* **priority**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

priority: Priority of service class. Type: numerical value; range: 0-7; default: 0.

[Description]

The command "**cable service-class priority**" is used to configure priority of service class. This command not support to the downstream traffic and the scheduling type is RTPS, UGS, UGS-AD service flow.

The command "**no cable service-class name priority** " is used to restore the default priority.

[Example]

Configure the priority as 5:

```
BT(config)# cable service-class name service-1 priority 5
BT(config)# show running-config | include priority
cable service-class name service-1 priority 5
```

6.10.29 cable service-class name sched-type

[Command]

cable service-class name *name* **sched-type (be | nrtps | rtps | ugs-ad | ugs)**

no cable service-class name *name* **sched-type**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

be | nrtps | rtps | ugs-ad | ugs: Sched type of service class, Best Effort | Non-Real-Time Polling Service | Real-time Polling Service | Unsolicited Grant Service with Activity Detection | Unsolicited Grant Service.

[Description]

The command "**cable service-class sched-type**" is used to configure sched type of service class. By default, the sched type is be.

The command "**no cable service-class name sched-type**" is used to restore the default sched type.

[Example]

Configure the sched type as nrtps:

```
BT(config)# cable service-class name service-1 sched-type nrtps
BT(config)# show running-config | include sched-type
cable service-class name service-1 sched-type nrtps
```

6.10.30 cable service-class name sid-cluster max-outstanding

[Command]

cable service-class name *name* **sid-cluster max-outstanding** *max-outstanding*

no cable service-class name *name* **sid-cluster max-outstanding**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

max-outstanding: Max outstanding size, in byte. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class name sid-cluster max-outstanding**" is used to configure max outstanding size of service class. Compared to "**cable sid-cluster-switching max-outstanding-byte**" in cmts view, this command has a higher priority.

The command "**no cable service-class name sid-cluster max-outstanding**" is used to restore the max outstanding size. Compared to "**no cable sid-cluster-switching max-outstanding-byte**" in cmts view, this command has a higher priority.

[Example]

Configure the max outstanding size as 2131244 byte:

```
BT(config)# cable service-class name service-1 sid-cluster max-outstanding2131244
BT(config)# show running-config | include sid-cluster max-outstanding
cable service-class name service-1 sid-cluster max-outstanding 2131244
```

6.10.31 cable service-class name sid-cluster max-request

[Command]

cable service-class name *name* **sid-cluster max-request** *max-request*

no cable service-class name *name* **sid-cluster max-request**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

max-request: Max request, in byte. Type: numerical value; range: 0-255; default: 0.

[Description]

The command "**cable service-class sid-cluster max-request**" is used to configure max request of service class. Compared to "**cable sid-cluster-switching max-request**" in cmts view, this command has a higher priority.

The command "**no cable service-class sid-cluster name max-request**" is used to restore the max request. Compared to "**no cable sid-cluster-switching max-request**" in cmts view, this command has a higher priority.

[Example]

Configure the max request as 18:

```
BT(config)# cable service-class name service-1 sid-cluster max-request 18
BT(config)# show running-config | include sid-cluster max-request
cable service-class name service-1 sid-cluster max-request 18
```

6.10.32 cable service-class name sid-cluster max-time

[Command]

cable service-class name *name* **sid-cluster max-time** *max-time*

no cable service-class name *name* **sid-cluster max-time**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

max-time: Maximum time for SID cluster to apply for bandwidth request , in ms. Type: numerical value; range: 0-65535; default: 0.

[Description]

The command "**cable service-class sid-cluster max-time**" is used to configure maximum time for SID cluster to apply for bandwidth request. Compared to "**cable sid-cluster-switching max-time**" in cmts view, this command has a higher priority.

The command "**no cable service-class name sid-cluster max-time**" is used to restore the maximum time for SID cluster to apply for bandwidth request. Compared to "**no cable sid-cluster-switching max-time**" in cmts view, this command has a higher priority.

[Example]

Configure the maximum time for SID cluster to apply for bandwidth request as 102 ms:

```
BT(config)# cable service-class name service-1 sid-cluster max-time 102
BT(config)# show running-config | include sid-cluster max-time
cable service-class name service-1 sid-cluster max-time 102
```

6.10.33 cable service-class name sid-cluster max-total-byte

[Command]

cable service-class name *name* **sid-cluster max-total-byte** *max-total-byte*

no cable service-class name *name* **sid-cluster max-total-byte**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

max-total-byte: Maximum size for SID cluster request can use, in byte. Type: numerical value; range: 0-4294967295; default: 0.

[Description]

The command "**cable service-class name sid-cluster max-total-byte**" is used to configure maximum size for SID cluster request can use. Compared to "**cable sid-cluster-switching max-total-byte**" in cmts view, this command has a higher priority.

The command "**no cable service-class name sid-cluster max-total-byte**" is used to restore the maximum size for SID cluster request can use. Compared to "**no cable sid-cluster-switching max-total-byte**" in cmts view, this command has a higher priority.

[Example]

Configure the maximum size for SID cluster request can use as 8543 byte:

```
BT(config)# cable service-class name service-1 sid-cluster max-total-byte 8543
BT(config)# show running-config | include sid-cluster max-total-byte
cable service-class name service-1 sid-cluster max-total-byte 8543
```

6.10.34 cable service-class name sid-cluster tos-overwrite

[Command]

cable service-class name *name* **sid-cluster tos-overwrite** *tos-and-mask tos-or-mask*

no cable service-class name *name* **sid-cluster tos-overwrite**

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

tos-and-mask: Overwrite AND operation mask of IP TOS, in byte. Type: numerical value; range: 0-0xff; default: 0xff.

tos-or-mask: Overwrite OR operation mask of IP TOS, in byte. Type: numerical value; range: 0-0xff; default: 0x00.

[Description]

The command "**cable service-class tos-overwrite**" is used to configure overwrite AND operation mask of IP TOS. The new IP TOS value = IP TOS value of packets and *tos-and-mask* or *tos-or-mask*, when the *tos-or-mask* as 0x00, the IP service class mask does not take effect.

The command "**no cable service-class name tos-overwrite** " is used to restore the maximum size for SID cluster request can use.

[Example]

Configure the maximum size for SID cluster request can use as 8543 byte:

```
BT(config)# cable service-class name service-1 sid-cluster max-total-byte 8543
BT(config)# show running-config | include sid-cluster max-total-byte
cable service-class name service-1 sid-cluster max-total-byte 8543
```

6.10.35 show cable service-class

[Command]

show cable service-class

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display the information of service class.

[Example]

View the information of service class:

```
BT(config)# show cable service-class
name          Dir     Sched     Prio    MaxSusRate   MaxBurst    MinRate
service-1     DS      BE        0       0            3044        0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
name	Service class name
Dir	Service class direction
Sched	Service class scheduling type
Prio	Service class traffic priority
MaxSusRate	Service class maximum sustained rate
MaxBurst	Service class max Burst
MinRate	Service class min reserved rate

6.10.36 show cable service-class verbose

[Command]

show cable service-class name name verbose

[View]

config view

[Parameter]

name: Service class name. Type: string; range: 1-15 characters.

[Description]

This command is used to display the details of service class.

[Example]

View the details of service class:

```
BT(config)# show cable service-class name service-1 verbose
Name                        : service-1
Direction                   : DS
Traffic Priority            : 0
Maximum Sustained Rate      : 0 bits/sec
Max Burst                   : 3044 bytes
Minimum Reserved Rate       : 0 bits/sec
Minimum Packet Size  : 0 bytes
Peak Rate                   : 3453647 bits/sec
Admitted Qos Timeout        : 99 seconds
Active Qos Timeout          : 43 seconds
Required Attribute Mask     : 0xFFFFFFF0
Forbidden Attribute Mask    : 0x1
Aggregate Attribute Mask    : 0xFF
Max Latency                 : 324 usecs
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Name	Service class name
Dir	Service class direction
Traffic Priority	Service class traffic priority
Maximum Sustained Rate	Service class maximum sustained rate
Max Burst	Service class max Burst
Minimum Reserved Rate	Service class min rate
Minimum Packet Size	Service class minimum packet size

Parameter	Description
Peak Rate	Service class peak rate
Admitted Qos Timeout	Service class admitted qos timeout
Active Qos Timeout	Service class active qos timeout
Required Attribute Mask	Service class required attribute mask
Forbidden Attribute Mask	Service class forbidden attribute mask
Aggregate Attribute Mask	Service class aggregate attribute mask
Max Latency	Service class max latency

6.11 Modulation Profile Management

6.11.1 cable modulation-profile

[Command]

cable modulation-profile *profile-index* **initial** *fecT fecK burst-len guard-t* **(qpsk | qam16 | qam32 | qam64 | qam256) (no-scrambler | scrambler seed) (diff | no-diff)** *pre-len* **fixed (qpsk0 | qpsk1)** *rs-depth rs-blksize*

cable modulation-profile *profile-index* **(request | reqdata | station | short | long | a-short | a-long | a-ugs)** *fecT fecK burst-len guard-t* **(qpsk | qam16 | qam32 | qam64 | qam256) (no-scrambler | scrambler seed) (diff | no-diff)** *pre-len* **(fixed | shortened) (qpsk0 | qpsk1)** *rs-depth rs-blksize*

no cable modulation-profile *profile-index* **[(request | reqdata | initial | station | short | long | a-short | a-long | a-ugs)]**

[View]

config view

[Parameter]

request: Request IUC

reqdata: Request/Data IUC

initial: Initial Ranging IUC

station: Periodic Ranging IUC

short: Short Data IUC

long: Long Data IUC

a-short: Advanced PHY Short Data Grant IUC

a-long: Advanced PHY Long Data Grant IUC

a-ugs: Advanced PHY Unsolicited Grant IUC

qpsk: The modulation mode is QPSK (Quad-Phase Shift Key)

qam16: The modulation mode is QAM16 (Quadrature Amplitude Modulation)

qam32: The modulation mode is QAM32

qam64: The modulation mode is QAM64

qam256: The modulation mode is QAM256

scrambler: Enable the scrambler

no-scrambler: Disable the scrambler

diff: Enable the differential encoding. It must be enabled when IUC1,2,5,6 is present in the modulation template and the mode is QPSK (where IUC3 and 4 must be the same)

no-diff: Enable the differential encoding

fixed: The last FEC code word is fixed

shortened: The last FEC code word is shortened

qpsk0: Preamble type QPSK0

qpsk1: Preamble type QPSK1

profile-index: Profile index. Type: numerical value; range: 19-54

fecT: FecT. Type: numerical value; range: 0-16

fecK: FecK. Type: numerical value; range: 1-253, when fecT is larger than 0, the range is 16-253.

burst-len: Burst length of mini-slot. Type: numerical value; range: 0-255

guard-t: Burst interval, valid at ATDMA. Type: numerical value; range: 4-255

seed: Scrambling polynomial seed, exists when scrambler is enabled. Type: numerical value; range: 0-65535

pre-len: Preamble length. Type: numerical value; range: 2-1536, and is a multiple of 2

rs-depth: R-S coding Interleave depth, valid at ATDMA. Type: numerical value; range: 0-113

rs-blksize: R-S coding Interleave size, valid at ATDMA and rs-depth=0. Type: numerical value; range: 36-2048

[Description]

The command "**cable modulation-profile**" is used to create a modulation profile for ATDMA. Repeated configuration of an IUC overwrites the current configuration.

The command "**no cable modulation-profile**" is used to delete the modulation profile.

[Example]

Create modulation profile for ATDMA:

```
BT(config)# cable modulation-profile 19 request 0 16 3 8 qpsk scrambler 338
no-diff 56 fixed qpsk1 1 36
BT(config)# show running-config | include modulation
 cable modulation-profile 19 request 0 16 3 8 qpsk scrambler 338 no-diff 56 fixed
qpsk1 1 36
```

6.11.2 cable upstream modulation-profile

[Command]

cable upstream *channel-id* **frequency** *frequency* **channel-width (1.6M | 3.2M | 6.4M) modulation-profile** *profile-index* **channel-mode (v2.0 | v3.0)**

cable upstream *channel-list* **modulation-profile** *profile-index*

[View]

cmts view

[Parameter]

1.6M: Upstream channel bandwidth is 1.6M

3.2M: Upstream channel bandwidth is 3.2M

6.4M: Upstream channel bandwidth is 6.4M

v2.0: DOCSIS 2.0(UCD29) mode

v3.0: DOCSIS 3.0(UCD35) mode

profile-index: Profile index. Type: numerical value; range: 19-54

channel-id: Upstream channel ID, type: numerical value; range: 1-8.

frequency: Upstream channel central frequency. Type: numerical value; range: (5000000+bandwidth/2)-(85000000-bandwidth/2)

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

[Description]

This command is used to configure a modulation profile of upstream channel. You can configure all the parameters of the upstream channel at a time, or you can configure only one or more upstream channels to use the extended modulation profile.

[Example]

Configure modulation profile 19 for upstream channel 1:

```
BT(config-if-cmts-1)# cable upstream 1 modulation-profile 19
BT(config)# show running-config | include modulation-profile
cable modulation-profile 19 request 0 16 3 8 qpsk scrambler 338 no-diff 56 fixed
qpsk1 1 36
```

6.11.3 show cable modulation-profile

[Command]

show cable modulation-profile [*profile-index***]**

[View]

show cable modulation-profile: cmts view

show cable modulation-profile *profile-index*: config view, cmts view

[Parameter]

profile-index: Profile index. Type: numerical value; range: 1-54

[Description]

The command "**show cable modulation-profile**" is used to display all the modulation profile of all the CMTS.

The command "**show cable modulation-profile** *profile-index*" is used to display specified the modulation profile of all the CMTS.

[Example]

Display the modulation profile 32 of all the CMTS.

```
BT(config)# show cable modulation-profile 32
-------------------------------------------------------------------------------------------------------------
Profile index     : 32
Channel Type      : ATDMA
Description       : ----
-------------------------------------------------------------------------------------------------------------
IUC               : IUC1   IUC2   IUC3   IUC4   IUC5   IUC6   IUC9   IUC10  IUC11
                    Req    Req/   Init   Per    Short  Long   Adv    Adv    Adv
                           Data   Maint  Maint  Data   Data   Short  Long   UGS
Modulation Type   : QPSK   QAM16  QPSK   QPSK   QAM64  QAM64  QAM64  QAM64  QAM16
Preamble Length   : 56     2      384    384    64     128    68     76     76
Diff encoding     : off    off    off    off    off    off    off    off    off
FEC T             : 0      0      5      5      16     16     12     16     8
FEC K             : 16     32     34     34     75     110    75     223    76
```

```
Scrambler         : on      on      on      on      on      on      on      on      on
Scrambler Seed    : 338     338     338     338     6236    6378    338     338     338
Max Burst Size    : 1       0       0       6       4       0       11      0       0
Guard Time        : 8       8       48      48      8       8       8       8       8
Last Codeword     : Fixed   Fixed   Fixed   Fixed   Short   Short   Short   Short   Short
Interleave Depth  : 1       1       1       1       1       1       1       0       1
Interleave Block  : 1536    1536    1536    1536    1536    1536    1536    2048    1536
Preamble Type     : QPSK1   QPSK1   QPSK1   QPSK1   QPSK1   QPSK1   QPSK1   QPSK1   QPSK1
Spreader          : off     off     off     off     off     off     off     off     off
Subframe Codes    : 0       0       0       0       0       0       0       0       0
Interleave Step   : 0       0       0       0       0       0       0       0       0
TCM Encode        : off     off     off     off     off     off     off     off     off
```

6.12 RCC Management

6.12.1 cable rcc-template

[Command]

cable rcc-template *rcc-temp-id*

no cable rcc-template *rcc-temp-id*

[View]

config view, cmts view

[Parameter]

rcc-temp-id: CC template ID. Type: numerical value; range: 1-255

[Description]

config view :

The command "**cable rcc-template**" is used to create and enter the rcc templat view from the config view.

The command "**no cable rcc-template**" is used to delete the configuration of the rcc templat.

cmts view:

The command "**cable rcc-template**" is used to associate RCC templates with CMTS devices. The RCC template needs to be created first.

The command "**cable rcc-template**" is used to delete the relationship between the RCC template and the current CMTS.

[Example]

Create and enter the rcc templat view:

```
BT(config)# cable rcc-template 1
BT(config-rcc-template1)#
```

6.12.2 cable rcc-template cmts

[Command]

cable rcc-template *rcc-temp-id* **cmts** *cmts-id*

[View]

config view

[Parameter]

rcc-temp-id: CC template ID. Type: numerical value; range: 1-255

cmts-id: CMTS ID. It is fixed as 1.

[Description]

This command is used to associate RCC templates with CMTS devices. The RCC template needs to be created first.

[Example]

Associate RCC templates with CMTS devices:

```
BT(config)# cable rcc-template 1 cmts 1
BT(config)# show cable rcc-template all
!
cable rcc-template 1
 rcp-id 0x00 0x00 0x00 0x00 0x00
exit
```

6.12.3 receive-channel

[Command]

receive-channel *channel-id* **center-frequency** *frequency* **connected-receive-module** *connect-module-id* **[primary]**

no receive-channel *channel-id*

[View]

rcc template view

[Parameter]

primary : Primary channel.

channel-id: The receive channel index. Type: numerical value; range: 1-10

frequency: The receive module first channel center frequency. Type: numerical value; range: European standard: (87000000 + bandwidth /2)-(1006000000 - bandwidth /2); American Standard: (54000000+bandwidth/2)-(1002000000-bandwidth/2).

connect-channel-id : The connected receive channel index.. Type: numerical value; range: 1-6

[Description]

The command "**receive-module**" is used to add the receive channel of the template.

The command "**no receive-module**" is used to delete the receive channel of the template.

[Example]

Add a receive channel in rcc template 1:

```
BT(config-rcc-template1)# receive-channel 1 center-frequency 560000000
connected-receive-module 1 primary
BT(config-rcc-template1)# show running-config
rcp-id 0x00 0x00 0x00 0x00 0x00
receive-module 1 channel-center-frequency 560000000 connected-receive-module 1
```

6.12.4 receive-module

[Command]

receive-module *module-id* **first-channel-center-frequency** *frequency* **[connected-receive-module** *connect-module-id***]**

no receive-module *module-id*

[View]

rcc template view

[Parameter]

module-id: The receive module index. Type: numerical value; range: 1-6

frequency: The receive module first channel center frequency. Type: numerical value; range: European standard: (87000000 + bandwidth /2)-(1006000000 - bandwidth /2); American Standard: (54000000+bandwidth/2)-(1002000000-bandwidth/2).

connect-module-id: The connected receive module index.. Type: numerical value; range: 1-6

[Description]

The command "**receive-module**" is used to add the receive module of the template.

The command "**no receive-module**" is used to delete the receive module of the template.

[Example]

Add a receive module in rcc template 1:

```
BT(config-rcc-template1)# receive-module 1 first-channel-center-frequency
560000000
BT(config-rcc-template1)# show running-config
rcp-id 0x00 0x00 0x00 0x00 0x00
receive-module 1 first-channel-center-frequency 560000000
```

6.12.5 rcp-id

[Command]

rcp-id *rcp-id*

[View]

rcc template view

[Parameter]

rcp-id: The receive channel profile identification. Type: string; range: 1-255

[Description]

This command is used to specify the receive channel profile identification for match action. The CM will report CM rcp-id to CMTS when it on line, to provide their own ability to receive. When the CM is online, the RCC template automatically compares CMTS rcp-id with CM rcp-id. If the two match, the CMTS initializes the CM using the receive module and the receive channel information configured in the template. If it does not match, use the built-in RCC template to initialize the CM.

[Example]

Specify the receive channel profile identification:

```
BT(config-rcc-template1)# rcp-id 01 02 03 04 05
BT(config-rcc-template1)# show running-config rcp-id
0x00 0x00 0x00 0x00 0x00
```

6.12.6 show cable rcc-template all

[Command]

show cable rcc-template all

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to view all RCC template information.

[Example]

This command is used to view all RCC template information.:

```
BT(config)# show cable rcc-template all
!
cable rcc-template 1
 rcp-id 0x00 0x00 0x00 0x00 0x00
exit
```

6.13 Fiber-node Management

6.13.1 cable fiber-node description

[Command]

cable fiber-node description *description*

[View]

cmts view

[Parameter]

description: Description information of fiber-node. Type: string; range: 1-255 characters.

[Description]

This command is used to describe the configuration description information of CMTS in fiber-node, which is FN-1 by default. The default description information of optical node is FN-1

[Example]

Fiber-node description information for CMTS configuration is XinHaiYuan-1:

```
BT(config-if-cmts-1)# cable fiber-node description XinHaiYuan-1
BT(config-if-cmts-1)# show running-config | include fiber-node cable
fiber-node description "XinHaiYuan-1"
```

6.13.2 show cable fiber-node brief

[Command]

show cable fiber-node brief

[View]

config view

[Parameter]

N/A

[Description]

This command is used to view CMTS device fiber-node information.

[Example]

View CMTS device fiber-node information.

```
BT(config)# show cable fiber-node brief
FN-Name     I/F         UsChannelId     DsChannelId     Description
FN-1        C1          1-8             1-32            XinHaiYuan-1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
FN-Name	Fiber node name, format: FN-, device ID.
I/F	CMTS device number
UsChannelId	Current upstream channel list for CMTS devices
DsChannelId	Current downstream channel list for CMTS devices
Description	Description information of fiber nodes

6.13.3 show cable service-group-id

[Command]

show cable service-group-id

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to view the upstream and downstream service group information of CMTS device fiber node.

[Example]

View CMTS device optical node upstream and downstream service group information.

```
BT(config)# show cable service-group-id
I/F         US-Service-Group-ID       US-Channel-Set-ID
C1          127                       4097
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
I/F	CMTS device number
US-Service-Group-ID	Upstream service group ID
DS-Channel-Set-ID	Downstream channel group ID

6.13.4 show cable us-to-ds channel-mapping

[Command]

show cable us-to-ds channel-mapping

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to view the mapping of the CMTS device's upstream channel to the downstream primary channel.

[Example]

View the mapping of the CMTS device's upstream channel to the downstream primary channel:

```
BT(config)# show cable us-to-ds channel-mapping
I/F         Upstream              Downstream
C1          1                     1-32
C1          2                     1-32
C1          3                     1-32
C1          4                     1-32
C1          5                     1-32
C1          6                     1-32
C1          7                     1-32
C1          8                     1-32
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
I/F	CMTS device number
Upstream	CMTS upstream channel ID
Downstream	CMTS downstream primary channel list

6.14 ERM Management

6.14.1 eqam erm

[Command]

eqam erm (enable|disable)

[View]

eqam template view

[Parameter]

enable: Connect ERM

disable: Disconnect ERM

[Description]

Enable or disable the ERM function

[Example]

Connect ERM:

```
BT(config-if-eqam-template-1)# eqam erm enable
BT(config-if-eqam-template-1)# show running-config | include eqam erm
eqam erm enable
```

6.14.2 eqam erm erm-ip port

[Command]

eqam erm erm-ip *ipv4-address* **port** *erm-port*

[View]

eqam template view

[Parameter]

ipv4-address: IPv4 address of ERM server. dotted decimal type; range: 0.0.0.0-255.255.255.255, default value: 192.165.152.89.

erm-port: The ERM server listens on the port number, Type: numerical value; range: 0-65535, default value: 6069.

[Description]

Configure the IP address and port number of the ERM server.

[Example]

The IP address of the ERM server is 192.168.1.10 and the port number is 8888:

```
BT(config-if-eqam-template-1)# eqam erm erm-ip 192.168.1.10 port 8888 BT(config-if-eqam-template-1)# show running-config | include eqam erm erm-ipeqam erm erm-ip 192.168.1.10 port 8888
```

6.14.3 eqam erm qam-name streamzone

[Command]

eqam erm qam-name *QAMNAME* **streamzone** *STREAMZONE*

[View]

eqam template view

[Parameter]

QAMNAME: The device name property of OPEN message in D6 protocol, Type: string; range: 1-63 characters, default value: EQAM1.

STREAMZONE: The stream region property of OPEN message in D6 specification, Type: string; range: 1-63 characters, default value: BeiJing.HaiDian.

[Description]

Configure the EQAM name and stream area of ERM.

[Example]

The eqam name of the configuration ERM is EQAM10, and the stream area is Shenzhen. NanShan.

```
BT(config-if-eqam-template-1)# eqam erm qam-name EQAM10 streamzone ShenZhen.NanShan
BT(config-if-eqam-template-1)# show running-config | include eqam erm qam-name
eqam erm qam-name EQAM10 streamzone ShenZhen.NanShan
```

6.14.4 eqam rtsp-port

[Command]

eqam rtsp-port *rtsp-port*

[View]

eqam template view

[Parameter]

rtsp-port: The port number used by RTSP

[Description]

Configure the port number used by RTSP, default value: 554.

[Example]

The port used to configure RTSP is 666

```
BT(config-if-eqam-template-1)# eqam ngod rtsp-port 666
BT(config-if-eqam-template-1)# show running-config | include eqam ngod rtsp-port
eqam ngod rtsp-port 666
```

6.14.5 eqam erm alivetime

[Command]

eqam erm alivetime *alive-time*

[View]

eqam template view

[Parameter]

alive-time: The cycle of sending the alivetime. Unit: s. Type: numerical value; range: 1-65535, default value: 30s

[Description]

Configure ERM alivetime.

[Example]

The alivetime for ERM configuration is 25 seconds.

```
BT(config-if-eqam-template-1)# eqam erm alivetime 25
```

```
BT(config-if-eqam-template-1)# show running-config | include eqam erm
alivetime
eqam erm alivetime 25
```

6.14.6 eqam erm retrytime

[Command]

eqam erm retrytime *retry-time*

[View]

eqam template view

[Parameter]

retry-time: Connection retry time. Unit: s. Type: numerical value; range: 1-65535, default value: 10s

[Description]

When a connection is not established, a TCP connection is established to the ERM server at this time interval.

[Example]

Configure the ERM connection for 20 seconds.

```
BT(config-if-eqam-template-1)# eqam erm retrytime 20
BT(config-if-eqam-template-1)# show running-config | include eqam erm
retrytime
eqam erm retrytime 20
```

6.14.7 eqam erm holdtime

[Command]

eqam erm holdtime *hold-time*

[View]

eqam template view

[Parameter]

hold-time: Maintenance time, Unit: s. Type: numerical value; range: 1-65535, default value: 90s

[Description]

ERM application resources are not used during Hold Time period and resources are recovered.

[Example]

Configure the maintenance of ERM for 60 seconds.

```
BT(config-if-eqam-template-1)# eqam erm holdtime 60
BT(config-if-eqam-template-1)# show running-config | include eqam erm holdtime
eqam erm holdtime 60
```

6.14.8 show eqam erm status

[Command]

show eqam erm status

[View]

cmts view

[Parameter]

N/A

[Description]

Display ERM configuration information and connection status.

[Example]

View ERM configuration information and connection status:

```
BT(config-if-cmts-1)# show eqam erm status
erm-switch:             disable
link-status:            unconnected
Erm-IP:                 192.165.152.89
port:                   6069
qam-name:               EQAM1
stream-zone:            BeiJing.HaiDian
Bandwidth-Update(kbps): 100
Routing-Cost:           15
RTSP-Port:              554
Keep-Alive(s):          30
Connection-Retry(s):    20
Hold-Time(s):           60
```

Chapter 7 Terminal Management

7.1 Basic Management of Cable Modem

7.1.1 cable flap-list insertion-time

[Command]

cable flap-list insertion-time *flap-time*

no cable flap-list insertion-time

[View]

config view

[Parameter]

flap-time: CM flap record time, in second. Type: numerical value; range: 60-86400; default: 180 seconds

[Description]

The command "**cable flap-list insertion-time**" is used to configure time range for recording flap-related value of CM. The overturning times exceeding the time range will not be recorded. For viewing flap-related information of CM, refer to the section "**show cable modem flap**".

The command "**no cable flap-list insertion-time**" is used to restore the default overturning interval.

[Example]

Configure the overturning interval of CM as 100s:

```
BT(config)# cable flap-list insertion-time 100 BT(config)#
show running-config verbose | include flapcable flap-list
insertion-time 100
```

7.1.2 cable modem description

[Command]

cable modem *mac-address* **description (basic | extended)** *description*

cable modem *mac-address* **description basic** *description* **extended** *description*

no cable modem *mac-address* **description (basic | extended)**

[View]

config view

[Parameter]

basic: Add basic remarks to CM

extended: Add extended remarks to CM

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

description: Remark description. Type: string; range: 0-60 characters.

[Description]

The command "**cable modem** *mac-address* **description (basic | extended)** *description*" is used to add basic or extended remarks to CM. There is no difference between the basic description and extended description . It's only two spaces for description. For example, one for the location and the other for the CM information.

The command "**cable modem description basic extended**" is used to add both basic remarks and extended remarks to CM.

The command "**no cable modem description**" is used to specify basic or extended remarks of CM.

[Example]

Configure basic remarks and extended remarks of CM in the config view:

```
BT(config)# cable modem 0025.f293.24c7 description basic test
BT(config)# show running | include description
cable modem 0025.f293.24c7 description basic "test"
```

Note:

This command can add descriptions to 500 CMs in total.

7.1.3 cable modem ds-frequency

[Command]

cable modem *mac-address* **ds-frequency** *frequence-Value*

[View]

config view

[Parameter]

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

frequence-Value : Type: numerical value; range: European standard: (87000000 + bandwidth /2)-(1006000000 - bandwidth /2); American Standard: (54000000+bandwidth/2)-(1002000000-bandwidth/2).

[Description]

The downstream of CM Which mac address XXXX.XXXX.XXXX is configured will move to selected frequency value.

[Example]

The downstrean frequency of CM which mac address is 001c.1df5.73c1 move to 576000000.

```
BT(config)# show cable modem primary-channel
MAC Address     IP Address     I/F    MAC        Primary Num Upstream       Downstream
                                      State      Sid     CPE Primary(list)  Primary(list)
001c.1df5.73c1 10.108.100.17 C1/U2 online(d) 4       0   2(1) 10(9,11,12,13,14,15,16)
BT(config)# cable modem 001c.1df5.73c1 ds-frequency 576000000
BT(config)# show cable modem primary-channel
MAC Address      IP Address  I/F     MAC       Primary  Num  Upstream       Downstream
                                     State     Sid      CPE  Primary(list)  Primary(list)
001c.1df5.73c1   --          C1/U2   offline   4        0    2(1)           10
BT (config)# show cable modem primary-channel
MAC Address     IP Address     I/F    MAC       Primary Num Upstream      Downstream
                                      State     Sid     CPE Primary(list) Primary(list)
001c.1df5.73c1 10.108.100.17 C1/U1 online(d) 4       0   1(2)          2(3,4,5,6,7,8,9)
```

7.1.4 cable modem ds-frequency-timeout

[Command]

cable modem ds-frequency-timeout *timeoutValue*

no cable modem ds-frequency-timeout

[View]

config view

[Parameter]

TimeoutValue: time out value; Type: numerical value; Range: 60s-1800s

[Description]

Change time out value of CM downstream switch.

The time out value is configured as 720 that is default value.

[Example]

Change time out value of downstream frequency switch

```
BT(config)# cable modem ds-frequency-timeout 90
BT(config)# show cable modem ds-frequency-timeout90
```

Change time out value of downstream frequency switch to default.

```
BT(config)# no cable modem ds-frequency-timeout
BT(config)# show cable modem ds-frequency-timeout720
```

7.1.5 cable modem max-number

[Command]

cable modem max-number *max-number*

[View]

cmts view

[Parameter]

max-number: Max CM number supported by CMTS. Type: numerical value; range: 1-1000; default: 1000

[Description]

This command is used to limit the maximum number of CM that CMTS can support, to guarantee network quality for online users. We need to modify this value according to the actual number of deployed CM.

[Example]

Configure the maximum number of CM that CMTS can support as 200:

```
BT(config-if-cmts-1)# cable modem max-number 200
It will take a long time to reset all CNUs, please be patient!
BT(config-if-cmts-1)# show running-config | include max-number
 cable modem max-number 200
```

7.1.6 cable modem max-number threshold

[Command]

cable modem max-number *threshold-warning* **threshold** *threshold-recovery* **threshold**

[View]

config view

[Parameter]

threshold-warning: Alarm threshold value of CM active quantity, value range: 1-99, default value: 95, unit: percentage.

threshold-recovery: Recovery threshold of CM active quantity, value range: 1-99, default value: 90, unit: percentage.

[Description]

This command is related to the "**cable modem max-number**" command and works with it.

Limit the maximum number of CMTS devices that can support CM through "**cable modem max-number**" Please refer to section 7.1.5 for details.

Through the "**cable modem max-number threshold**" command, set the alarm threshold and recovery threshold of CM active quantity. When the CM quantity reaches the threshold, the alarm will be triggered; when the active quantity is lower than recovery, the alarm will be recovered.

Configuration parameter requirements: "*threshold-recovery*" value is less than "*threshold-warning*".

[Example]

The alarm threshold of CM active number is 55 and the recovery threshold is 45.

```
BT(config)# cable modem max-number threshold-warning 55 threshold-recovery 45
BT(config)#
```

7.1.7 cable modem monitor specific

[Command]

cable modem monitor specific (enable | disable)

cable modem monitor specific *mac-address* [*description*]

no cable modem monitor specific [*mac-address*]

[View]

config view

[Parameter]

enable: Enable specific CM monitoring function

disable: Disable specific CM monitoring function

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

description: CM descriptions. Type: string; range: 0-36 characters.

[Description]

The command "**cable modem monitor specific (enable | disable)**" is used to enable or disable CM online/offline monitoring function. By default, this function is disabled. You can view its configuration with command "**show cable modem monitor specific config**".

The command "**cable modem monitor specific** *mac-address* [*description*]" is used to add the specified CM MAC address and descriptions to the monitoring list. To make this command take effect, it requires specifying the monitoring mode as normal. For specific command, refer to the section "**cable modem monitor specific mode**". You can view its configuration with command "**show cable modem monitor specific list**".

The command "**no cable modem monitor specific**" is used to clear the whole monitoring list. All CM will not monitor.

The command "**no cable modem monitor specific** *mac-address*" is used to delete a MAC address from the monitoring list, and cancel the monitoring of the CM.

[Example]

Enable or disable specific CM monitoring function

```
BT(config)# cable modem monitor specific enable
BT(config)# cable modem monitor specific 4432.c83c.88e4 specific_CM
BT(config)# show cable modem monitor specific config
cable modem monitor specific enable
cable modem monitor specific mode normal
BT(config)# show cable modem monitor specific listcable
modem monitor specific 4432.c83c.88e4 specific_CM cable
modem monitor specific list num is 1
```

7.1.8 cable modem monitor specific mode

[Command]

cable modem monitor specific mode (all | normal)

[View]

config view

[Parameter]

all: Monitor all CM

normal: Monitor the CM in the monitoring list

[Description]

Configure the CM online/offline monitoring mode. By default, it is normal mode. You can view its configuration with command "**show cable modem monitor specific config**".

[Example]

Monitor all CM:

```
BT(config)# cable modem monitor specific enable BT(config)#
cable modem monitor specific mode all BT(config)# show
cable modem monitor specific configcable modem monitor
specific enable
cable modem monitor specific mode all
```

7.1.9 cable modem offline age-clock

[Command]

cable modem offline age-clock *time*

no cable modem offline age-clock

[View]

config view

[Parameter]

time: the moments (The whole point of time of the day) of clean the offline CM, Type: numerical value; range: 0-23; default: 0

[Description]

The command "**cable modem offline age-clock**" is used to configure scheduled mode, after reaching the moment, will be cleared offline CM operation.

The command "**no cable modem offline age-clock**" is used to restore the default time of the clean the offline CM.

[Example]

Configure the clean the offline CM on 17:00 every day:

```
BT(config)# cable modem offline age-clock 17 BT(config)#
show running-config | include age-clockcable modem offline
age-clock 17
```

7.1.10 cable modem offline age-mode

[Command]

cable modem offline age-mode (polling | timing)

no cable modem offline age-mode

[View]

config view

[Parameter]

polling: polling mode, the device check and clear the CM which offline time over threshold every 10 minutes

timing: timing mode, the device check and clear the CM which offline time over threshold at a specific point in time

[Description]

The command "**cable modem offline age-mode**" is used to configure the mode of clean the offline CM. By default, it is polling mode.

The command "**no cable modem offline age-mode**" is used to restore the default the mode of clean the offline CM.

[Example]

The device check and clear the CM which offline time over threshold every 10 minutes:

```
BT(config)# cable modem offline age-mode polling BT(config)# show
running-config verbose | include age-mode
cable modem offline age-mode polling
```

7.1.11 cable modem offline age-time

[Command]

cable modem offline age-time *age-time*

no cable modem offline age-time

[View]

config view

[Parameter]

age-time: CM aging time, in minute. Type: numerical value; range: 0 | 10-40320; default: 10080 minutes

[Description]

The command "**cable modem offline age-time**" is used to configure the aging time of offline CM. If CM's offline interval reaches this time, the system will delete the records of the CM automatically.

The command "**no cable modem offline age-time**" is used to restore the default CM aging time.

[Example]

Configure the aging time of offline CM as 100 minutes:

```
BT(config)# cable modem offline age-time 100
BT(config)# show running-config verbose | include age-time
 cable modem offline age-time 100
```

7.1.12 cable modem pending-list

[Command]

cable modem pending-list *cm-number*

[View]

cmts view

[Parameters]

cm-number: CM number, numeric type, range: 10-200; default: 60

[Description]

This command is used to configure the CM number ranging at the same time. It can improve the online efficiency of CM by setting the value reasonably.

[Example]

Configuration the CM number ranging at the same time as 150:

```
BT(config-if-cmts-1)# cable modem pending-list 150
BT(config-if-cmts-1)# show running-config | include pending-list
 cable modem pending-list 150
```

7.1.13 cable modem polling-period

[Command]

cable modem polling-period *interval*

[View]

config view

[Parameters]

interval : Data polling intervals related to the CM Status, unit: seconds; numeric type, range: 0, 15-86400 where 0 is used to indicate no polling and the default value is 30s.

[Description]

This command is used to configure the global polling intervals for the CM Status. A zero means that there is no polling, and the SNMP table related to the CM Status will collect information in real-time. If the value is non-zero, this means that data collection will occur at periodic intervals as defined by the numeric value, and the SNMP table related to the CM Status will collect information at the polling intervals, and this improves the collection efficiency.

[Example]

Configuration the global polling interval for the CM Status as 60s:

```
BT(config)# cable modem polling-period 60
BT(config)# show cable modem polling-period
 cable modem polling-period: 60 s
```

7.1.14 cable power-adjust continue

[Command]

cable power-adjust continue *power-level*

no cable power-adjust continue

[View]

cmts view

[Parameters]

power-level: The power level of each adjustment, in 1/4 dBmV, numeric type, range: 1-32; default: 16.

[Description]

The command "**cable power-adjust continue**" is used to configure the CM power level of each adjustment. In the actual network, the transmission level of the CM passes through the loss of the link to the CMTS, is not necessarily the best reception level. In order that the the transmission level of CM after loss equal to the best reception level, the power level difference adjustment is necessary. The power level of each adjustment will affect the number of adjustments, the rational allocation of the value, you can improve the CM on-line efficiency.

The command "**no cable power-adjust continue**" is used to restore the default value of the CM power level of each adjustment.

[Example]

Configuration the CM power level of each adjustment as 20 dBmV:

```
BT(config-if-cmts-1)# cable power-adjust continue 20
BT(config-if-cmts-1)# show running-config | include ranging-continue
 cable power-adjust continue 20
```

7.1.15 cable ranging-continue interval

[Command]

cable ranging-continue interval *interval*

no cable ranging-continue interval

[View]

cmts view

[Parameters]

interval: Ranging continue interval, in millisecond, numeric type, range: 50-5000; default: 250

[Description]

The command "**cable ranging-continue interval**" is used to configure the CM ranging continue interval. When a CM's first ranging fails, the CMTS needs to send the unicast message again to the CM, and the loop continues until the ranging is successful. The ranging continue interval means the time between the two ranging distances during the CM multiple ranging.

The command "**no cable ranging-continue interval**" is used to restore the default value of CM ranging continue interval.

[Example]

Configuration the CM number ranging at the same time as 150:

```
BT(config-if-cmts-1)# cable ranging-continue interval 160
BT(config-if-cmts-1)# show running-config | include ranging-continue
 cable ranging-continue interval 160
```

7.1.16 cable service type

[Command]

cable service type *service-type* **ds-frequency** *frequency*

no cable service type *service-type*

[View]

config view

[Parameter]

service-type: Service type. Type: string; range: 1-16 bytes

frequency: Downstream channel central frequency. Type: numerical value; range: European standard: (87000000 + bandwidth /2)-(1006000000 - bandwidth /2); American Standard: (54000000+bandwidth/2)-(1002000000-bandwidth/2).

[Description]

The command "**cable service type ds-frequency**" is used to configure the corresponding relationship between service type ID and downstream frequency. If there's CM with such service type ID in the registration request, CMTS will scan the downstream frequency corresponding to the service type ID.

The command "**no cable service type**" is used to delete the corresponding relationship between service type ID and downstream frequency.

[Example]

Configure the service type ID as commercial and corresponding frequency as 550000000 Hz in the config view:

```
BT(config)# cable service type commercial ds-frequency 550000000
BT(config)# show running-config | include service type
cable service type commercial ds-frequency 550000000
```

7.1.17 cable upstream data-backoff

[Command]

cable upstream *channel-list* **data-backoff** *start-backoff end-backoff*

no cable upstream *channel-list* **data-backoff**

[View]

cmts view

[Parameter]

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

start-backoff: initial value of data backoff. Type: numerical value; range: 0-15; default: 2

end-backoff: end value of data backoff. Type: numerical value; range: 0-15; default: 8

Requirements on backoff value configuration: initial value<=end value

[Description]

The command "**cable upstream data-backoff**" is used to set the value of CM data backoff. If multiple CMs send the data request simultaneously, there may be conflict. You can set reasonable data

backoff to reduce the conflict, to avoid data congestion. If these values are too small, CM will frequently conflict and lead to slow on-line, else if the values are too big, CM will only initialize the ranging again in a long time after conflict and lead to slow on-line too.

The command "**no cable upstream data-backoff**" is used to restore the default value of CM data backoff.

[Example]

Display the set backoff value from 3 to 4:

```
BT(config-if-cmts-1)# cable upstream 1 data-backoff 3 4
BT(config-if-cmts-1)# show running-config verbose | include data-backoff
 cable upstream 1 data-backoff 3 4
```

7.1.18 cable upstream range-backoff

[Command]

cable upstream *channel-id* **range-backoff** *start-backoff end-backoff*

no cable upstream *channel-id* **range-backoff**

[View]

cmts view

[Parameter]

channel-id: Upstream channel ID. Type: numerical value; range: 1-8

start-backoff: initial value of range backoff. Type: numerical value; range: 0-15; default: 3

end-backoff: end value of range backoff. Type: numerical value; range: 0-15; default: 6

Requirements on backoff value configuration: initial value<=end value

[Description]

The command "**cable upstream range-backoff**" is used to set the value of CM range backoff. If multiple CMs send the range request simultaneously, there may be conflict. You can set reasonable range backoff to reduce the conflict, to avoid range congestion. If these values are too small, CM will frequently conflict and lead to slow on-line, else if the values are too big, CM will only initialize the ranging again in a long time after conflict and lead to slow on-line too.

The command "**no cable upstream range-backoff**" is used to restore the default value of CM range backoff.

[Example]

Display the set backoff value from 3 to 4:

```
BT(config-if-cmts-1)# cable upstream 1 range-backoff 3 4
BT(config-if-cmts-1)# show running-config verbose | include range-backoff
 cable upstream 1 range-backoff 3 4
```

7.1.19 clear cable modem delete

[Command]

clear cable modem (all | *ip-address* | *mac-address*) delete

[View]

enable view, config view, cmts view

[Parameter]

all: all CMs of the device

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

Restart the specified CM and delete its records.

[Example]

Delete all CM records:

```
BT(config-if-cmts-1)# show cable modem
MAC Address     IP Address     I/F  MAC     Primary RxPwr Timing Number BPI     Online
                                    State   Sid     dB    Offset CPE    Enabled Time
4432.c83c.88e4 10.10.28.119 C1/U2 online 3       6.0   667    0      no      0d1h49m
Total CM:1
BT(config-if-cmts-1)# clear cable modem all delete
BT(config-if-cmts-1)# show cable modem
MAC Address    IP Address  I/F   MAC     Primary  RxPwr  Timing  Number  BPI      Online
                                 State   Sid      dB     Offset  CPE     Enabled Time
Total CM:0
```

7.1.20 clear cable modem flap-list

[Command]

clear cable modem flap-list all

clear cable modem *(ip-address | mac-address)* **flap-list**

[View]

enable view, config view, cmts view

[Parameter]

all: All CMs of the device

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

clear cable modem flap-list all: This command is used to clear flap records of all CMs

clear cable modem (*ip-address* | *mac-address*) **flap-list**: This command is used to clear flap records of specific CM.

[Example]

Clear flap records of CM:

```
BT(config-if-cmts-1)# show cable modem flap
MAC Address      I/F      Ins  Hit    Miss CRC P-LowerAdj P-HigherAdj Time
0026.5ba6.4779  C1/U1    3    2973   0     0    0           45           Jan1 22:18:37
Total CM:1
Note: CM with no insertion flap will not appear on the above list.
BT(config-if-cmts-1)# clear cable modem 0026.5ba6.4779 flap-list
BT(config-if-cmts-1)# show cable modem flap
MAC Address      I/F      Ins  Hit    Miss CRC P-LowerAdj P-HigherAdj Time
Total CM:0
Note: CM with no insertion flap will not appear on the above list.
```

7.1.21 clear cable modem offline

[Command]

clear cable modem offline all

clear cable modem offline *mac-address*

[View]

enable view, config view, cmts view

[Parameter]

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

Clear the records of one or all offline CMs.

[Example]

Clear the records of all offline CMs:

```
BT(config)# show cable modem
MAC Address      IP Address  I/F      MAC        Primary   Number   Online
                                      State      Sid       CPE      Time
0026.5ba6.4779   --          C1/U1    offline    1         0        0d0h0m
Total CM:1
BT(config)# clear cable modem offline all
BT(config)# show cable modem
MAC Address      IP Address  I/F      MAC        Primary   Number   Online
                                      State      Sid       CPE       Time
Total CM:0
```

7.1.22 clear cable modem reset

[Command]

clear cable modem all reset

clear cable modem (*ip-address* **|** *mac-address***) reset**

[View]

enable view, config view, cmts view

[Parameter]

all: All CMs of the device

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

The command "**clear cable modem all reset**" is used to restart all CMs of the device.

The command "**clear cable modem** *(ip-address | mac-address)* **reset**" is used to restart the specified CM.

[Example]

Restart the active CM in the config view:

```
BT(config)# show cable modem
MAC Address     IP Address     I/F   MAC     Primary RxPwr Timing Number BPI
Online
                                     State   Sid     dB    Offset  CPE    Enabled
Time
```

```
4432.c83c.88e4  10.10.28.116  C1/U2  online  3        6.0    667     0       no
0d1h7m
Total CM:1
BT(config)# clear cable modem all reset
BT(config)# show cable modem
MAC Address    IP Address  I/F    MAC      Primary RxPwr  Timing  Number BPI     Online
                                  State    Sid     dB     Offset  CPE    Enabled Time
4432.c83c.88e4  --         C1/U2  offline 3       6.0    0       0      no      0d0h0m
Total CM:1
```

7.1.23 clear cable modem service-type-id

[Command]

clear cable modem *(ip-address | mac-address)* **service-type-id**

clear cable modem all service-type-id

[View]

config view, cmts view

[Parameter]

all: All CMs of the device

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

Delete service-type-id information of the specified CM or all CMs.

[Example]

Delete service-type-id information of all CMs in the config view:

```
BT(config)# show cable modem service-type-id commercial
MAC Address     IP Address     I/F       MAC      Primary  Service-type-id
                                         State    Sid
0026.5ba6.4779  192.168.2.167  C1/U1     online   1        commercial
BT(config)# clear cable modem all service-type-id
BT(config)# show cable modem service-type-id commercial
MAC Address     IP Address     I/F       MAC      Primary  Service-type-id
                                         State    Sid
0026.5ba6.4779  192.168.2.167  C1/U1     online   1
```

7.1.24 show cable modem

[Command]

show cable modem *ipv4-address* **[vlan (untag | *vlan-id*)]**

show cable modem [(*ipv6-address* | *mac-address*)]

show cable modem ipv6

show cable modem (upstream | downstream) *channel-id* **[ipv6]**

[View]

enable view, config view, cmts view

[Parameter]

upstream: upstream channels

downstream: downstream channels

ipv6: IPv6 address service

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

channel-id: Downstream or upstream channel ID. Type: numerical value; range: downstream channel: 1-32, upstream channel: 1-8

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

The command "**show cable modem**" is used to display the information of all the CMs. The IPv4 address of CMs will be displayed first.

The command "**show cable modem ipv6**" is used to display the information of all the CMs. The IPv6 address of CMs will be displayed first..

The command "**show cable modem** *(ip-address | mac-address)*" is used to display the information of a specific CM.

[Example]

Display the information of CMs using IPv4 address.

1, IP Address only in current IP protocol stack:

```
BT(config)# show cable modem
MAC Address     IP Address     I/F    MAC       Primary RxPwr Timing  Number
BPI       Online
```

```
                                        State     Sid      dB     Offset  CPE
Enabled   Time
001c.1df5.7408  10.106.100.39  C1/U2  w-online  104      10.0   2493    0
no        0d16h35m
001c.1df5.7491  10.106.100.252 C1/U3  w-online  56       10.0   2457    0
no        0d16h35m
001c.1df5.72ef  10.106.100.51  C1/U1  w-online  1        10.0   2492    0
no        0d16h35m
001c.1df5.7306  --             C1/U3  offline   72       10.0   0       0
no        0d0h0m
```

2, IP Address only in the other IP protocol stack

```
BT(config)# show cable modem
MAC Address    IP Address I/F    MAC      Primary RxPwr Timing Number BPI    Online
                                State    Sid     dB    Offset CPE    Enabled Time
001c.1df5.7408 *          C1/U2 w-online 104     10.0  2493   0      no     0d16h35m
001c.1df5.7491 *          C1/U3 w-online 56      10.0  2457   0      no     0d16h35m
001c.1df5.72ef *          C1/U1 w-online 1       10.0  2492   0      no     0d16h35m
001c.1df5.7306 --         C1/U3 offline  72      10.0  0      0      no      0d0h0m
```

3, IP Address in Dual IP protocol Stack

```
BT(config)# show cable modem
MAC Address     IP Address        I/F    MAC       Primary RxPwr  Timing  Number
BPI      Online
                                        State     Sid     dB     Offset  CPE
Enabled  Time
001c.1df5.7408  10.106.100.39*   C1/U2  w-online  104     10.0   2493    0
no       0d16h35m
001c.1df5.7491  10.106.100.252*  C1/U3  w-online  56      10.0   2457    0
no       0d16h35m
001c.1df5.72ef  10.106.100.51*   C1/U1  w-online  1       10.0   2492    0
no       0d16h35m
001c.1df5.7306  --               C1/U3  offline   72      10.0   0       0
no       0d0h0m
```

- In the example, the command echo parameters are explained in the following table:

Parameter	Description
MAC Address	MAC address of CM
IP Address	IP address of CM "—" No IP Address in IPv4 or IPv6 " * " The other IP protocol stack has IP Address 10.106.100.39*: Existing IPv4 and IPv6 addresses when current IPv4 protocol stack. 2001:106::4cf0:7e0d:5dc7:ffb9*: Existing IPv4 and IPv6 addresses when current IPv6 protocol stack.
I/F	CMTS upstream interface, including CMTS ID and upstream channel ID
MAC State	Current state of CM offline: offline state

Parameter	Description
	init(r2): ranging ongoing EAE stage： expire (epk): KEK expires, while CM does not reissue the request expire (ept): TEK expires, while CM does not reissue the request reject(epk): KEK check failed reject(ept): TEK check failed The following is the online phase： In the absence of BPI+ online: CM is registered successfully online(d) : CM is online but is not allowed to forward any data p-online: one or more channels in the TCS and/or the RCS are unusable w-online: all of the channels in the TCS and the RCS are usable p-online(d): one or more channels in the TCS and/or the RCS are unusable, and CM is prohibited from forwarding data w-online(d): all of the channels in the TCS and the RCS are usable, and CM is prohibited from forwarding data BPI+: online (pk): CM is on line normally, and BPI + enabled and KEK allocated online (pt): CM is on line normally, and BPI + enabled, TEK allocated online (pk d): online (pk) + online (d) online (pt d): online (pt) + online (d) w-online (pk): CM is online with wide band and BPI + enabled, KEK allocated w-online (pt): CM is online with wide band and BPI + enabled, TEK allocated w-online (pk d): w-online (pk) + w-online (d) w-online (pt d): w-online (pt) + w-online (d) p-online (pk): CM is on-line with wide band and in partial service and BPI + enabled, KEK allocated p-online (pt): CM is on-line with wide band and in partial service with BPI + enabled and TEK allocated p-online (pk d): p-online (pk) + p-online (d) p-online (pt d): p-online (pt) + p-online (d) expire (pk): KEK expires, while CM does not reissue the request expire (pt): TEK expires, while CM does not reissue the request reject(pk): KEK check failed reject(pt): TEK check failed The following is the DHCP state for the IPv4 address of the CM: init(d): CMTS device has seen DISCOVER packets from CM init(io): CMTS device has seen OFFER packets from DHCP Server init(dr): CMTS device has seen REQUEST packets from CM init(i): CMTS device has seen ACK packets from DHCP Server The following is the DHCP state for the IPv6 address of the CM: init6(s): CMTS device has seen SOLICIT packets from CM init6(a): CMTS device has seen ADVERTISE packets from DHCP Server init6(r): CMTS device has seen REQUEST packets from CM

Parameter	Description
	init6(i): CMTS device has seen REPLY packets from DHCP Server
Primary Sid	Primary service flow ID of CM
RxPwr dB	Upstream receiving level at CMTS side
Timing Offset	Ranging value of CM
Number CPE	Number of CPE connected through DHCP
BPI Enabled	BPI enabling information
Online Time	Online duration of CM, starting from this online time
UsChnl	Local upstream channel ID of CM
Ranging	Number of CM with ranging ongoing
Offline	Number of CM with state as offline
Online(d)	Number of CM with state as online(d), including online(d) state, w-online(d) state and p-online(d) state.
Online	Number of CM with state as online, including online state, w-online state, p-online state, online(d) state, w-online(d) state and p-online(d) state.
Total	Total number of CM having records

7.1.25 show cable modem attenuation

[Command]

show cable modem attenuation

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the upstream/downstream level attenuation value of main channels of CM.

[Example]

Display the level attenuation from CMTS to upstream/downstream main channels of CM:

```
BT(config)# show cable modem attenuation
IP address      MAC address        DS_Attenuation    US_Attenuation
                                   (dB)              (dB)
10.10.28.111    0014.f8bf.0c68     41.7              40.7
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
IP Address	IP address of CM "—" No IP Address in IPv4 or IPv6

Parameter	Description
	" * " The other IP protocol stack has IP Address 10.106.100.39*: Existing IPv4 and IPv6 addresses when current IPv4 protocol stack. 2001:106::4cf0:7e0d:5dc7:ffb9*: Existing IPv4 and IPv6 addresses when current IPv6 protocol stack.
MAC Address	MAC address of CM
DS_Attenuation (dBmv)	Downstream attenuation of CM, in dBmv
US_Attenuation (dBmv)	Upstream attenuation of CM, in dBmv

7.1.26 show cable modem capability

[Command]

show cable modem (*ip-address* | *mac-address*) **capability**

[View]

enable view, config view, cmts view

[Parameter]

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF

[Description]

This command is used to display the performance indicators of CM

[Example]

Display the performance indicators of CM with IP address as 10.10.28.116:

```
BT(config-if-cmts-1)# show cable modem 10.10.28.116 capability
  Concatenation Support                                : Yes
  DOCSIS Version                                       : DOCSIS v3.0
  Fragmentation Support                                : Yes
  Payload Header Suppression Support                   : No
  IGMP Support                                         : No
  Privacy Support                                      : BPI Plus Support
  Downstream SAID Support                              : 15
  Upstream Service Flow Support                        : 16
  Optional Filtering Support                           : 802.1P Filtering[No],802.1Q
Filtering[No]
  Transmit Pre-Equalizer Taps per Modulation Interval: 1
  Number of Transmit Equalizer Taps                    : 24
  DCC Support                                          : Yes
  IP Filters Support                                   : 0 IP Filters
```

```
  LLC Filters Support                                : 0 LLC Filters
  Expanded Unicast SID Space                         : Yes
  Ranging Hold-Off Support                           : CM
  L2VPN Capability                                   : CM not compliant with DOCSIS
L2VPN Section 7
  L2VPN eSAFE Host Capability                        : ePS or eRouter:0000.0000.0000
  Downstream Unencrypted Traffic (DUT) Filtering     : Not Supported
  Upstream Frequency Range Support                   : Standard
  Upstream Symbol Rate Support                       : 160ksps /320ksps /640ksps
/1280ksps /2560ksps /5120ksps
  Selectable Active Code Mode 2 Support              : Yes
  Code Hopping Mode 2 Support                        : Yes
  Multiple Transmit Channel Support                  : 4 Channels
  5.12 Msps Upstream Transmit Channel Support        : 4 Channels
  2.56 Msps Upstream Transmit Channel Support        : 4 Channels
  Total SID Cluster Support                          : 32 SID Clusters
  SID Clusters per Service Flow Support              : 2 SID Clusters
  Multiple Receive Channel Support                   : 8 Channels
  Total Downstream Service ID (DSID) Support         : 32 DSIDs
  Resequencing Downstream Service ID (DSID) Support : 16 DSIDs
  Multicast Downstream Service ID (DSID) Support     : 16 DSIDs
  Multicast DSID Forwarding                          : Support for GMAC promiscuous
  Frame Control Type Forwarding Capability           : Isolation Packet PDU MAC
Header(FC_Type of 10) is forwarded
  DPV Capability                                     : U1 supported as a Start
Reference Point for DPV per Path[No]/Packet[No]
  Unsolicited Grant Service/Upstream Service Flow Support: 0 Service Flows
  MAP and UCD Receipt Support                        : Yes
  Upstream Drop Classifier Support                   : 0 Drop Classifiers
  IPv6 Support                                       : Yes
  Extended Upstream Transmit Power Capability        : 0
  Serial Number                                      : 00007349500646
  Hardware Version                                   : 2.1
  Software Version                                   : STAD.0A.20
  Boot ROM Version                                   : 2.3.1
  Organizationally Unique Identifier                 : 30:30:31
  Model Number                                       : TCM471
  Vendor Name                                        : Thomson
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Concatenation Support	Concatenation support
DOCSIS Version	DOCSIS version of CM
Fragmentation Support	Fragmentation support

Parameter	Description
Payload Header Suppression Support	Payload header suppression support
IGMP Support	IGMP (Internet Group Management Protocol) support
Privacy Support	Encryption support, CM baseline encryption interface support
Downstream SAID Support	Number of downstream secured connection identifier supported
Upstream Service Flow Support	Number of upstream service flow supported
Optional Filtering Support	Optional filtering support
Transmit Pre-Equalizer Taps per Modulation Interval	Number of pre-equalizer taps per modulation interval supported by CM
Number of Transmit Equalizer Taps	Number of transmit equalizer taps supported by CM
DCC Support	Downstream channel conversion supported by CM
IP Filters Support	Number of IP address filter supported by CM
LLC Filters Support	Number of LLC filter supported by CM
Expanded Unicast SID Space	Does CM support expanded unicast SID space?
Ranging Hold-Off Support	Does CM support ranging hold-off feature?
L2VPN Capability	Is CM compatible with Layer-2 virtual private network?
Downstream Unencrypted Traffic (DUT) Filtering	Does CM support downstream unencrypted traffic filtering?
Upstream Frequency Range Support	Upstream frequency range support
Upstream Symbol Rate Support	Upstream symbol rate support
Selectable Active Code Mode 2 Support	Does CM support selectable active code 2?
Code Hopping Mode 2 Support	Does CM support code-hopping mode 2?
Multiple Transmit Channel Support	Number of upstream channel supporting multicast transmission
5.12 Msps Upstream Transmit Channel Support	This field shows the maximum number of upstream channels at symbol rate 5.12 Msps that the CM can support.
2.56 Msps Upstream Transmit Channel Support	If this CM capability setting is not included or the number of upstream channels is 0, the CM can support only one upstream channel at 2.56 Msps. A CM that can support N channels at symbol rate 2.56 Msps can support N channels at equal or lower symbol rates.
Total SID Cluster Support	Total number of SID cluster supported by CM
SID Clusters per Service Flow Support	Number of SID cluster supported by each service flow
Multiple Receive Channel Support	Number of multiple receiving channel supported by CM
Total Downstream Service ID (DSID) Support	Total number of downstream service ID supported by CM
Resequencing Downstream Service ID (DSID) Support	Number of resequencing downstream service ID supported by CM simultaneously
Multicast Downstream Service ID (DSID) Support	Number of multicast downstream service ID supported by CM simultaneously
Multicast DSID Forwarding	Multicast downstream service ID forwarding support
Frame Control Type Forwarding Capability	Frame control-type forwarding capability
DPV Capability	Docsis Path Verify capability
Unsolicited Grant Service/Upstream Service Flow	Number of unsolicited grant service flow supported by CM

Parameter	Description
Support	
MAP and UCD Receipt Support	Does CM support MAP and UCD?
Upstream Drop Classifier Support	Number of upstream drop classifier supported
IPv6 Support	Does the device support IPv6?
Extended Upstream Transmit Power Capability	Extended upstream transmit power capability
Serial Number	CM serial number
Hardware Version	CM firmware version
Software Version	CM software version
Boot ROM Version	CM boot ROM version
Organizationally Unique Identifier	CM manufacturer OUI
Model Number	CM model
Vendor Name	CM vendor name

7.1.27 show cable modem counters

[Command]

show cable modem [(*pri-sid* **|** *ip-address* **|** *mac-address***)] counters**

show cable modem *ip-address* **counters [vlan [untag |** *vlan-id***]]**

[View]

enable view, config view, cmts view

[Parameter]

untag: VLAN as untag

pri-sid: Primary service ID of CM. Type: numerical value; range: 1-65535

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

sfid: Primary service ID. Type: numerical value; range: 1-4294967295

classid: Classifier ID. Type: numerical value; range: 1-65535

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

Note:

If the option **[vlan (untag |** *vlan-id***)]** is not input, service flow information of all CM with the same IP but different MAC address is displayed. This option can only be entered if *ip-address* is IPv4.

[Description]

This command is used to display the reading of upstream/downstream flowmeter of CM, including the statistics of upstream/downstream channels the number of packets, the bytes of traffic and the bytes of SAV dorp.

[Example]

Display the reading of upstream / downstream flowmeter of all CMs:

```
BT(config-if-cmts-1)# show cable modem counters
MAC Address      Ds Packets   Ds Bytes    Us Packets   Us Bytes   Us DropPkts
4432.c83c.88e4   555          107911      1265         36427      863
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
Ds Packets	Number of downstream packets received by CM with record starting from this startup
Ds Bytes	Downstream packet traffic received by CM with record starting from this startup, in Bytes
Us Packets	Number of upstream packets received by CM with record starting from this startup
Us Bytes	Upstream packet traffic received by CM with record starting from this startup, in Bytes
Us DropPkts	Number of upstream packets droped by CM with record starting from this startup

7.1.28 show cable modem docsis version

[Command]

show cable modem docsis version

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the details of cable modem docsis version.

[Example]

Display the details of cable modem docsis version:

```
BT(config-if-cmts-1)# show cable modem docsis version
MAC Address        I/F        MAC            Primary   Docsis          US Phy
```

```
                                State          Sid        Version          Mode
001c.1df5.7494      R1/U3       w-online       1          DOCSIS V3.0      atdma
4432.c83c.89d3      R1/U1       p-online       22         DOCSIS V3.0      atdma
fc94.e3e1.0d5e      R1/U2       offline        32         DOCSIS V2.0      atdma
001c.1df5.749a      R1/U1       w-online       33         DOCSIS V3.0      atdma
fc94.e349.490e      R1/U1       init(r2)       44         DOCSIS V2.0      atdma
fc94.e349.487e      R1/U3       online         51         DOCSIS V2.0      atdma
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
DOCSIS Registered	Docsis version of CM.(surporting v3.0/v2.0)
US Phy Mode	Upstream PHY mode.(surporting ATDMA)
Interface	CMTS upstream interface, including CMTS ID and upstream channel ID
Online	Number off online CM
v3.0	Number off CM online DOCSIS v3.0
v2.0	Number off CM online DOCSIS v2.0
scdma	Number off CM upstream PHY mode as SCDMA
atdma	Number off CM upstream PHY mode as ATDMA

7.1.29 show cable modem docsis version summary

[Command]

show cable modem docsis version summary

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the statistics of cable modem docsis version.

[Example]

Display the statistics of cable modem docsis version:

```
BT(config-if-cmts-1)# show cable modem docsis version summary
                        DOCSIS Registered    US Phy Mode
                      ----------------------------  --------------------
Interface    Online    v3.0    v2.0    scdma  atdma
R1/U1        35        28      7       0      35
R1/U2        25        18      7       0      25
R1/U3        20        20      0       0      20
```

```
R1/U4        24        23      1        0       24
Total:       104       89      15       0       104
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
DOCSIS Registered	Docsis version of CM.
US Phy Mode	Upstream PHY mode.(surporting ATDMA)
Interface	CMTS upstream interface, including CMTS ID and upstream channel ID
Online	Current state of CM. All states refer to the table of the command “show cable modem”.
v3.0	Docsis version of CM.
v2.0	Upstream PHY mode.(surporting ATDMA)
scdma	Number off CM upstream PHY mode as SCDMA
atdma	Number off CM upstream PHY mode as ATDMA

7.1.30 show cable modem ds-frequency-timeout

[Command]

show cable modem ds-frequency-timeout

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to fetch the time out value of CM downstream switch.

[Example]

Display time out value of downstream frequency switch

```
BT # show cable modem ds-frequency-timeout
cable modem ds-frequency-timeout: 60s
```

7.1.31 show cable modem flap

[Command]

show cable modem flap

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display flap information of CM.

[Example]

Display flap information of CM:

```
BT(config-if-cmts-1)# show cable modem flap
MAC Address      I/F      Ins   Hit    Miss   CRC    P-LowerAdj P-HigherAdj Time
2476.7d06.cd7e   C1/U2    1     7100   0      0      0          1           Jan 1   00:06:18
2476.7d06.d21c   C1/U2    1     7101   4      0      0          4           Jan 1   00:06:21
2476.7d06.d268   C1/U2    1     7100   5      0      0          4           Jan 1   00:03:35
Total CM:3
Note: CM with no insertion flap will not appear on the above list.
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
I/F	CMTS upstream interface, including CMTS ID and upstream channel ID
Ins	Times for CM to exception join the network
Hit	Times of successful ranging of CM
Miss	Times of unsuccessful ranging of CM
CRC	Times of unsuccessful CRC check
P-LowerAdj	Times for lower adjustment of CM sending level, exceeding 3 dB
P-HigherAdj	Times for higher adjustment of CM sending level, exceeding 3 dB
Time	Time of the latest disconnection of CM
Total CM	Number of CM with flap record

7.1.32 show cable modem local

[Command]

show cable modem local [ipv6]

show cable modem local (upstream | downstream) *channel-id*

[View]

enable view, config view, cmts view

[Parameter]

upstream: upstream channels

downstream: downstream channels

ipv6: IPv6 address service

channel-id: Downstream or upstream channel ID. Type: numerical value; range: downstream channel: 1-32, upstream channel: 1-8

[Description]

This command is used to display local records of CM, excluding RxPwr , Timing Offset and BPI information (fast echo, applicable to a great number of cm display).

[Example]

Display local CM information:

```
BT(config-if-cmts-1)# show cable modem local
MAC Address     IP Address     I/F      MAC         Primary  Number   Online
                                        State       Sid      CPE      Time
4432.c83c.88e4  10.10.28.116   C1/U2    online      3        0        0d1h59m
001c.1df5.73e6  10.10.28.117   C1/U4    w-online    4        0        0d1h0m
001c.1df5.5ebd  10.10.28.118   C1/U4    p-online    7        0        0d1h0m
Total CM:3
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
IP Address	IP address of CM "—" No IP Address in IPv4 or IPv6 " * " The other IP protocol stack has IP Address 10.106.100.39*: Existing IPv4 and IPv6 addresses when current IPv4 protocol stack. 2001:106::4cf0:7e0d:5dc7:ffb9*: Existing IPv4 and IPv6 addresses when current IPv6 protocol stack.
I/F	CMTS upstream interface, including CMTS ID and upstream channel ID
MAC State	CM state
Primary Sid	Primary service flow ID of CM
Number CPE	Number of CPE connected through DHCP
Online Time	Online duration of CM, starting from this online time
Total CM	Number of all the CMs

7.1.33 show cable modem monitor specific

[Command]

show cable modem monitor specific (config | list)

[View]

enable view, config view

[Parameter]

config: Display the settings of monitoring function

list: Display the list of monitoring

[Description]

The command "**show cable modem monitor specific config**" is used to display the configuration information of online/offline monitoring of CM. For corresponding configuration of this command, refer to the sections for "**cable modem monitor specific**" and "**cable modem monitor specific mode**".

The command "**show cable modem monitor specific list**" is used to display the list of online/offline monitoring of CM. For configuration of the list, refer to the section for command: "**cable modem monitor specific**".

[Example]

Display system configuration of CM monitoring functions:

```
BT(config)# show cable modem monitor specific config
cable modem monitor specific enable
cable modem monitor specific mode all
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
cable modem monitor specific	The state of online/offline monitoring of CM, with optional configuration as: enable/disable
cable modem monitor specific mode	Online/offline monitoring mode of CM, with optional configuration as: normal/all

Display CM Monitor list:

```
BT(config)# show cable modem monitor specific listcable
modem monitor specific 4432.c83c.88e4 specific_CM cable
modem monitor specific list num is 1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
cable modem monitor specific	List of online/offline monitoring of CM, with parameters including MAC address of CM and descriptions

7.1.34 show cable modem offline

[Command]

show cable modem offline

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the information of offline CM.

[Example]

Display the information of all offline CMs:

```
BT(config-if-cmts-1)# show cable modem offline
Interface  MAC Address      Prim  Previous  Offline          Rx      Rx     SM
                            Sid   State     Time             Power   SNR    Exhaust
C1/U2      4432.c83c.88e4   3     online    Jan 02 20:13:31  6.0     --     0
Total CM:1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Interface	Local CMTS ID and channel ID of CM
MAC Address	MAC address of CM
Prim Sid	Primary service flow ID of CM
Previous State	The previous state of CM
Offline Time	Offline time of CM
Rx Power	Upstream receiving level before CM becomes offline, in dBmV
Rx SNR	Upstream SNR before CM becomes offline, in dB
SM Exhaust	Times for CM to exhaust the maximum retransmission chance
Total CM	The number of all offline CM

7.1.35 show cable modem offline age config

[Command]

show cable modem offline age config

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display configuration information of CM aging config.

[Example]

Display configuration information of CM aging config:

```
BT(config)# show cable modem offline age config
cable modem offline age-time 10080
cable modem offline age-mode polling
cable modem offline age-clock 0
```

7.1.36 show cable modem online-d

[Command]

show cable modem online-d

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the information of online CM with network interface as down, and other states will be filtered out. The CM of this state will be online successfully, but will refuse to forward data.

[Example]

Display the information of online CM with network interface state as down:

```
BT(config-if-cmts-1)# show cable modem online-d
MAC Address     IP Address    I/F     MAC         Primary   Number   Online
                                      State       Sid       CPE      Time
a4a8.0fa9.607c  10.10.28.185  C1/U2   online(d)   1         0        0d0h5m
Total online-d CM:1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
IP Address	IP address assigned to CM by DHCP server
I/F	CMTS upstream interface, including CMTS ID and upstream channel ID
MAC State	Current state of CM
Primary Sid	Primary service ID of CM
Number CPE	Number of CPE connected to CM through DHCP mode

Parameter	Description
Online Time	Online time of CM
Total online-d CM	Number of CM in the online-d state

7.1.37 show cable modem partial-service state

[Command]

show cable modem partial-service state

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the information of wide-band CM with state of partial service, including the state of the downstream and upstream channels on the cable modem, impaired DS and US channel set.

[Example]

Display the channel information of wide-band CM with partial service state:

```
BT(config-if-cmts-1)# show cable modem partial-service state
MAC Address     IP Address  I/F    MAC       Primary DSxUS  Impaired Impaired
                                   State     Sid     State  Ds       Us
001c.1df5.7456  150.8.0.55  C1/U6  p-online 42      6x4     1,2      --

Total CM:1
```

- **Description of this command output:**

Parameter	Description
MAC Address	Mac address of the cable modem
IP Address	IP address of the cable modem
I/F, interface	CMTS upstream channel of CM is using, including CMTS ID and upstream channel ID
MAC State	Current State of CM, only the CMs with p-online state will be displayed; p-online: one or more channels in the TCS and/or the RCS are unusable
Primary Sid	Primary service flow ID of CM
DSxUS State	State of the downstream and upstream channels on the cable modem
Impaired DS	Impaired DS channel set, display as "--" if no channel is impaired
Impaired US	Impaired US channel set, display as "--" if no channel is impaired

7.1.38 show cable modem phy

[Command]

show cable modem *[(pri-sid | ip-address | mac-address)]* **phy**

show cable modem phy (upstream | downstream) *channel-id*

[View]

enable view, config view, cmts view

[Parameter]

upstream: upstream channels

downstream: downstream channels

pri-sid: primary service ID of CM. Type: numerical value; range: 1-65535

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

channel-id: Downstream or upstream channel ID. Type: numerical value; range: downstream channel: 1-32, upstream channel: 1-8

[Description]

The command "**show cable modem phy**" is used to display the information of physical layer of all CMs under the CMTS.

The command "**show cable modem** *(pri-sid | ip-address | mac-address)* **phy**" is used to display the information of physical layer of a specific CM.

The command "**show cable modem phy (upstream | downstream)** *channel-id*" is used to display the information of physical layer of all CMs on the upstream or downstream channel.

[Example]

Display the information of physical layer of CMs:

```
BT(config-if-cmts-1)# show cable modem a4a8.0fa9.607c phy
MAC Address      I/F      Sid   US_Pwr  US_SNR   Timing  DS_Pwr  DS_SNR  Mode
                                (dBmV)   (dB)     Offset  (dBmV)  (dB)
001c.1df5.7494   R1/U3    1     0.0     0.00     0       0.0     0.0     atdma
001c.1df5.7362   R1/U4    2     0.0     0.00     0       0.0     0.0     atdma
001c.1df5.7452   R1/U2    3     0.0     0.00     0       0.0     0.0     atdma
001c.1df5.73ec   R1/U4    4     0.0     0.00     0       0.0     0.0     atdma
001c.1df5.7449   R1/U4    5     0.0     0.00     0       0.0     0.0     atdma
001c.1df5.7301   R1/U2    6     0.0     0.00     0       0.0     0.0     atdma
```

```
001c.1df5.730d   R1/U1    7     0.0     0.00     0       0.0     0.0     atdma
Total CM:7
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
I/F	CMTS upstream interface, including CMTS ID and upstream channel ID
Sid	Primary service ID of CM
US_Pwr (dBmV)	Upstream transmit level of CM, in dBmV
US_SNR (dB)	Upstream SNR of CM, in dB
Timing Offset	Ranging value of CM
DS_Pwr (dBmV)	Downstream receiving level of CM, in dBmV
DS_SNR (dB)	Downstream SNR of CM, in dB
Mode	Upstream communication mechanism adopted by CM
Total CM	Number of all the CMs

7.1.39 show cable modem phy ofdm-profile

[Command]

show cable modem (*ipv4-address* **|** *ipv6-address* **|** *mac-address***) phy ofdm-profile**

show cable modem phy ofdm-profile

[View]

show cable modem (*ipv4-address* **|** *ipv6-address* **|** *mac-address***) phy ofdm-profile:** enable view, config view, cmts view

show cable modem phy ofdm-profile: enable view, config view, cmts view

[Parameter]

ipv4-address: IP address of CM, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ipv6-address: IPv6 address of CM, 32-bit hexadecimal type; range: 0::0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF.

[Description]

Display the CM physical layer information of 3.1CM on the downstream OFDM channel, such as channel id, RxMer, current profile, recommend profile, unfit profile, downgrade profile.

[Example]

Displays the downstream channel physical layer information of all CM:

```
BT(config-if-cmts-1)# show cable modem phy ofdm-profile
```

```
MAC Address      I/F    DCID  RxMer     Curr      Recm       Unfit        Dwngd
                                        Prof      Prof       Prof         Prof
a84e.3f37.143a  C1/U13  197   44.2        1         --         --           --
                        196   45.5        1         --         --           --
6477.7d90.3e5a  C1/U6   197   0.0         1         --         --           --
                        198   0.0         1         --         --           --
 Total CM:2
```

Display the downstream channel physical layer information of CM with MAC address a84e.3f37.143a:

```
BT(config-if-cmts-1)# show cable modem a84e.3f37.143a phy ofdm-profile
MAC Address      I/F      DCID   RxMer     Curr       Recm      Unfit    Dwngd
                                  Prof      Prof       Prof      Prof
a84e.3f37.143a  C1/U13   197    44.2       1          --        --       --
                         196    45.5       1          --        --       --
```

Display the downstream channel physical layer information of CM with IP address 10.10.10.10:

```
BT(config-if-cmts-1)# show cable modem 10.10.10.10 phy ofdm-profile
MAC Address      I/F       DCID  RxMer   Curr      Recm    Unfit          Dwngd
                                 ProfProf        Pr      Prof
a84e.3f37.143a   C1/U13    197   44.2    1         --      --             --
                           196   45.5    1         --      --             --
```

7.1.40 show cable modem phy verbose

[Command]

show cable modem phy verbose [(upstream|downstream) *Channel-id*]

show cable modem (*pri-sid* **|** *ip-address* **|** *mac-address*) **phy verbose**

[View]

enable view, config view, cmts view

[Parameter]

upstream: upstream channel

downstream: downstream channel

channel-id: Downstream or upstream channel ID. Type: numerical value; range: downstream channel: 1-32, upstream channel: 1-8

pri-sid: primary service ID of CM. Type: numerical value; range: 1-65535

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

The command "**show cable modem phy verbose**"is used to check the all phy information of the CM channel binding.

The command "**show cable modem phy verbose (upstream | downstream)** *Channel-id*"is used to display the CM of the specified upstream or downstream physical layer verbose information.

[Example]

Display the physical layer verbose information of all CMs:

```
BT(config)# show cable modem phy verbose
```

MAC Address	I/F	Sid	US_Pwr (dBmV)	US_SNR (dB)	DS_Pwr (dBmV)	DS_SNR (dB)
4432.c83c.8a06	C1/U1	5	35.2	36.70	--	--
4432.c83c.8a06	C1/U2	5	36.9	42.10	--	--
4432.c83c.8a06	C1/U3	5	35.5	39.10	--	--
4432.c83c.8a06	C1/U4	5	34.9	39.10	--	--
4432.c83c.8a06	C1/D1	5	--	--	-6.0	42.5
4432.c83c.8a06	C1/D2	5	--	--	-5.4	41.9
4432.c83c.8a06	C1/D3	5	--	--	-4.8	42.0
4432.c83c.8a06	C1/D4	5	--	--	-5.3	41.9
4432.c83c.8a06	C1/D5	5	--	--	-4.3	43.1
4432.c83c.8a06	C1/D6	5	--	--	-4.6	42.5
4432.c83c.8a06	C1/D7	5	--	--	-3.9	41.7
4432.c83c.8a06	C1/D8	5	--	--	-4.1	41.3
4432.c83c.87f1	C1/D5	6	--	--	--	--
2476.7d06.bcb8	C1/U4	7	47.2	42.10	--	--
2476.7d06.bcb8	C1/D1	7	--	--	-21.4	29.3
2476.7d06.ce96	C1/U1	1	37.4	36.10	--	--
2476.7d06.ce96	C1/D9	1	--	--	-8.3	39.9
2476.7d06.d030	C1/U3	2	48.9	39.10	--	--
2476.7d06.d030	C1/D3	2	--	--	-21.2	29.4
2476.7d06.cfae	C1/U4	3	47.4	42.10	--	--
2476.7d06.cfae	C1/D2	3	--	--	-20.5	29.1
2476.7d06.ce62	C1/U1	4	50.2	38.10	--	--
2476.7d06.ce62	C1/D4	4	--	--	-23.4	27.0

```
Total CM:24
```

Display the upstream or downstream physical layer verbose information of the specified CM:

```
BT(config)# show        cable modem phy verbose upstream 1
```

MAC Address	I/F	Sid	US_Pwr (dBmV)	US_SNR (dB)	DS_Pwr (dBmV)	DS_SNR (dB)
4432.c83c.8a06	C1/U1	5	35.0	38.10	--	--
4432.c83c.87f1	C1/U1	6	43.5	36.10	--	--
2476.7d06.ce96	C1/U1	1	37.4	38.10	--	--
2476.7d06.ce62	C1/U1	4	50.2	38.10	--	--

```
Total CM:4
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
I/F	Local CMTS and upstream channel of CM
Sid	Primary service ID of CM
US_Pwr (dBmV)	Upstream transmit level of CM, in dBmV
US_SNR (dB)	Upstream SNR of CM, in dB
DS_Pwr (dBmV)	Downstream receiving level of CM, in dBmV
DS_SNR (dB)	Downstream SNR of CM, in dB

7.1.41 show cable modem polling-period

[Command]

show cable modem polling-period

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the polling cycle of the current CM status.

[Example]

Display the polling cycle of the current CM status:

```
BT(config)# show cable modem polling-period
 cable modem polling-period: 60 s
```

7.1.42 show cable modem primary-channel

[Command]

show cable modem [*(ip-address | mac-address)*] **primary-channel**

show cable modem primary-channel (upstream|downstream) *channel-id*

[View]

enable view, config view, cmts view

[Parameter]

upstream: upstream channels

downstream: downstream channels

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

channel-id: Downstream or upstream channel ID. Type: numerical value; range: downstream channel: 1-32, upstream channel: 1-8

[Description]

The command "**show cable modem primary-channel**" is used to display the registered primary channel information of all CMs under CMTS.

The command "**show cable modem** (*ip-address* | *mac-address*) **primary-channel**" is used to display the registered primary channel information of specific CM.

The command "**show cable modem primary-channel (upstream|downstream)** *channel-id*" is used to display the registered primary channel information of specific CM on the upstream or downstream channel.

[Example]

Display the registered primary channel information of all CMs under CMTS device:

```
BT(config-if-cmts-1)# show cable modem primary-channel
MAC Address     IP Address  I/F  MAC        Primary   Upstream       Downstream
                                 State      Sid       Primary(list)  Primary(list)
001c.1df5.7301  21.21.0.1   U2   w-online   1         1(2)           2(3,4,5,6,7,8,9)
Total CM:1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
IP Address	IP address assigned to CM by DHCP server
I/F	CMTS upstream interface, including CMTS ID and upstream channel ID
MAC State	Current state of CM. To display the state of CM, refer to the section for command line "**show cable modem**".
Primary Sid	Primary SID assigned to CM by CMTS
Num CPE	Number of online CPE
Upstream Primary(list)	Upstream primary channel and other channel list
Downstream Primary(list)	Downstream primary channel and other channel list
Total CM	Number of all the CMs

7.1.43 show cable modem prof-mgmt downstream

[Command]

show cable modem (*ipv6-address* | *mac-address*)prof-mgmt downstream

show cable modem (*ipv4-address*)prof-mgmt downstream

[View]

enable view, config view, cmts view

[Parameter]

ipv6-address：IPv6 address of CM, 32-bit hexadecimal type; range: 0::0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF.

ipv4-address: IPv4 address of CM, dotted decimal type; range: 0.0.0.0-255.255.255.255.

[Description]

This command is used for RxMer query of downstream OFDM channel of DOCSIS 3.1 CM.

[Example]

Display RxMer of specified CM downstream OFDM channel:

```
BT# show cable modem 0024.689c.a3be prof-mgmt downdownstream
MAC Address                : 0024.689c.a3be
IPv4 Address               : 11.237.0.110
IPv6 Address               : --
RxMer Exempt Percent       : N/A
RxMer Margin qDB           : N/A
Automatic Prof Downgrade : Active
DCID                       : 193
 Configured  Profile(s)  :  0-3
 Profile(s) in REG-RSP-MP : 0-3
 Profile(s)  in  DBC-REQ  :  0-3
 Current profile  : 3
 Percentages of ideal BL vs Curr Prof : N/A
 Downgrade profile         : 3
 Recommend profile         : N/A
 Unfit profile(s)          : N/A
 Recommend profile (Expired) : N/A
 Unfit profile(s) (Expired) : N/A
Number of SubCarrier       : 8192
1st Active SubCarrier      : 296
# of Active SubCarrier     : 6616
Tx Timer                   : 0h:7m:59s ago
Rx Timer                   : 0h:7m:58s ago
OFDM Profile Failure Rx    : 0
MER Poll Period (s)        : 600
```

```
Recommend Timeout (s)      : 1800
Unfit Timeout (s)          : 600
Average RxMer(db)          : 35.5
Source                     : OPT
Sub-Carrier            RxMER
0x0000 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
0x0010 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
0x0020 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
0x0030 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
0x0040 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
0x0050 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
0x0060 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
0x0070 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
0x0080 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
0x0090 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
0x00A0 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0
… …
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
IP Address	IPv4 address of CM
IPv6 Address	IPv6 address of CM
RxMer Exempt Percent	Not support
RxMer Margin qDB	Not support
Automatic Prof Dwngrd	When the optimal profile is not suitable, it will automatically switch to the sub optimal one, with the following command: **cable ofdm-downstream multi-profile downgrade (enable|disable)**
DCID	OFDM downstream channel ID
Configured Profile(s)	Profile configured
Profile(s) in REG-RSP-MP	Register the profile in the response
Profile(s) in DBC-REQ	Profile requested by DBC

Parameter	Description
Current profile	Profile currently in use by CM
Percentages of ideal BL vs Curr Prof	Not support
Downgrade profile	When the recommended profile test fails, test the next degraded profile
Recommend profile	Recommended profile. Based on RxMer, CMTS will find the best profile to recommend to CM
Unfit profile(s)	Inappropriate profile ID. CMTS will receive an event of "DS OFDM profile failure", and it is deemed that the profile is not suitable for this CM
Recommend profile (Expired)	Not support
Unfit profile(s) (Expired)	Not support
Number of SubCarriers	Number of subcarriers (4K or 8K)
1st Active SubCarrier	The first valid subcarrier
# of Active SubCarriers	The last valid subcarrier
Tx Time	Send time
Rx Time	Receiving time
OFDM Profile Failure Rx	Number of OPT (OFDM Downstream Profile Test) send failures
MER Poll Period (s)	MER polling interval
Recommend Timeout (s)	Recommended profile timeout
Unfit Timeout (s)	Inappropriate profile timeout
Average RxMer(db)	Average of RxMer
Source	Source: opt requests MER
Sub-Carrier	Subcarriers
RxMER	Receive modulation error ratio (not displayed when acquisition fails)

7.1.44 show cable modem service-type-id

[Command]

show cable modem service-type-id [*service-type-id*]

[View]

enable view, config view, cmts view

[Parameter]

service-type-id: Service type ID. Type: string; length: 1-16 bytes

[Description]

This command is used to query the service type ID information of CM, with non-participant parameter showing the service type ID information of all CMs; the participant parameter showing only the information of service type ID which is identical to the parameter.

[Example]

Display the service type ID information of all CMs:

```
BT(config-if-cmts-1)# show cable modem service-type-id
MAC Address      IP Address     I/F     MAC      Primary   Service-type-id
                                        State    Sid
a4a8.0fa9.607c   10.10.28.118   C1/U3   online   13        commercial
Total CM:1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
IP Address	IP address of CM "—" No IP Address in IPv4 or IPv6 " * " The other IP protocol stack has IP Address 10.106.100.39*: Existing IPv4 and IPv6 addresses when current IPv4 protocol stack. 2001:106::4cf0:7e0d:5dc7:ffb9*: Existing IPv4 and IPv6 addresses when current IPv6 protocol stack.
I/F	CMTS upstream interface, including CMTS ID and upstream channel ID
MAC State	Current state of CM
Primary Sid	Primary service flow ID of CM
Service-type-id	Service type ID of CM
Total CM	Number of all the CMs

7.1.45 show cable modem summary

[Command]

show cable modem summary [(ipv6 | upstream|downstream)]

[View]

show cable modem summary [ipv6]: enable view, config view, cmts view

show cable modem summary (upstream|downstream): cmts view

[Parameter]

ipv6: IPv6 address service

upstream: upstream channels

downstream: downstream channels

[Description]

This command is used to display the information of CM in all or the specified channel direction, that is number statistics of CM in different states.

[Example]

Display the CM statistics information:

```
BT(config-if-cmts-1)# show cable modem summary
Interface                              Cable Modem
           Total  Active  Online  Online(d) Offline Wideband  Expire  Reject  initR2
initRA  initRC  initD  initIO  initDR  initI
C1         167    155     106     0         12      89        0       0       45
0       0       0      0       0       4
```

Display CM upstream statistics information:

```
BT(config-if-cmts-1)# show cable modem summary upstream
Interface                              Cable Modem
    Total Active Online Online(d) Offline wide-band Expire Reject initR2 initRA
initRC  initD   initIO  initDR  initI   init6S  init6A  init6R  init6I
C1   45   45     44     0          0       44        0       0       0       0
0        0       0       0       1       0       0       0       0

Upstream cable modem summary:
channel    Total   Active  Online  Online(d) Offline wide-band Expire  Reject  initR2
initRA  initRC  initD   initIO  initDR  initI   init6S  init6A  init6R  init6I
1          28      28      28      0         0       28        0       0       0
0       0       0       0       0       0       0       0       0       0
2          6       6       6       0         0       6         0       0       0
0       0       0       0       0       0       0       0       0       0
3          7       7       6       0         0       6         0       0       0
0       0       0       0       0       1       0       0       0       0
4          2       2       2       0         0       2         0       0       0
0       0       0       0       0       0       0       0       0       0
5          0       0       0       0         0       0         0       0       0
0       0       0       0       0       0       0       0       0       0
6          1       1       1       0         0       1         0       0       0
0       0       0       0       0       0       0       0       0       0
7          1       1       1       0         0       1         0       0       0
0       0       0       0       0       0       0       0       0       0
8          0       0       0       0         0       0         0       0       0
0       0       0       0       0       0
   0       0       0       0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Interface	Port number of CMTS device
Total	Number of all CMs, registered, unregistered, offline, etc.

Parameter	Description
Active	Number of active CM, excluding those in offline state
Online	Number of CM with state as online, including online state, w-online state, p-online state, online(d) state, w-online(d) state and p-online(d) state.
Online(d)	Number of CM with state as online(d), including online(d) state, w-online(d) state and p-online(d) state.
Offline	Number of CM offline
wide-band	Number of 3.0 CM with state as online, including w-online state, p-online state, online(d) state, w-online(d) state and p-online(d) state.
initR2	Number of CM with ranging ongoing
initRA	Number of CM with ranging aborted
initRC	Number of CM with ranging completed
initD	Number of CM with state as init(d)
initIO	Number of CM with state as init(io)
initDR	Number of CM with state as init(dr)
initI	Number of CM with state as init(i)
init6S	Number of CM with state as init6(s)
init6A	Number of CM with state as init6(a)
init6R	Number of CM with state as init6(r)
init6I	Number of CM with state as init6(i)

7.1.46 show cable modem summary verbose

[Command]

show cable modem summary verbose

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to display the details of CM in all the channels direction, number statistics of CM in different states.

[Example]

Display the details of CM in all the channels direction:

```
BT(config-if-cmts-1)# show cable modem summary verbose
Interface                              Cable Modem
        Total Active Online Online(d) Offline initR2 initRA initRC initD  initIO
initDR initI  nit6S  init6A init6R  init6I
```

```
C1      1       1       1       0       0       0       0       0       0       0
0       0       0       0       0       0
Upstream cable modem summary:
channel  Total  Active  Online Online(d) Offline initR2  initRA initRC  initD  initIO
initDR initI  init6S init6A  init6R init6I
1        1      1       1      0        0       0       0      0       0      0
0       0      0       0       0       0
2        0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
Downstream cable modem summary:
channel  Total  Active  Online Online(d) Offline initR2  initRA initRC  initD  initIO
initDR initI  init6S init6A  init6R init6I
1        0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
2        0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
3        0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
4        0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
5        0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
6        1      1       1      0        0       0       0      0       0      0
0       0      0       0       0       0
7        0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
8        0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
9        0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
10       0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
11       0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
12       0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
13       0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
14       0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
15       0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
16       0      0       0      0        0       0       0      0       0      0
0       0      0       0       0       0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Interface	Port number of CMTS device
Total	Number of all CMs, registered, unregistered, offline, etc.
Active	Number of active CM, excluding those in offline state
Online	Number of CM with state as online, including online state, w-online state, p-online state, online(d) state, w-online(d) state and p-online(d) state.
Online(d)	Number of CM with state as online(d), including online(d) state, w-online(d) state and p-online(d) state.
Offline	Number of CM offline
wide-band	Number of 3.0 CM with state as online, including w-online state, p-online state, online(d) state, w-online(d) state and p-online(d) state.
initR2	Number of CM with ranging ongoing
initRA	Number of CM with ranging aborted
initRC	Number of CM with ranging completed
initD	Number of CM with state as init(d)
initIO	Number of CM with state as init(io)
initDR	Number of CM with state as init(dr)
initI	Number of CM with state as init(i)
init6S	Number of CM with state as init6(s)
init6A	Number of CM with state as init6(a)
init6R	Number of CM with state as init6(r)
init6I	Number of CM with state as init6(i)
Upstream cable modem summary:	Number of CM in upstream channels
Downstream cable modem summary:	Number of CM in downstream channels

7.1.47 show cable modem throughput

[Command]

show cable modem (*ipv6-address* **|** *mac-address***) throughput**

show cable modem *ipv4-address* **throughput**

show cable modem throughput

[View]

enable view, config view, cmts view

[Parameter]

ipv6-address：IPv6 address of CM, 32-bit hexadecimal type; range: 0::0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff.

ipv4-address: IPv4 address of CM, dotted decimal type; range: 0.0.0.0-255.255.255.255.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF.

[Description]

This command is used to display throughput details.

[Example]

Display CM throughput details:

```
BT(config-if-cmts-1)# show cable modem 120.0.50.46 throughput
MAC Address         US_Throughput       DS_Throughputs
                    (kbps)              (kbps)
001c.1df5.73bf      1                   0
BT(config-if-cmts-1)# show cable modem throughput
MAC Address         US_Throughput       DS_Throughputs
                    (kbps)              (kbps)
fc94.e3e1.0d30      0                   0
fc94.e349.4872      0                   0
fc94.e349.4ce4      0                   0
001c.1df5.7333      0                   0
28be.9bfe.aca6      0                   0
fc94.e349.4d4e      0                   0
fc94.e349.4d78      0                   0
001c.1df5.73ad      0                   0
001c.1df5.7359      0                   0
001c.1df5.73b0      0                   0
fc94.e3e1.0d12      0                   0
fc94.e349.4f12      0                   0
001c.1df5.73ae      0                   0
001c.1df5.7335      0                   0
001c.1df5.732d      0                   0
001c.1df5.73b2      0                   0
001c.1df5.7487      0                   0
001c.1df5.7480      0                   0
001c.1df5.73a4      0                   0
001c.1df5.73c5      0                   0
001c.1df5.747e      0                   0
001c.1df5.73c4      1                   0
```

7.1.48 show cable modem wideband

[Command]

show cable modem wideband

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the information of 3.0 CM under CMTS.

[Example]

Display all 3.0 CM and relevant information in the cmts view:

```
BT(config-if-cmts-1)# show cable modem wideband
MAC Address     IP Address    I/F    MAC         Primary   DSID   MD-DS-SG/
                                     State       Sid               MD-US-SG
0026.5ba6.4760  172.16.7.101  C1/U2  w-online    2         517    127/0
Total wideband CM:1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
IP Address	IP address assigned to CM by DHCP server
I/F	CMTS upstream interface, including CMTS ID and upstream channel ID
MAC State	Current state of CM. To display the state of CM, refer to the section for command line "**show cable modem**".
Primary SID	Primary service ID
DSID	Downstream service ID
MD-DS-SG/ MD-US-SG	MAC Domain Downstream Service Group MAC Domain Upstream Service Group

7.1.49 show cable modem verbose

[Command]

show cable modem (*ip-address* | *mac-address*) **verbose**

[View]

enable view, config view, cmts view

[Parameter]

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

This command is used to display CM details.

[Example]

Display CM details:

```
BT(config-if-cmts-1)# show cable modem 4432.c83c.8720 verbose
MAC Address                     : 4432.c83c.8720
Dual IP                         : N
IPv4 Address                    : --
IPv6 Address                    : 2000::10
IPv6 prefix                     : --
Ipv6 Local Link Address         : fe80::4632:c8ff:fe3c:8720
Prim Sid                        : 13
Interface                       : C1/U3
Online times                    : 1
Offline times                   : 0
Ipv4 Bundle Interface Name      :
Ipv6 Bundle Interface Name      : bundle1
Upstream Channel                : US3
Upstream Power(dBmV)            : 45.7
Upstream SNR(dB)                : 38.1
Received Power(dBmV)            : 6.0
Reported Transmit Power(dBmV)  : 0.0
Timing Offset(97.6 ns)   : 318
Good Codewords rx               : 3289
Corrected Codewords rx          : 0
Uncorrectable Codewords rx      :  0
Phy Operating Mode              : atdma
MAC Version                     : DOCSIS v2.0
Qos Provisioned Mode            : DOC1.1
Enable DOCSIS2.0 Mode           : Y
Capabilities                    : {Frag=Y, Concat=Y, PHS=N, Priv=BPI+}
Sid/Said Limit                  : {Max Us Sids=16, Max Ds Saids=15}
Optional Filtering Support      : {802.1P=N, 802.1Q=N}
Transmit Equalizer Support      : {Taps/Symbol= 0, Num of Taps= 24}
Number of CPE IPs               : 0
DHCPv4 Config File              : 9685_L2VPN_Test.cfg
DHCPv6 Config File              : cmc_modem_v6.cfg
Flaps                           : 0 (    0  00:00:00)
Errors                          : 0 CRCs, 0 HCSes
Stn Mtn Failures                : 0 aborts, 0 exhausted
Total US Flows                  : 4 (4 active)
Total DS Flows                  : 4 (4 active)
Total US Data                   : 1540 packets, 538448 bytes
Total DS Data                   : 1366 packets, 264617 bytes
```

```
SAV Drop Counter                : --
Service Type ID                 :
Active Classifiers              : 6 (Max = NO LIMIT)
Total Time Online               : 0d0h38m
CM init reason                  : NO PRIM SF USCHAN(17)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
Dual IP	whether the CM support double IP
IPv4 Address	IPv4 address of CM
IPv6 Address	IPv6 address of CM
IPv6 prefix	IPv6 PD address of CM
Ipv6 Local Link Address	IPv6 local address of CM
IP Address	IP address of CM
Prim Sid	Primary service ID of CM
Interface	Local CMTS and upstream channel of CM
Online times	Online times of CM
Offline times	Offline times of CM
Ipv4 Bundle Interface Name	bundle for IPv4 method online CM
Ipv6 Bundle Interface Name	bundle for IPv4 method online CM
Upstream Channel	Upstream channel statistics
Upstream Power(dBmV)	Upstream channel level, in dBmV
Upstream SNR(dB)	Upstream channel SNR, in dB
Received Power(dBmV)	Upstream receiving level, in dBmV
Reported Transmit Power(dBmV)	Recorded transmit level, in dBmV
Timing Offset(97.6 ns)	Ranging value of CM
Good Codewords rx	Number of correct code received
Corrected Codewords rx	Number of error-correcting code received
Uncorrectable Codewords rx	Number of error-correcting-free code received
Phy Operating Mode	PHY operating mode
MAC Version	MAC version
Qos Provisioned Mode	QOS provision mode
Enable DOCSIS2.0 Mode	Is DOCSIS 2.0 mode supported?
Capabilities	CM capability
Sid/Said Limit	Service identifier/security associated identifier limit
Optional Filtering Support	Optional filter support
Transmit Equalizer Support	Transmit equalizer support
Number of CPE IPs	Number of CPE access to CM
DHCPv4 Config File	DHCPv4 config file
DHCPv6 Config File	DHCPv6 config file
Flaps	Times of flap statistics
Errors	Errors, including CRC (Cyclic Redundancy Check) and HCS (Header Check

Parameter	Description
	Sequence)
Stn Mtn Failures	STN MTN failure statistics, including the actively aborted ones and those exceeding the transmission times
Total US Flows	Number of upstream service flow
Total DS Flows	Number of downstream service flow
Total US Data	Total statistics of upstream transmission data, including statistics of packet by number and statistics of traffic size by bytes
Total DS Data	Total statistics of downstream transmission data, including statistics of packet by number and statistics of traffic size by bytes
SAV Drop Counter	SAV Drop Counter
Service Type ID	Service type ID
Active Classifiers	Number of active classifier
Total Time Online	Total time online of CM
CM init reason	CM init reason

7.1.50 show cable modem vlan

[Command]

show cable modem vlan (all | untag | *vlan-id***)**

[View]

enable view, config view, cmts view

[Parameter]

all: All VLANs

untag: VLAN as untag

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

This command is used to display the VLAN information of CM.

[Example]

Display the VLAN information of all CMs:

```
BT(config)# show cable modem vlan allCM IP
Address            VLAN      CM MAC
10.10.28.239       100       a4a8.0fa9.607c
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
CM IP Address	IP address of CM

Parameter	Description
VLAN	VLAN ID of CM
CM MAC	MAC address of CM

7.1.51 show tech cm-mac

[Command]

show tech [page] cm-mac *mac-address*

[View]

enable view, config view, cmts view

[Parameter]

page: Pagination display

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

This command is used to display the CM information collectively once for all by the CM MAC address.

[Example]

Display the information collectively of CM 0024.a115.e691:

```
BT(config)# show tech cm-mac 0024.a115.e691
--------------------------show mac-address all--------------------------
MAC Index         CNU ID     MAC                Is CM
1696              25         0024.a115.e691     Y
--------------------------show dhcp-relay terminal-data-------------------------
Device Mac:0024.a115.e691, IP=10.0.0.26, Expire:865886
           InterfaceMac:0024.a115.e691, Bundle Interface:
--------------------------show ip dhcp binding--------------------------
MAC Address         IP Address      Expire time     Device Type
0024.a115.e691      10.0.0.26       9d23h25m        CM
--------------------------show cable modem [ipv6]-------------------------
MAC Address     IP Address I/F   MAC     Primary RxPwr  Timing Number BPI      Online
                                State   Sid     (dBmV) Offset CPE    Enabled  Time
0024.a115.e691 10.0.0.26  C1/U2 online  25      6.0    619    0      no       0d0h39m
--------------------------show cable modem primary-channel-------------------------
MAC Address      IP Address  I/F    MAC      Primary  Num  Upstream        Downstream
                                    State    Sid      CPE  Primary(list)   Primary(list)
0024.a115.e691   10.0.0.26   C1/U2  online   25       0    2               1
```

7.2 Cable Modem Qos Management

7.2.1 cable map lead-time

[Command]

cable map lead-time *lead-time*

no cable map lead-time

[View]

config view

[Parameter]

lead-time: The lead time of send map message, in microseconds. Type: numerical value; range: (-500)-5000; default: 0.

[Description]

This command is used to configure the relative lead time of map message sended by CMTS device. By adjusting the value, it can improve the uplink channel utilization and reduce the amount of upstream packets transmission delay.

[Example]

Configure the relative lead time of map message as 2000 microseconds:

```
BT(config-if-cmts-1)# cable map lead-time 2000
BT(config-if-cmts-1)# show running-config verbose | include map lead
 cable map lead-time 2000
```

7.2.2 cable map max-time

[Command]

cable map max-time *max-time*

no cable map max-time

[View]

config view

[Parameter]

max-time: The max time of send map message, in microseconds. Type: numerical value; range: 5000-40000; default: 5000.

[Description]

This command is used to configure the relative max time of map message sended by CMTS device. By adjusting the value, it can improve the uplink channel utilization and reduce the amount of upstream packets transmission delay.

[Example]

Configure the relative max time of map message as 6000 microseconds:

```
BT(config-if-cmts-1)# cable map max-time 6000
BT(config-if-cmts-1)# show running-config verbose | include map max
 cable map max-time 6000
```

7.2.3 cable map min-time

[Command]

cable map min-time *min-time*

no cable map min-time

[View]

config view

[Parameter]

min-time: The min time of send map message, in microseconds. Type: numerical value; range: 2500-40000; default: 2500.

[Description]

This command is used to configure the relative min time of map message sended by CMTS device. By adjusting the value, it can improve the uplink channel utilization and reduce the amount of upstream packets transmission delay.

[Example]

Configure the relative min time of map message as 6000 microseconds:

```
BT(config-if-cmts-1)# cable map min-time 6000
BT(config-if-cmts-1)# show running-config verbose | include map min
 cable map min-time 6000
```

7.2.4 cable service flow activity-timeout

[Command]

cable service flow activity-timeout *activity-timeout*

no cable service flow activity-timeout

[View]

cmts view

[Parameter]

activity-timeout: timeout for active qos parameters.Type: numerical value; range: 0,30-65535; default:0s.

[Description]

The command "**cable service flow activity-timeout**" is used to configure globle timeout for active qos parameters of dynamic service flow. When one dynamic service flow is inactive within the timeout,it will be deleted. When the value is 0, it will never timeout.

The command "**no cable service flow activity-timeout**" is used to restore the default configuration of service flow activity timeout.

[Example]

Configure service flow activity timeout as 200 seconds:

```
BT(config-if-cmts-1)# cable service flow activity-timeout 200
BT(config-if-cmts-1)# show running-config | include activity-timeout
 cable service flow activity-timeout 200
```

7.2.5 cable sid-cluster-group num-of-cluster

[Command]

cable sid-cluster-group num-of-cluster *num-cluster*

no cable sid-cluster-group [num-of-cluster]

[View]

cmts view

[Parameter]

num-cluster: The num-of-cluster value. Type: numerical value; range: 1-8; default:1.

num-of-cluster: The num-of-cluster value.

[Description]

The command "**cable sid-cluster-group num-of-cluster**" is used to configure a SID cluster group and specifies the number of SID clusters. Configuring more than one SID Cluster can reduce the

impact on upstream channel bandwidth and transmission latency because of Request / Grant is missing, when Request / Grant is drop due to an upstream burst error or conflict

The command "**no cable sid-cluster-group num-of-cluster**" is used to restore the default number of cluster.

The command "**no cable sid-cluster-group**" is used to restore the default the configuration of the sid-cluster-group.

[Example]

Configure the number of SID clusters as 2:

```
BT(config-if-cmts-1)# cable sid-cluster-group num-of-cluster 2
BT(config-if-cmts-1)# show cable sid-cluster
 cable sid-cluster-group req-multiplier 8
 cable sid-cluster-group num-of-cluster 2
 cable sid-cluster-switching max-request 1
 cable sid-cluster-switching max-outstanding-byte 1000000
 cable sid-cluster-switching max-total-byte 500000
 cable sid-cluster-switching max-time 5000
```

7.2.6 cable sid-cluster-group req-multiplier

[Command]

cable sid-cluster-group req-multiplier *req-multiplier*

no cable sid-cluster-group [req-multiplier]

[View]

cmts view

[Parameter]

req-multiplier: The number of bytes per bandwidth request for the upstream service flow. Type: numerical value; range: 1 | 2 | 4 | 8 | 16; default: 4.

[Description]

The command "**cable sid-cluster-group req-multiplier**" is used to configure the number of bytes per bandwidth request for the upstream service flow. The number of bytes requested by each CM must be a multiple of the value.

The command "**no cable sid-cluster-group req-multiplier**" is used to restore the default number of bytes per bandwidth request for the upstream service flow.

The command "**no cable sid-cluster-group**" is used to restore the default the configuration of the sid-cluster-group.

[Example]

Configure the number of bytes per bandwidth request for the upstream service flow as 8:

```
BT(config-if-cmts-1)# cable sid-cluster-group req-multiplier 8
BT(config-if-cmts-1)# show cable sid-cluster
 cable sid-cluster-group req-multiplier 8
 cable sid-cluster-group num-of-cluster 1
 cable sid-cluster-switching max-request 1
 cable sid-cluster-switching max-outstanding-byte 1000000
 cable sid-cluster-switching max-total-byte 500000
 cable sid-cluster-switching max-time 5000
```

7.2.7 cable sid-cluster-switching max-outstanding-byte

[Command]

cable sid-cluster-switching max-outstanding-byte *max-outstanding-byte*

no cable sid-cluster-switching [max-outstanding-byte]

[View]

cmts view

[Parameter]

max-outstanding-byte: The max-request value, in bytes. Type: numerical value; range: 0-4294967295; default: 1000000

[Description]

The command "**cable sid-cluster-switching max-outstanding-byte**" is used to specify the total size of Service ID (SID) cluster, for outstanding requests using the SID cluster.

The command "**no cable sid-cluster-switching max-outstanding-byte**" is used to restore the default total size of SID cluster.

The command "**no cable sid-cluster-switching**" is used to restore the default the configuration of the sid-cluster-switching.

[Example]

Configure the specifies the total size of SID cluster as 2000000:

```
BT(config-if-cmts-1)# cable sid-cluster-switching max-outstanding-byte2000000
BT(config-if-cmts-1)# show cable sid-cluster
 cable sid-cluster-group req-multiplier 8
 cable sid-cluster-group num-of-cluster 2
 cable sid-cluster-switching max-request 5
```

```
 cable sid-cluster-switching max-outstanding-byte 2000000
 cable sid-cluster-switching max-total-byte 500000
 cable sid-cluster-switching max-time 5000
```

7.2.8 cable sid-cluster-switching max-request

[Command]

cable sid-cluster-switching max-request *max-request*

no cable sid-cluster-switching [max-request]

[View]

cmts view

[Parameter]

max-request: The max-request value. Type: numerical value; range: 0-255; default: 8

[Description]

The command "**cable sid-cluster-switching max-request**" is used to specify the maximum number of requests that can be made using the SID cluster.

The command "**no cable sid-cluster-switching max-request**" is used to restore the default number of cluster.

The command "**no cable sid-cluster-switching**" is used to restore the default the configuration of the sid-cluster-switching.

[Example]

Configure the specifies the maximum number of requests as 5:

```
BT(config-if-cmts-1)# cable sid-cluster-switching max-request 5
BT(config-if-cmts-1)# show cable sid-cluster
 cable sid-cluster-group req-multiplier 8
 cable sid-cluster-group num-of-cluster 2
 cable sid-cluster-switching max-request 5
 cable sid-cluster-switching max-outstanding-byte 1000000
 cable sid-cluster-switching max-total-byte 500000
 cable sid-cluster-switching max-time 5000
```

7.2.9 cable sid-cluster-switching max-time

[Command]

cable sid-cluster-switching max-time *max-time*

no cable sid-cluster-switching [max-time]

[View]

cmts view

[Parameter]

max-time: The max-request value, in milliseconds. Type: numerical value; range: 0-65535; default: 5000

[Description]

The command "**cable sid-cluster-switching max-time**" is used to specify the total time that a service flow can continue to use the SID cluster for bandwidth requests of SID cluster.

The command "**no cable sid-cluster-switching max-time**" is used to restore the default total time of SID cluster.

The command "**no cable sid-cluster-switching**" is used to restore the default the configuration of the sid-cluster-switching.

[Example]

Configure the total time as 3000 milliseconds:

```
BT(config-if-cmts-1)# cable sid-cluster-switching max-time 3000
BT(config-if-cmts-1)# show cable sid-cluster
 cable sid-cluster-group req-multiplier 8
 cable sid-cluster-group num-of-cluster 2
 cable sid-cluster-switching max-request 5
 cable sid-cluster-switching max-outstanding-byte 1000000
 cable sid-cluster-switching max-total-byte 500000
 cable sid-cluster-switching max-time 3000
```

7.2.10 cable sid-cluster-switching max-total-byte

[Command]

cable sid-cluster-switching max-total-byte *max-total-byte*

no cable sid-cluster-switching [max-total-byte]

[View]

cmts view

[Parameter]

max-total-byte: The max-total-byte value, in bytes. Type: numerical value; range: 0-4294967295; default: 500000

[Description]

The command "**cable sid-cluster-switching max-total-byte**" is used to specify the total number of bytes that can be requested using the SID cluster.

The command "**no cable sid-cluster-switching max-total-byte**" is used to restore the default total number of bytes of SID cluster.

The command "**no cable sid-cluster-switching**" is used to restore the default the configuration of the sid-cluster-switching.

[Example]

Configure the specifies the total number of bytes as 300000:

```
BT(config-if-cmts-1)# cable sid-cluster-switching max-total-byte 300000
BT(config-if-cmts-1)# show cable sid-cluster
 cable sid-cluster-group req-multiplier 8
 cable sid-cluster-group num-of-cluster 2
 cable sid-cluster-switching max-request 5
 cable sid-cluster-switching max-outstanding-byte 1000000
 cable sid-cluster-switching max-total-byte 300000
 cable sid-cluster-switching max-time 5000
```

7.2.11 show cable map-time

[Command]

show cable map-time

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the configuration of map time.

[Example]

Display the configuration of map time:

```
BT(config)# show cable map-time
 cable map min-time 2500
 cable map max-time 5000
 cable map lead-time 3000
```

7.2.12 show cable modem classifiers

[Command]

show cable modem (*pri-sid* **|** *ip-address* **|** *mac-address***) classifiers [sfid** *sfid* **[***classid***]]**

show cable modem *ip-address* **classifiers [sfid** *sfid* **[***class-id***]] [vlan [untag |** *vlan-id***]]**

[View]

enable view, config view, cmts view

[Parameter]

untag: VLAN as untag

pri-sid: Primary service ID of CM. Type: numerical value; range: 1-65535

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

sfid: Primary service ID. Type: numerical value; range: 1-4294967295

classid: Classifier ID. Type: numerical value; range: 1-65535

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

Note:

If the option **[vlan (untag |** *vlan-id***)]** is not input, service flow information of all CM with the same IP but different MAC address is displayed. This option can only be entered if *ip-address* is IPv4.

[Description]

The command "**show cable modem classifiers**" is used to display the classifier information of CM.

The command "**show cable modem classifiers sfid**" is used to display the classifier information filtered by the service flow. The classifier is optional, and is used to display the classifier information filtered simultaneously by the classifier and the service flow.

[Example]

Display the classifier information of CM with primary SID as 2:

```
BT(config-if-cmts-1)# show cable modem 2 classifiers
CfrID   Cfr   SFID    SF  MAC Address      Direction  State       Priority   Pkts
        Ref           Ref
```

```
11      11      1024    2    001c.1df5.742e   US         Active(N)   1(Y)        200
12      12      1025    3    001c.1df5.742e   US         Active(N)   2(Y)        200
13      13      1026    4    001c.1df5.742e   US         Active(N)   3(Y)        200
14      14      1027    5    001c.1df5.742e   US         Active(N)   4(Y)        200
15      15      1028    6    001c.1df5.742e   US         Active(N)   5(Y)        200
16      16      1029    7    001c.1df5.742e   US         Active(N)   6(Y)        200
17      17      1030    8    001c.1df5.742e   US         Active(N)   7(Y)        200
31      31      66562   22   001c.1df5.742e   DS         Active(Y)   1(Y)        200
32      32      67586   28   001c.1df5.742e   DS         Active(Y)   2(Y)        200
33      33      68610   24   001c.1df5.742e   DS         Active(N)   3(Y)        200
34      34      69634   25   001c.1df5.742e   DS         Active(N)   4(Y)        200
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
CfrID	Classifier ID
Cfr Ref	Classifier Reference
SFID	Service Flow ID
SF Ref	Service Flow Reference
MAC Address	MAC address of CM
Direction	Classifier direction of CM, including upstream channel and downstream channel
State	Current state of classifier
Priority	Priority of classifier
Pkts	Classifier packet number

7.2.13 show cable modem classifiers verbose

[Command]

show cable modem (*pri-sid* | *ip-address* | *mac-address*) **classifiers verbose** [**sfid** *sfid* [*classid*]]

show cable modem *ip-address* **classifiers verbose** [**sfid** *sfid* [*classid*]] [**vlan** [**untag** | *vlan-id*]]

[View]

enable view, config view, cmts view

[Parameter]

untag: VLAN as untag

pri-sid: Primary service ID of CM. Type: numerical value; range: 1-65535

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

sfid: Primary service ID. Type: numerical value; range: 1-4294967295

classid: Classifier ID. Type: numerical value; range: 1-65535

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

Note:

If the option **[vlan (untag | *vlan-id*)]** is not input, service flow information of all CM with the same IP but different MAC address is displayed. This option can only be entered if *ip-address* is IPv4.

[Description]

This command is used to display the classifier details of CM.

[Example]

Display the classifier information of cm with primary SID as 2:

```
BT(config-if-cmts-1)# show cable modem 2 classifiers verbose
Classifier Settings:
 Classifier ID              : 11
 Classifier Reference       : 11
 Service-flow ID            : 1024
 Service-flow Reference     : 2
 CM Mac Address             : 001c.1df5.742e
 Direction                  : US
 State                      : Active(N)
 Priority                   : 1(Y)
IP Classifier Settings:
 IP Tos Low                 : 0(N)
 IP Tos High                : 0(N)
 IP Tos Mask                : 0(N)
 IP Protocol                : 258(N)
 IPv6 Flow label            : 0(N)
 source IP address          : --(N)
 source IP mask             : 255.255.255.255(N)
 dest IP address            : --(N)
 dest IP mask               : 255.255.255.255(N)
 source port start          : 0(N)
 source port end            : 65535(N)
 dest port start            : 0(N)
 dest port end              : 65535(N)
Ethernet LLC settings:
 Dest Mac Address           : 0000.0000.0000(N)
 Dest Mac Mask              : 0000.0000.0000(N)
 Source Mac Address         : ffff.ffff.ffff(N)
```

```
 Ethertype/802.2 SAP        : 0x01 0x08 0x06(Y)
802.1 P/Q settings:
 User Priority              : low-0(N)  high-7(N)
 Vlan ID                    : 0(N)
 Pkts                       : 200
...
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Classifier Settings	Display the classifier settings, including: classifier ID, classifier reference, corresponding service flow ID, service flow reference, MAC address of CM, direction of classifier, state of classifier and priority of classifier
IP Classifier Settings	Display the IP classifier settings, including: type of low-IP service, type of high-IP service, mask of IP service type, IP protocol, IPv6 Flow label, source IP address, mask of source IP address, destination IP address, mask of destination IP address, start source port number, end source port number, start destination port number and end destination port number
Ethernet LLC settings	Display the Ethernet LLC settings, including: destination MAC address, source MAC address, IEEE 802.2
802.1 P/Q settings	Display 802.1 P/Q settings, including user priority, VLAN ID

7.2.14 show cable modem qos

[Command]

show cable modem (*pri-sid* **|** *ip-address* **|** *mac-address***) qos**

show cable modem *ip-address* **qos [vlan [untag |** *vlan-id***]]**

[View]

enable view, config view, cmts view

[Parameter]

untag: VLAN as untag

pri-sid: Primary service ID of CM. Type: numerical value; range: 1-65535

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

sfid: Primary service ID. Type: numerical value; range: 1-4294967295

classid: Classifier ID. Type: numerical value; range: 1-65535

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

Note:

If the option **[vlan (untag | *vlan-id*)]** is not input, service flow information of all CM with the same IP but different MAC address is displayed. This option can only be entered if *ip-address* is IPv4.

[Description]

This command is used to display QoS information of CM.

[Example]

Display QoS information of CM with MAC address as a4a8.0fa9.607c:

```
BT(config-if-cmts-1)# show cable modem a4a8.0fa9.607c qos
Qos informations of CM a4a8.0fa9.607c are as follows:
SFID  SF  Dir Curr   Sid   Sched  Prio MaxSusRate  MaxBurst   MinRate PeakRate Flags
      Ref     State       Type
2     1   US  active 2     BE(Y)  0(Y) 0(N)        6400(Y)    0(N)    0(N)     static
1024  2   US  active 1024  BE(Y)  1(Y) 0(N)        6400(Y)    0(N)    0(N)     static
1025  3   US  active 1025  BE(Y)  2(Y) 0(N)        6400(Y)    0(N)    0(N)     static
1026  4   US  active 1026  BE(Y)  3(Y) 0(N)        6400(Y)    0(N)    0(N)     static
1027  5   US  active 1027  BE(Y)  4(Y) 0(N)        6400(Y)    0(N)    0(N)     static
1028  6   US  active 1028  BE(Y)  5(Y) 0(N)        6400(Y)    0(N)    0(N)     static
1029  7   US  active 1029  BE(Y)  6(Y) 0(N)        6400(Y)    0(N)    0(N)     static
1030  8   US  active 1030  BE(Y)  7(Y) 0(N)        6400(Y)    0(N)    0(N)     static
65538 21  DS  active N/A   BE(N)  0(Y) 0(N)        6400(Y)    0(N)    0(N)     static
66562 22  DS  active N/A   BE(N)  1(Y) 60000007(Y) 6400(Y)    0(N)    0(N)    static
67586 28  DS  active N/A   BE(N)  7(Y) 8000005(Y)  6000000(Y) 0(N)    0(N)    static
68610 24  DS  active N/A   BE(N)  2(Y) 60000005(Y) 3044(N)    0(N)    0(N)    static
69634 25  DS  active N/A   BE(N)  6(Y) 60000005(Y) 3044(N)    0(N)    0(N)    static
70658 23  DS  active N/A   BE(N)  3(Y) 60000006(Y) 3044(N)    0(N)    0(N)    static
71682 26  DS  active N/A   BE(N)  7(Y) 60000005(Y) 3044(N)    0(N)    0(N)    static
72706 27  DS  active N/A   BE(N)  7(Y) 60000005(Y) 3044(N)    0(N)    0(N)    static
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
SFID	Service-flow ID
SF Ref	Service-flow Reference
Dir	Direction of QOS
Curr State	The current state of the service flow
Sid	Service ID of the service flow
Sched Type	Scheduling type of the service flow
Prio	Priority of the service flow
MaxSusRate	Maximum transmission rate of the service flow
MaxBurst	Maximum burst rate of the service flow

Parameter	Description
MinRate	Minimum reserve bandwidth of the service flow
PeakRate	The peak rate, in bps
Flags	Type identification

7.2.15 show cable modem qos verbose

[Command]

show cable modem (*pri-sid* **|** *ip-address* **|** *mac-address***) qos verbose [sfid** *sfid***]**

show cable modem *ip-address* **qos verbose [vlan [untag |** *vlan-id***]]**

[View]

enable view, config view, cmts view

[Parameter]

untag: VLAN as untag

pri-sid: Primary service ID of CM. Type: numerical value; range: 1-65535

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

sfid: Primary service ID. Type: numerical value; range: 1-4294967295

classid: Classifier ID. Type: numerical value; range: 1-65535

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

Note:

If the option **[vlan (untag |** *vlan-id***)]** is not input, service flow information of all CM with the same IP but different MAC address is displayed. This option can only be entered if *ip-address* is IPv4.

[Description]

This command is used to display QoS details of CM.

[Example]

Display QOS details of CM with IP address as 192.168.2.102:

```
BT(config-if-cmts-1)# show cable modem 192.168.2.102 qos verbose
Qos verbose informations of CM a4a8.0fa9.607c are as follows:
Sfid                                : 2
Current State                       : active
```

```
Sid                                 : 2
Traffic Priority                    : 0(Y)
Maximum Sustained rate              : 0(N) bits/sec
Maximum Burst                       : 6400(Y) bytes
Minimum Reserved rate               : 0(N) bits/sec
Minimum Packet Size                 : 0(N) bytes
Admitted QoS Timeout                : 200(N) seconds
Active QoS Timeout                  : 0(N) seconds
Maximum Concatenated Burst          : 1522(N) bytes
Scheduling Type                     : Best Effort(Y)
Request/Transmission policy         : 0x00000000
IP ToS Overwrite[AND-mask, OR-mask] : 0xff(N),0x00(N)
Peak Rate                           : 0(N) bits/sec
Sfid                                : 1024
Current State                       : active
Sid                                 : 1024
Traffic Priority                    : 1(Y)
Maximum Sustained rate              : 0(N) bits/sec
Maximum Burst                       : 6400(Y) bytes
Minimum Reserved rate               : 0(N) bits/sec
Minimum Packet Size                 : 0(N) bytes
Admitted QoS Timeout                : 200(N) seconds
Active QoS Timeout                  : 0(N) seconds
Maximum Concatenated Burst          : 1522(N) bytes
Scheduling Type                     : Best Effort(Y)
Request/Transmission policy         : 0x00000000
IP ToS Overwrite[AND-mask, OR-mask] : 0xff(N),0x00(N)
Peak Rate                           : 0(N) bits/sec
Sfid                                : 1025
Current State                       : active
Sid                                 : 1025
Traffic Priority                    : 2(Y)
Maximum Sustained rate              : 0(N) bits/sec
Maximum Burst                       : 6400(Y) bytes
Minimum Reserved rate               : 0(N) bits/sec
Minimum Packet Size                 : 0(N) bytes
Admitted QoS Timeout                : 200(N) seconds
Active QoS Timeout                  : 0(N) seconds
Maximum Concatenated Burst          : 1522(N) bytes
Scheduling Type                     : Best Effort(Y)
Request/Transmission policy         : 0x00000000
IP ToS Overwrite[AND-mask, OR-mask] : 0xff(N),0x00(N)
Peak Rate                           : 0(N) bits/sec
...
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Sfid	Service-flow ID
Current State	Current state
Sid	Security identifier
Traffic Priority	Transmission priority
Maximum Sustained rate	The maximum sustained transmission rate
Maximum Burst	The maximum burst transmission rate
Mimimum Reserved rate	The minimum reserved rate
Mimimum Packet Size	The minimum length of packet
Admitted QoS Timeout	Admitted QOS timeout
Active QoS Timeout	Active QOS timeout
Maximum Concatenated Burst	The maximum concatenated burst rate
Scheduling Type	Scheduling type
Request/Transmission policy	Request/Transmission policy
IP ToS Overwrite[AND-mask, OR-mask]	IP TOS rewrite
PeakRate	The peak rate, in bps

7.2.16 show cable modem service-flow

[Command]

show cable modem (*pri-sid* | *ip-address* | *mac-address*) **service-flow**

show cable modem *ip-address* **service-flow [vlan [untag** | *vlan-id*]]

[View]

enable view, config view, cmts view

[Parameter]

untag: VLAN as untag

pri-sid: Primary service ID of CM. Type: numerical value; range: 1-65535

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

sfid: Primary service ID. Type: numerical value; range: 1-4294967295

classid: Classifier ID. Type: numerical value; range: 1-65535

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

Note:

If the option **[vlan (untag | *vlan-id*)]** is not input, service flow information of all CM with the same IP but different MAC address is displayed. This option can only be entered if *ip-address* is IPv4.

[Description]

This command is used to display the service flow information of CM.

[Example]

Display the service flow information of CM with primary service ID as 2:

```
BT(config-if-cmts-1)# show cable modem 2 service-flow
Service-flow informations of CM a4a8.0fa9.607c are as follows:
SFID  SF Dir Curr    Sid  Sched  Prio  MaxSusRate  MaxBurst   MinRate  PeakRate Flags
      Ref    State        Type
2     1  US  active  2    BE(Y)  0(Y)  0(N)        6400(Y)    0(N)     0(N)     static
1024  2  US  active  1024 BE(Y)  1(Y)  0(N)        6400(Y)    0(N)     0(N)     static
1025  3  US  active  1025 BE(Y)  2(Y)  0(N)        6400(Y)    0(N)     0(N)     static
1026  4  US  active  1026 BE(Y)  3(Y)  0(N)        6400(Y)    0(N)     0(N)     static
1027  5  US  active  1027 BE(Y)  4(Y)  0(N)        6400(Y)    0(N)     0(N)     static
1028  6  US  active  1028 BE(Y)  5(Y)  0(N)        6400(Y)    0(N)     0(N)     static
1029  7  US  active  1029 BE(Y)  6(Y)  0(N)        6400(Y)    0(N)     0(N)     static
1030  8  US  active  1030 BE(Y)  7(Y)  0(N)        6400(Y)    0(N)     0(N)     static
65538 21 DS  active  N/A  BE(N)  0(Y)  0(N)        6400(Y)    0(N)     0(N)     static
66562 22 DS  active  N/A  BE(N)  1(Y)  60000007(Y) 6400(Y)    0(N)     0(N)     static
67586 28 DS  active  N/A  BE(N)  7(Y)  8000005(Y)  6000000(Y) 0(N)     0(N)     static
68610 24 DS  active  N/A  BE(N)  2(Y)  60000005(Y) 3044(N)    0(N)     0(N)     static
69634 25 DS  active  N/A  BE(N)  6(Y)  60000005(Y) 3044(N)    0(N)     0(N)     static
70658 23 DS  active  N/A  BE(N)  3(Y)  60000006(Y) 3044(N)    0(N)     0(N)     static
71682 26 DS  active  N/A  BE(N)  7(Y)  60000005(Y) 3044(N)    0(N)     0(N)     static
72706 27 DS  active  N/A  BE(N)  7(Y)  60000005(Y) 3044(N)    0(N)     0(N)     static
Upstream service flow details:
SFID   SF  SID    Requests Polls  Grants Delayed  Dropped  Packets  Bytes  Drops(pkt)
       Ref                             Grants   Grants
2      1   2      0        0      0      0        0        177      8060   0
1024   2   1024   0        0      0      0        0        0        0      0
1025   3   1025   0        0      0      0        0        0        0      0
1026   4   1026   0        0      0      0        0        0        0      0
1027   5   1027   0        0      0      0        0        0        0      0
1028   6   1028   0        0      0      0        0        0        0      0
1029   7   1029   0        0      0      0        0        0        0      0
1030   8   1030   0        0      0      0        0        0        0      0
Downstream service flow details:
SFID     SF    RP_SFID  QID   Flg   Packets  Bytes    Drops(pkt)
         Ref
65538    21    0        0     0     413      63490    0
```

```
66562    22    0        0        0        0        0        0
67586    28    0        0        0        0        0        0
68610    24    0        0        0        0        0        0
69634    25    0        0        0        0        0        0
70658    23    0        0        0        0        0        0
71682    26    0        0        0        0        0        0
72706    27    0        0        0        0        0        0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
SFID	Service-flow ID
SF Ref	Service-flow Reference
Dir	Direction of QOS
Curr State	The current state of the service flow
Sid	Service ID of the service flow
Sched Type	Scheduling type of the service flow
Prio	Priority of the service flow
MaxSusRate	Maximum transmission rate of the service flow
MaxBurst	Maximum burst rate of the service flow
MinRate	Minimum reserve bandwidth of the service flow
PeakRate	The peak rate, in bps
Flags	Type identification
SID	Service ID
Requests	Number of request
Polls	Number of polling
Grants	Authorization
Delayed Grants	Delayed authorization
Dropped Grants	Discarded authorization
Packets	Number of packet transmitted
Bytes	Traffic transmitted, in byte
Drops(pkt)	Number of packet discarded
RP_SFID	Route processor service flow identifier
QID	Queue identifier
Flg	Queue delay flag

7.2.17 show cable sid-cluster

[Command]

show cable sid-cluster

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the configurations of sid-cluster.

[Example]

Display the configurations of sid-cluster:

```
BT(config-if-cmts-1)# show cable sid-cluster
 cable sid-cluster-group req-multiplier 4
 cable sid-cluster-group num-of-cluster 1
 cable sid-cluster-switching max-request 1
 cable sid-cluster-switching max-outstanding-byte 1000000
 cable sid-cluster-switching max-total-byte 500000
 cable sid-cluster-switching max-time 5000
```

7.3 Cable Modem Remote Query Management

7.3.1 cable modem remote-query

[Command]

cable modem remote-query

no cable modem remote-query

[View]

cmts view

[Parameter]

N/A

[Description]

The command "**cable modem remote-query**" is used to enable Remote Query function of current CMTS device.

The command "**no cable modem remote-query**" is used to disable Remote Query function of current CMTS device.

[Example]

Enable remote query function of CMTS 1:

```
BT(config-if-cmts-1)# cable modem remote-query
```

```
BT(config-if-cmts-1)# show running-config verbose | include remote
 cable modem remote-query
```

7.3.2 cable modem remote-query community-string

[Command]

cable modem remote-query community-string *community-string*

[View]

cmts view

[Parameter]

community-string: Community name for use at the time of SNMP communication with CM. Type: string; range: 1-63 bytes.

[Description]

This command is used to set the string for a global community name, and remote query will take this community name as the name for authentication which is used for SNMP communication with CM. When no setting is made, remote query will use the default string “public”.

[Example]

Set the community name for remote query function as community1:

```
BT(config-if-cmts-1)# cable modem remote-query community-string community1
BT(config-if-cmts-1)# show running-config verbose | include community-stringcable
modem remote-query community-string "community1"
```

7.3.3 cable modem remote-query interval

[Command]

cable modem remote-query interval *interval*

[View]

cmts view

[Parameter]

interval: interval between two complete polling by Remote Query, in second. Type: numerical value; range: 5-86400; default: 5s.

[Description]

This command is used to set the interval between the end of a complete polling by remote query and the beginning of the next complete polling. The complete polling refers to finishing the polling of all CMs under CMTS with remote query function enabled.

[Example]

Set the polling interval of remote query function as 1 hour:

```
BT(config-if-cmts-1)# cable modem remote-query interval 3600
```

7.3.4 cable modem remote-query src-ip

[Command]

cable modem remote-query src-ip *ip-address*

no cable modem remote-query src-ip

[View]

cmts view

[Parameter]

ip-address: IPv4 unicast address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

[Description]

The command "**cable modem remote-query src-ip**" is used to specify a local IP address for remote query function to establish SNMP communication with CM. This IP address should be a local IP address that is reachable to the three layers of CM. In case of no setting of this, the system will try itself to select an available IP address, which will be displayed as 0.0.0.0 in relevant commands for display.

The command "**no cable modem remote-query src-ip**" is used to cancel the local IP address specified for remote query function, but let the system select an IP address.

[Example]

Configure the IP address for use by remote query as 192.168.161.12:

```
BT(config-if-cmts-1)# cable modem remote-query src-ip 192.168.161.12 BT(config-if-
cmts-1)# show running-config verbose | include remote-query src-ip
cable modem remote-query src-ip 192.168.161.12
```

7.3.5 show cable modem remote-query

[Command]

show cable modem remote-query

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display CM information collected through remote query function.

[Example]

Display CM information collected through remote query function:

```
BT(config)# show cable modem remote-query
IP address      MAC address      DS_SNR  US_Pwr  DS_Pwr  Micro (dB)  MER   Modem
FetchTime
                                 (dB)    (dBmV)  (dBmV)  Reflection  (dB)  Online
Year Mon Day HH:MM:SS
192.168.0.102   0026.5ba6.4789   33.2    35.8    12.9    44          45.4  Y
2019 Jan 01 08:51:52
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
IP address	IP address of CM "—" No IP Address in IPv4 or IPv6 " * " The other IP protocol stack has IP Address 10.106.100.39*: Existing IPv4 and IPv6 addresses when current IPv4 protocol stack. 2001:106::4cf0:7e0d:5dc7:ffb9*: Existing IPv4 and IPv6 addresses when current IPv6 protocol stack.
MAC address	MAC address of CM
DS_SNR (dB)	Upstream SNR of CM, in dB
US_Pwr (dBmV)	Upstream transmit level of CM, in dBmV
DS_Pwr (dBmV)	Downstream transmit level of CM, in dBmV
Micro (dB) Reflection	Micro-reflection of CM
MER (dB)	MER of CM, in dB
Modem Online	CM state. whether CM online. Y means yes, and N means no.
FetchTime Year Mon Day HH:MM:SS	Fetch time of CM

7.3.6 show cable modem remote-query (cpe-info | description | ds-info | interface-info | system-info | us-info)

[Command]

show cable modem [*ipv6-address***|***mac-address***] remote-query (cpe-info | description | ds-info | interface-info | system-info | us-info)**

show cable modem *ipv4-address* **remote-query (cpe-info | description | ds-info | interface-info | system-info | us-info) [vlan (untag |** *vlan-id***)]**

[View]

enable view, config view, cmts view

[Parameter]

ipv6-address: CM's IPv6 address,IPv6 address, with format as X:X::X:X.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

ipv4-address: IPv4 address of CM, dotted decimal type; range: 0.0.0.0-255.255.255.255

cpe-info: CM terminal information

description: CM Description Information

ds-info: CM downstream channel information, Inner If Index (port id), DS Id (downstream channel id), Error Ration (bit error rate), Rate (rate, unit bps).

interface-info: Interface information, Port Id (port id), Description (description information), Status (1:up 2: down).

system-info: Interface information, Port Id (port id), Description (description information), Status (1:up 2: down).

us-info: CM upstream channel information, Inner If Index (port id), us Id (upstream channel id), Error Ration (bit error rate), Rate (rate, unit bps).

untag: No VLAN ID.

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

The IP or MAC of the specified CM displays the details of the CM collected through the remotequery function.

[Example]

Display CM cpe-info:

```
BT(config-if-cmts-1)# show cable modem 001c.1df5.73c2 remote-query cpe-info
 CPE Mac address
 001c.1df5.739c
 00cc.9404.0072
 00cc.9406.0061
 0105.0304.0506
```

Display CM description：

```
BT(config-if-cmts-1)# show cable modem 001c.1df5.73c2 remote-query
description
 Description
 BFC cablemodem reference design <<HW_REV: V1.0; VENDOR: Broadcom; BOOTR: 2.4.0;
SW_REV: SC011_Tv_151128; MODEL: BCM93383DCM>>
```

Display CM ds-info：

```
BT(config-if-cmts-1)# show cable modem 001c.1df5.73c2 remote-query ds-info
```

Inner If Index	DS Id	Error Ration(%)	Rate(bps)
3	7	0.0	1397690
48	8	0.0	1399190
49	6	0.0	1401406
50	5	0.0	1401424
51	4	0.0	1404666
52	3	0.0	1404645
53	2	0.0	1402446
54	1	0.0	1402451

Display CM us-info：

```
BT(config-if-cmts-1)# show cable modem 001c.1df5.73c2 remote-query us-info
```

Inner If Index	US Id	Error Ration(%)	Rate(bps)
4	5	0.0	84
80	6	0.0	119
81	7	0.0	129
82	8	0.0	122

Display CM interface-info：

```
BT(config-if-cmts-1)# show cable modem 001c.1df5.73c2 remote-query interface-info
```

Port Id	Description	Status
1	Ethernet CPE Interface	down
2	RF MAC Interface	up
3	RF Downstream Interface 1	up
4	RF Upstream Interface 1	up
5	Software Loopback	up
48	RF Downstream Interface 2	up
49	RF Downstream Interface 3	up
50	RF Downstream Interface 4	up
51	RF Downstream Interface 5	up
52	RF Downstream Interface 6	up
53	RF Downstream Interface 7	up
54	RF Downstream Interface 8	up
80	RF Upstream Interface 2	up
81	RF Upstream Interface 3	up
82	RF Upstream Interface 4	up

Display CM system-info

```
BT(config-if-cmts-1)# show cable modem 001c.1df5.73c2 remote-query system-info
 Mac address          Resets              uptime
 001c.1df5.73c2       65                  2day:11h:18m:33s
```

7.3.7 show cable modem remote-query config

[Command]

show cable modem remote-query config

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

Display the configuration information about remote query function.

[Example]

Display all configuration information about remote query function:

```
BT(config)# show cable modem remote-query config
cmts remote query status:
 Interface    Status      Interval(s)   Src-ip       Community
 C1           enable      5             0.0.0.0      public
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Interface	Local CMTS and upstream channel of CM
Status	Remote Query state
Src-ip	Remote Query source IP address
Interval	Remote Query cycle
Community	Community communication string

7.3.8 show cable modem remote-query filter

[Command]

show cable modem remote-query filter (ds-snr | ds-pwr | us-pwr | ds-mer) (less | greater) *threshold*

[View]

enable view, config view, cmts view

[Parameter]

ds-snr: Downstream SNR

ds-pwr: Downstream receiving level

us-pwr: Upstream transmit level

ds-mer: Downstream modulation error rate

less: Less than the threshold

greater: Greater than the threshold

threshold: Filtering threshold. Type: numerical value; range: N/A

[Description]

This command is used to display the CM information collected through Remote Query by certain filtering conditions.

[Example]

Display the CM information collected through remote query function:

```
BT(config)# show cable modem remote-query filter ds-snr less 40.5
IP address      MAC address    DS_SNR  US_Pwr  DS_Pwr  Micro (dB)  MER   Modem
FetchTime
                               (dB)    (dBmV)  (dBmV)  Reflection  (dB)  Online
Year Mon Day HH:MM:SS
192.168.0.102  0026.5ba6.4789 33.2    35.8    12.9    44          45.4  Y
2019 Jan 01 08:51:52
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
IP address	IP address of CM "—" No IP Address in IPv4 or IPv6 " * " The other IP protocol stack has IP Address 10.106.100.39*: Existing IPv4 and IPv6 addresses when current IPv4 protocol stack. 2001:106::4cf0:7e0d:5dc7:ffb9*: Existing IPv4 and IPv6 addresses when current IPv6 protocol stack.
MAC address	MAC address of CM
DS_SNR (dB)	Downstream SNR of CM, in dB
US_Pwr (dBmV)	Upstream transmit level of CM, in dBmV
DS_Pwr (dBmV)	Downstream transmit level of CM, in dBmV
Micro (dB) Reflection	Micro-reflection of CM
MER (dB)	MER of CM, in dB

Parameter	Description
Modem Online	CM state. whether CM online. Y means yes, and N means no.
FetchTime Year Mon Day HH:MM:SS	Fetch time of CM

7.3.9 show cable modem remote-query ofdm-profile

[Command]

show cable modem (*ipv6-address* | *mac-address*) remote-query ofdm-profile

show cable modem (*ipv4-address*) remote-query ofdm-profile

show cable modem remote-query ofdm-profile

[View]

enable view, config view, cmts view

[Parameter]

ipv6-address：IPv6 address of CM, 32-bit hexadecimal type; range: 0::0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff.

mac-address：MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF.

ipv4-address：IPv4 address of CM, dotted decimal type; range: 0.0.0.0-255.255.255.255.

[Description]

This command displays the codeorders statistics for the OFDM profile.

[Example]

Show the codeorders statistics for the CM OFDM profile.

```
BT(config-if-cmts-1)# show cable modem remote-query ofdm-profile
 CM                  chan       Profile    total      corrected uncorrected
 MAC                 id         id         codewords  codewords codewords
 6477.7d90.3dbc      193        0          2117817    3731      0
                                1          27         1         0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
CM MAC	MAC address of CM
chan id	OFDM downstream channel ID
Profile id	Profile id
Total codewords	The total codeword
Corrected codewords	Error correcting code
Uncorrected codewords	Non error correcting code

7.3.10 show cable modem remote-query verbose

[Command]

show cable modem *(ip-address | mac-address)* **remote-query verbose**

[View]

enable view, config view, cmts view

[Parameter]

ip-address: IP address of CM, dotted decimal type; range: 0.0.0.0-255.255.255.255.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

Display the CM details collected through remote query function (support 3.0 CM).

[Example]

Display the details of CM with IP address as 192.168.0.102, collected through remote query function:

```
BT(config)# show cable modem 192.168.0.102 remote-query verbose
IP Address              : 192.168.0.102
MAC Address             : 0026.5ba6.4789
DataFetch Time          : 2019 Jan 01  08:54:05
M_US_TxPwr(dBmv)        : 35.8
M_DS_RxPwr(dBmv)        : 12.9
M_DS_SNR(dB)            : 33.2
M_MicroReflection(dB)   : 43
M_DS_MER(dB)            : 45.2
S_US_TxPwr(dBmv)        : 35.7(2) 24.9(3)
S_DS_RxPwr(dBmv)        : 12.1(8) 11.6(7) 11.3(6) 11.4(5) 11.6(4) 12.0(3) 12.6(2)
S_DS_SNR(dB)            : 33.1(8) 33.1(7) 33.2(6) 33.2(5) 33.0(4) 33.1(3) 33.1(2)
S_MicroReflection(dB)   : 84(8)   83(7)  85(6)   84(5)  39(4)  34(3)  38(2)
S_DS_MER(dB)            : 45.5(8)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
IP address	IP address of CM "—" No IP Address in IPv4 or IPv6 " * " The other IP protocol stack has IP Address 10.106.100.39*: Existing IPv4 and IPv6 addresses when current IPv4 protocol stack. 2001:106::4cf0:7e0d:5dc7:ffb9*: Existing IPv4 and IPv6 addresses when current IPv6 protocol stack.

Parameter	Description
MAC address	MAC address of CM
DataFetch Time	Online time of CM
M_US_TxPwr(dBmv)	Upstream transmit level of 3.0 CM main channel
M_DS_RxPwr(dBmv)	Downstream receiving level of 3.0 CM main channel
M_DS_SNR(dB)	Downstream SNR of 3.0 CM main channel
M_MicroReflection(dB)	Micro-reflection of 3.0 CM main channel
M_DS_MER(dB)	Downstream modulation error rate of 3.0 CM main channel
S_US_TxPwr(dBmv)	Upstream transmit level of 3.0 CM secondary channel
S_DS_RxPwr(dBmv)	Downstream receiving level of 3.0 CM secondary channel
S_DS_SNR(dB)	Downstream SNR of 3.0 CM secondary channel
S_MicroReflection(dB)	Micro-reflection of 3.0 CM secondary channel
S_DS_MER(dB)	Downstream modulation error rate of 3.0 CM secondary channel

7.4 Cable Access List Management

7.4.1 cable access black-list

[Command]

cable access black-list (enable | disable)

cable access black-list *mac-start* **[***mac-end***]**

no cable access black-list (all | *mac-start***)**

[View]

cmts view

[Parameter]

enable: Enable the black list function

disable: Disable the black list function

all: All the CM

mac-start: Start MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

mac-end: End MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

The command "**cable access black-list (enable | disable)**" is used to enable or disable the black list function. When the black list function is enabled, the MAC addresses of CMs in the black list are not allowed to access to the network. By default, the black list function is disabled.

The command "**cable access black-list** *mac-start* **[***mac-end***]**" is used to add MAC address or MAC address segment of CMs into the black list.

The command "**no cable access black-list (all |** *mac-start***)**" is used to delete all MAC address or start MAC address of CMs in the black list.

[Example]

Enable the black list function:

```
BT(config-if-cmts-1)# cable access black-list enable
BT(config-if-cmts-1)# show running-config verbose | include black-list enable
cable access black-list enable
```

Add CM's MAC address 2476.7d06.bd9a into the black list:

```
BT(config-if-cmts-1)# cable access black-list 2476.7d06.bd9a
BT(config-if-cmts-1)# show cable access black-list
 cable access black-list disable
 cable access black-list 2476.7d06.bd9a
 the total number of CM is 1
!
```

Add a MAC address segment to the black list:

```
BT(config-if-cmts-1)# cable access black-list 4432.c83c.0000 4432.c83c.0009
BT(config-if-cmts-1)# show cable access black-list
 cable access black-list disable
 cable access black-list 2476.7d06.bd9a
 cable access black-list 4432.c83c.0000 4432.c83c.0009
 the total number of CM is 11
!
```

7.4.2 cable access white-list

[Command]

cable access white-list (enable | disable)

cable access white-list *mac-start* [*mac-end*]

no cable access white-list (all | *mac-start***)**

[View]

cmts view

[Parameter]

enable: Enable the white list function

disable: Disable the white list function

all: All the CM

mac-start: Start MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

mac-end: End MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

The command "**cable access white-list (enable | disable)**" is used to enable or disable the white list function. When the white list function is enabled, the MAC addresses of CMs in the white list are allowed to access to the network. By default, the white list function is disabled.

The command "**cable access white-list** *mac-start* [*mac-end*]" is used to add MAC address or MAC address segment of CMs into the white list.

The command "**no cable access white-list (all |** *mac-start*)" is used to delete all MAC address or start MAC address of CMs in the white list.

[Example]

Enable the white list function:

```
BT(config-if-cmts-1)# cable access white-list enable
BT(config-if-cmts-1)# show running-config verbose | include white-list enable
cable access white-list enable
```

Add CM's MAC address 2476.7d06.bd9a into the white list:

```
BT(config-if-cmts-1)# cable access white-list 2476.7d06.bd9a
BT(config-if-cmts-1)# show cable access white-list
 cable access white-list disable
 cable access white-list 2476.7d06.bd9a
 the total number of CM is 1
!
```

Add a MAC address segment to the white list:

```
BT(config-if-cmts-1)# cable access white-list 4432.c83c.0000 4432.c83c.0009
BT(config-if-cmts-1)# show cable access white-list
 cable access white-list disable
 cable access white-list 2476.7d06.bd9a
 cable access white-list 4432.c83c.0000 4432.c83c.0009
 the total number of CM is 11
!
```

7.4.3 show cable access black-list

[Command]

show cable access black-list

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to display the configuration of the black list.

[Example]

Display the configuration of the black list:

```
BT(config-if-cmts-1)# show cable access black list
 cable access black list disable
 cable access black list 2476.7d06.bd9a
 the total number of CM is 1
!
```

7.4.4 show cable access white-list

[Command]

show cable access white-list

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to display the configuration of the white list.

[Example]

Display the configuration of the white list:

```
BT(config-if-cmts-1)# show cable access white-list
 cable access white-list disable
 cable access white-list 2476.7d06.bd9a
 the total number of CM is 1
!
```

7.5 CM Upgrade Management

7.5.1 cable modem auto-upgrade

[Command]

cable modem auto-upgrade *[model-num sw-version filename]*

no cable modem auto-upgrade *[model-num]*

[View]

config view

[Parameter]

model-num: CM number. Type: string; range: 1-32 bytes.

sw-version: CM software version. Type: string; range: 1-32 bytes.

filename: CM filename. Type: string; range: 1-64 bytes.

[Description]

The command "**cable modem auto-upgrade**" is used to enable the CM auto upgrade function.

The command "**no cable modem auto-upgrade**" is used to disable the CM auto upgrade function.

The command "**cable modem auto-upgrade** *model-num sw-version filename*" is used to create and modify the CM upgrade configuration. When the CM upgrade function is enabled, the modem number in the CM as the same as the configuration and the the software version is different from the configuration, the CMTS will trigger this CM to automatically upgrade.

The command "**no cable modem auto-upgrade** *model-num*" is used to delete the configuration of CM auto upgrade.

[Example]

Enable the CM auto upgrade function:

```
BT(config)# cable modem auto-upgrade
```

Note:

In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure.

7.5.2 load cm-class-config

[Command]

load cm-class-config ftp *ip-address username password remote-filename [local-filename]*

load cm-class-config tftp *ip-address remote-filename [local-filename]*

[View]

enable view

[Parameter]

ip-address: FTP/TFTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

username: FTP username. Type: string; range: 1-50 characters.

password: FTP password. Type: string; range: 1-50 characters.

remote-filename: CM configuration file name acquired from FTP/TFTP server. Type: string; range: 1-128 characters.

local-filename: CM configuration file name in the CMTS device. Type: string; range: 1-128 characters.

[Description]

The command "**load cm-class-config ftp**" is used to download the CM configuration file on the FTP server into the CMTS file system.

The command "**load cm-class-config tftp**" is used to download the CM configuration file on the TFTP server into the CMTS file system.

This CM configuration file can be bound in client-class. After the configuration file is bound, the CM within the client-class will use the CM configuration file.

[Example]

Import the CM configuration file on the FTP server into the CMTS file system:

```
BT# load cm-class-config ftp 192.168.1.100 username1 password1 online.cfg
File saved successfully!
```


Note:

1. Before using this command, make sure that the network between the device and the TFTP/FTP server is smooth, and open the TFTP/FTP software;
2. In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure;
3. In case of successful execution of the command, the system will prompt the process of the execution.

7.5.3 load cm-class-image

[Command]

load cm-class-image ftp *ip-address username password remote-filename [local-filename]*

load cm-class-image tftp *ip-address remote-filename [local-filename]*

[View]

enable view

[Parameter]

ip-address: FTP/TFTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

username: FTP username. Type: string; range: 1-50 characters.

password: FTP password. Type: string; range: 1-50 characters.

remote-filename: CM image file name acquired from FTP/TFTP server. Type: string; range: 1-128 characters.

local-filename: CM image file name in the CMTS device. Type: string; range: 1-128 characters.

[Description]

The command "**load cm-class-image ftp**" is used to download the CM image file on the FTP server into the CMTS file system.

The command "**load cm-class-image tftp**" is used to download the CM image file on the TFTP server into the CMTS file system.

[Example]

Import the CM image file on the TFTP server into the CMTS file system:

```
BT# load cm-class-image tftp 192.168.1.100 cm-image
File saved successfully!
```

Note:

1. Before using this command, make sure that the network between the device and the TFTP/FTP server is smooth, and open the TFTP/FTP software.
2. In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure;

3. In case of successful execution of the command, the system will prompt the process of the execution.

7.5.4 load cm-config

[Command]

load (cm-config | cm-3.0-config) ftp *ip-address username password filename*

load (cm-config | cm-3.0-config) tftp *ip-address filename*

[View]

enable view

[Parameter]

cm-config: CM configuration file.

cm-3.0-config: 3.0 CM configuration file.

ip-address: FTP/TFTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

username: FTP username. Type: string; range: 1-50 characters.

password: FTP password. Type: string; range: 1-50 characters.

filename: CM configuration file name acquired from FTP server. Type: string; range: 1-64 characters.

[Description]

The command "**load (cm-config | cm-3.0-config) ftp**" is used to configure the address, username and password of FTP server, and the name of CM configuration file to be acquired from the server, enabling the device to acquire CM configurations from FTP server.

The command "**load (cm-config | cm-3.0-config) tftp**" is used to configure the address, and the name of CM configuration file to be acquired from the server, enabling the device to acquire CM configurations from TFTP server.

[Example]

Import the configuration file "cm-config.cfg" to the device from the FTP server with IP address as 192.168.1.100:

```
BT# load cm-config ftp 192.168.1.100 username1 password1 cm-config.cfg
File saved successfully!
```

Note:

1. The configuration file loaded by the command "**load cm-config**" is saved as cm.cfg. The local provision system uses this configuration file by default.
2. The configuration file loaded by the command "**load cm-3.0-config**" is saved as cm30.cfg. The local provision system uses this configuration file by default when specifying the use of D3.0 configuration file.
3. Before using this command, make sure that the network between the device and the TFTP/FTP server is smooth, and open the TFTP/FTP software.
4. In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure;
5. In case of successful execution of the command, the system will prompt the process of the execution.

7.5.5 remove cm-class-config

[Command]

remove cm-class-config *filename*

[View]

enable view

[Parameter]

filename: CM configuration filename in CMTS. Type: string; range: 1-64 bytes.

[Description]

This command is used to remove the CM configuration filename in CMTS.

[Example]

Remove the CM configuration filename in CMTS:

```
BT# remove cm-class-config online.cfg
```

Note:

In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure:

1. The old file name is too long.
2. The old file name format is invalid.
3. The new file name is too long.

4. The new file name format is invalid.
5. The old file not exist.
6. Rename old-filename failed, the file new-filename already exists.

7.5.6 remove cm-class-image

[Command]

remove cm-class-image *filename*

[View]

enable view

[Parameter]

filename: CM image filename in CMTS. Type: string; range: 1-64 bytes.

[Description]

This command is used to remove the CM image filename in CMTS.

[Example]

Remove the CM image filename in CMTS:

```
BT# remove cm-class-image SC011_Tv_151128.bin
```

Note:

In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure:

1. The file name is too long.
2. The file name format is invalid.
3. The specified file does not exist.
4. Delete file information failed.

7.5.7 rename cm-class-config

[Command]

rename cm-class-config *filename*

[View]

enable view

[Parameter]

filename: CM configuration filename in CMTS. Type: string; range: 1-64 bytes.

[Description]

This command is used to rename the CM configuration filename in CMTS.

[Example]

Rename the CM configuration filename in CMTS:

```
BT# rename cm-class-config online.cfg
```

Note:

In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure:

1. The old file name is too long.
2. The old file name format is invalid.
3. The new file name is too long.
4. The new file name format is invalid.
5. The specified file does not exist.
6. Rename old-filename failed, the file new-filename already exists.

7.5.8 rename cm-class-image

[Command]

rename cm-class-image *filename*

[View]

enable view

[Parameter]

filename: CM image filename in CMTS. Type: string; range: 1-64 bytes.

[Description]

This command is used to rename the CM image filename in CMTS.

[Example]

Rename the CM image filename in CMTS:

```
BT# rename cm-class-image SC011_Tv_151128.bin
```

Note:

In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure:

1. The old file name is too long.
2. The old file name format is invalid.
3. The new file name is too long.
4. The new file name format is invalid.
5. The old file not exist.
6. Rename old-filename failed, the file new-filename already exists.

7.5.9 show cable modem upgrade status

[Command]

show cable modem (all | *mac-address*) upgrade status

[View]

enable view

[Parameter]

all: All CM

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

This command is used to display the last upgrade status of the CM.

[Example]

Display the last upgrade status of the CM:

```
BT# show cable modem all upgrade status
MAC Address      Last-Sw-Vers      Curr-Sw-Vers      Upgrade Status Begin Time
End Time            File Name
001c.1df5.72e1  SC011_Tv_151128  SC011_Tv_151128  success          2019/01/01 04:51
2019/01/01 04:53    SC011_Tv_151128.bin
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
Last-Sw-Vers	The software version before upgrade.
Curr-Sw-Vers	The current software version.
Upgrade Status	The last upgrade status
Begin Time	Begin time of the last upgrade
End Time	End time of the last upgrade
File Name	The CM image file name last used to upgrade

Note:

In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure.

7.5.10 show cable modem version

[Command]

show cable modem version

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the CM number and the software version.

[Example]

Display the CM number and the software version:

```
BT(config)# show cable modem version
MAC Address         Model Number      Software Version
001c.1df5.72e1      BCM93383DCM       SC011_Tv_151128
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
Model Number	Cable modem number.
Software Version	Software version of the CM.

Note:

In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure.

7.5.11 show system file

[Command]

show system file

[View]

enable view

[Parameter]

N/A

[Description]

This command is used to display the CM file download to the CMTS file system. including CM image file and the CM configuration file.

[Example]

Display the CM file download to the CMTS file system:

```
BT# show        system file
File Type           Size        Date            File Name
cm-class-image      7249024     Jan 01 2019     dolmgmt.bin
                    7249024     Jan 01 2019     cc8800v1.2.3.8.bin
cm-class-config     637         Jan 01 2019     12016.cfg
                    234         Jan 01 2019     online-staticip.cfg
File total size: 14498919B(14160KB)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
File Type	CM file type. Including cm image and cm config
Size	File size. In bytes
Date	Date of the file saved
File Name	File name.
File total size	File total size.

7.5.12 upgrade cable modem

[Command]

upgrade cable modem *mac-address filename*

[View]

config view

[Parameter]

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

filename: CM image filename. Type: string; range: 1-64 bytes.

[Description]

This command is used to upgrade the single CM.

[Example]

Upgrade the single CM:

```
BT# upgrade cable modem 001c.1df5.72e1 SC011_Tv_151128.bin
```

Note:

In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure.

7.5.13 upload cm-class-config

[Command]

upload cm-class-config *local-filename* **ftp** *ip-address username password [remote-filename]*

upload cm-class-config *local-filename* **tftp** *ip-address [remote-filename]*

[View]

enable view

[Parameter]

ip-address: FTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

username: FTP username. Type: string; range: no limit.

password: FTP password. Type: string; range: no limit.

remote-filename: CM image file name acquired from FTP/TFTP server. Type: string; range: 1-128 characters.

local-filename: CM image file name in the CMTS device. Type: string; range: 1-128 characters.

[Description]

The command "**upload cm-class-config ftp**" is used to upload the CM configuration file to the FTP server from the CMTS file system.

The command "**upload cm-class-config tftp**" is used to upload the CM configuration file to the TFTP server from the CMTS file system.

[Example]

Upload the CM configurations on the device to the FTP server with IP address as 192.168.1.100, and rename the modem.cfg as online.cfg:

```
BT# upload cm-class-config modem.cfg ftp 192.168.1.100 username1 password1
online.cfg
```

Upload the CM configurations on the device to the TFTP server with IP address as 192.168.1.100, and rename the modem.cfg as online.cfg:

```
BT# upload cm-class-config modem.cfg tftp 192.168.1.100 online.cfg
```

Note:

1. In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure;
2. In case of successful execution of the command, the system will prompt the process of the execution.

7.5.14 upload cm-class-image

[Command]

upload cm-class-image *local-filename* **ftp** *ip-address username password [remote-filename]*

upload cm-class-image *local-filename* **tftp** *ip-address [remote-filename]*

[View]

enable view

[Parameter]

ip-address: FTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

username: FTP username. Type: string; range: no limit.

password: FTP password. Type: string; range: no limit.

remote-filename: CM image file name acquired from FTP/TFTP server. Type: string; range: 1-128 characters.

local-filename: CM image file name in the CMTS device. Type: string; range: 1-128 characters.

[Description]

The command "**upload cm-class-image ftp**" is used to upload the CM image file to the FTP server from the CMTS file system.

The command "**upload cm-class-image tftp**" is used to upload the CM image file to the TFTP server from the CMTS file system.

[Example]

Upload the CM image file on the device to the FTP server with IP address as 192.168.1.100:

```
BT# upload cm-class-image SC011_Tv_151128.bin ftp 192.168.1.100 testname
testpassword SC011_Tv_151128.bin
File saved to /app/cmImage/cm-image.bin
```

Note:

Before using the command, please ensure that the network between the device and FTP server is unblocked, and open the FTP software;

If the command fails to execute, the system will provide relevant prompt according to the failure reason;

1. Bad IP address!
2. The local file name is too long.
3. The local file name format is invalid.
4. The remote file name is too long.
5. The remote file name format is invalid.
6. The local file not exist.

7.5.15 upload cm-config

[Command]

upload (cm-config | cm-3.0-config) ftp *ip-address username password filename*

upload (cm-config | cm-3.0-config) tftp *ip-address filename*

[View]

enable view

[Parameter]

cm-config: CM configuration file.

cm-3.0-config: 3.0 CM configuration file.

ip-address: TFTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

filename: Name of CM configuration file to be uploaded to the TFTP server. Type: string; range: 1-64 characters.

[Description]

The command "**upload (cm-config | cm-3.0-config) ftp**" is used to upload the CM configurations on CMTS to the FTP server.

The command "**upload (cm-config | cm-3.0-config) tftp**" is used to upload the CM configurations on CMTS to the TFTP server.

[Example]

Upload the CM configurations on the device to the TFTP server with IP address as 192.168.1.100:

```
BT# upload cm-config ftp 192.168.1.100 username1 password1 cm-config.cfg
```

Note:

1. Before using this command, make sure that the network between the device and the TFTP/FTP server is smooth, and open the TFTP/FTP software.
2. In case of unsuccessful execution of the command, the system will give relevant prompts based on the reasons for the failure;
3. In case of successful execution of the command, the system will prompt the process of the execution.

7.6 CPE Management

7.6.1 auto-delete offline-cm cpe

[Command]

auto-delete offline-cm cpe

no auto-delete offline-cm cpe

[View]

config view

[Parameter]

N/A

[Description]

The command "**auto-delete offline-cm cpe**" is used to configure to delete the CPE entry after the CM offline automatically. By default, the auto delete CPE function is enabled.

The command "**no auto-delete offline-cm cpe**" is used to configure to retain the CPE entry after the CM offline.

[Example]

Delete the CPE entry after the CM offline:

```
BT(config)# auto-delete offline-cm cpe
BT(config)# show cpe all
CPE MAC        CMC Index  CM MAC          CPE IP Address Dual IP CPE Type Lease
Time Learned
0000.9463.0201 C1         0025.f1fd.9463  20.99.2.11     Y       Host     10800s
N
0000.9463.0201 C1         0025.f1fd.9463  2000:6300::201 Y       Host     10800s
N
Host IP count             :    2(IPv4:   1, IPv6:   1)
MTA IP count              :    0(IPv4:   0, IPv6:   0)
STB IP count              :    0(IPv4:   0, IPv6:   0)
Extension device IP count :    0(IPv4:   0, IPv6:   0)
Other device IP count     :    0(IPv4:   0, IPv6:   0)
Total IP count            :    2(IPv4:   1, IPv6:   1)
BT(config)# clear cable modem 0025.f1fd.9463 reset
BT(config)# show cable modem
MAC Address    IP Address I/F   MAC     Primary RxPwr  Timing  Number BPI    Online
                                State   Sid     (dBmV)  Offset CPE    Enabled Time
0025.f1fd.9463 --         C1/U1 offline  1       6.0     0      0      no     0d0h0m
BT(config)# show cable modem
MAC Address    IP Address    I/F   MAC     Primary RxPwr  Timing Number BPI    Online
                               State   Sid     (dBmV) Offset CPE    Enabled Time
0025.f1fd.9463 172.16.10.10 C1/U1 online 1       6.0    948    0      no     0d0h0m
   BT(config)# show cpe     all
CPE MAC  CMC Index  CM MAC  CPE IP Address  Dual IP  CPE Type  Lease Time  Learned
```

7.6.2 clear cpe

[Command]

clear cpe *mac-address*

[View]

config view, cmts view

[Parameter]

mac-address: MAC address of CPE, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

This command is used to delete the information of CPE.

[Example]

Delete the information of online CPE:

```
BT(config)# show cpe all
MAC            CMC Index CM MAC         CPE IP Address          Dual IP CPE Type Lease
Time
60eb.69e2.d21d C1        4a8.0fa9.607c  10.10.28.239            N       Host    604800s
0003.c83c.88e5 C1        4432.c83c.88e5 2000::1:2303:6789:abcc N       Host    600000s
Host count             :    2
MTA count              :    0
STB count              :    0
Extension device count :    0
IAPD count             :    0
Total count            :    2
BT(config)# clear cpe 60eb.69e2.d21d
BT(config)# show cpe all
MAC             CMC Index  CM MAC          CPE IP Address          Dual IP  CPE Type
Lease Time
0003.c83c.88e5  C1         4432.c83c.88e5  2000::1:2303:6789:abcc  N        Host
600000s
Host count             :    1
MTA count              :    0
STB count              :    0
Extension device count :    0
IAPD count             :    0
Total count            :    1
```

7.6.3 show cable modem cpe

[Command]

show cable modem (*ipv6-address* | *mac-address*) cpe

show cable modem *ipv4-address* cpe [vlan (untag | *vlan-id*)]

[View]

enable view, config view, cmts view

[Parameter]

untag: VLAN as untag

ipv4-address: IPv4 address of management port, dotted decimal type; range: 0.0.0.0-255.255.255.255; default: 192.168.0.10.

ipv6-address: IPv6 address of management port, 32-bit hexadecimal type; range: 0::0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

This command is used to display the information of online CPE under some a CM.

[Example]

Display the CPE information under the specified CM in the config view.:

```
BT(config)# show cable modem 0011.e6cb.1cc1 cpe
MAC             CMC Index  CM MAC     IP Address     Dual IP   CPE Type    Lease Time
60eb.69e2.d21d C1     0011.e6cb.1cc1  10.10.28.120   N          Host       86400s
Host count             :    1
MTA count              :    0
STB count              :    0
Extension device count :    0
IAPD count             :    0
Total count            :    1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC	MAC address of CPE
CMC Index	CMTS registration ID
CM MAC	MAC address of CM
IP Address	IP address of CPE

Parameter	Description
Dual IP	Whether to support dual IP. Y means yes; N means no.
CPE Type	CPE type, including : host, mta, stb, device (user-defined device)
Lease Time	DHCP lease of CPE
Host count	Nuber of host
MTA count	Nuber of MTA
STB count	Nuber of STB
Extension device count	Nuber of user-defined device
IAPD count	Nuber of tatal identity association for prefix delegation
Total count	Nuber of tatal CPE

7.6.4 show cpe all

[Command]

show cpe all

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the information of all CPEs.

[Example]

View all CPEs:

```
BT(config)# show cpe all
CPE MAC          CMC Index  CM MAC          CPE IP Address Dual IP CPE Type
Lease Time   Learned
0000.9463.0201  C1         0025.f1fd.9463  20.99.2.11      Y        Host
10800s       N
0000.9463.0201  C1         0025.f1fd.9463  2000:6300::201  Y        Host
10800s       N
Host IP count             :    2(IPv4:   1, IPv6:   1)
MTA IP count              :    0(IPv4:   0, IPv6:   0)
STB IP count              :    0(IPv4:   0, IPv6:   0)
Extension device IP count :    0(IPv4:   0, IPv6:   0)
Other device IP count     :    0(IPv4:   0, IPv6:   0)
Total IP count            :    2(IPv4:   1, IPv6:   1)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
CPE MAC	MAC address of CPE
CMC Index	Port number of CMTS device
CM MAC	MAC address of CM to which CPE belongs
IP Address	IP address of CPE
Dual IP	Whether to support dual IP. Y means yes; N means no.
CPE Type	Type of CPE, supporting PC, STB, MTA and user-defined device
Lease Time	Lease time of IP address of CPE
Learned	Whether the CPE's IP address is obtained through learning
Host IP count	Nuber of host
MTA IP count	Nuber of MTA
STB IP count	Nuber of STB
Extension device IP count	Nuber of user-defined device
Other device IP count	Nuber of other device
Total IP count	Nuber of tatal CPE

7.6.5 show cpe dynamic

[Command]

show cpe dynamic (ipv4 | ipv6)

[View]

enable view, config view, cmts view

[Parameter]

ipv4: IPv4 network

ipv6: IPv6 network

[Description]

This command is used to display the information of IPv4/IPv6 CPE online through the provision.

[Example]

View the information of IPv4 CPE online through the provision:

```
BT(config)# show cpe dynamic ipv4
CPE MAC         CMC Index CM MAC          CPE IP Address Dual IP CPE Type    Lease Time
c85b.76ff.8134 C1         28be.9bfe.ad04 12.12.12.3     N       Host        864000s
Host IP count              :    1
MTA IP count               :    0
STB IP count               :    0
Extension device IP count :    0
Total IP count             :    1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
CPE MAC	MAC address of CPE
CMC Index	CMTS registration ID
CM MAC	MAC address of CM to which CPE belongs
CPE IP Address	The IP address of CPE
Dual IP	Whether to support dual IP. Y means yes; N means no.
CPE Type	CPE type, including : host, mta, stb, device (user-defined device)
Lease Time	Lease time of IP address of CPE

7.6.6 show cpe dynamic ipv6 prefix

[Command]

show cpe dynamic ipv6 prefix

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display prefix information obtained by the PD..

[Example]

View all prefixes retrieved by PDs.:

```
BT(config)# show cpe dynamic ipv6 prefix
MAC             CMC Index  CM MAC          IPv6 Prefix          Dual IP  Lease Time
0002.c83c.88e5  C1         4432.c83c.88e5  2000::1:2301:0:0/96  N        6000000s
0000.c83c.88e5  C1         4432.c83c.88e5  2000::1:2345:0:0/96  N        6000000s
Total IAPD  :    2
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC	MAC address of CPE
CMC Index	CMTS registration ID
CM MAC	MAC address of CM to which PD belongs
IPv6 Prefix	the information of IPv6 prefix of PD
Dual IP	Whether to support dual IP. Y means yes; N means no.
CPE Type	Type of CPE, supporting PC, STB, MTA and user-defined device
Lease Time	Lease time of IP address of CPE

7.6.7 show cpe ip

[Command]

show cpe *ipv6-address*

show cpe *ipv4-address* **[vlan (untag |** *vlan-id***)]**

[View]

enable view, config view, cmts view

[Parameter]

untag: VLAN as untag

ipv4-address: IPv4 address of management port, dotted decimal type; range: 0.0.0.0-255.255.255.255; default: 192.168.0.10.

ipv6-address: IPv6 address of management port, 32-bit hexadecimal type; range: 0::0-ffff:ffff:ffff:ffff::ffff:ffff:ffff:ffff.

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

This command is used to display the information of CPE with IP address specified.

[Example]

View CPEs which IP address as 10.10.28.239:

```
BT(config)# show cpe 10.10.28.239
CPE MAC          CMC Index  CM MAC          CPE IP Address Dual IP CPE Type
Lease Time   Learned
0000.9463.0201  C1         0025.f1fd.9463  10.10.28.239    N        Host
10800s       N
Host IP count             :    1(IPv4:   1, IPv6:   0)
MTA IP count              :    0(IPv4:   0, IPv6:   0)
STB IP count              :    0(IPv4:   0, IPv6:   0)
Extension device IP count :    0(IPv4:   0, IPv6:   0)
Other device IP count     :    0(I Pv4:   0, IPv6:   0)
Total IP count            :    1(IPv4:   1, IPv6:   0)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
CPE MAC	MAC address of CPE
CMC Index	CMTS registration ID
CM MAC	MAC address of CM to which PE belongs

Parameter	Description
IP Address	IP address of CPE
Dual IP	Whether to support dual IP. Y means yes; N means no.
CPE Type	Type of CPE, supporting PC, STB, MTA and user-defined device
Lease Time	Lease time of IP address of CPE
Learned	Whether the CPE's IP address is obtained through learning
Host IP count	Nuber of host
MTA IP count	Nuber of MTA
STB IP count	Nuber of STB
Extension device IP count	Nuber of user-defined device
Other device IP count	Nuber of other device
Total IP count	Nuber of tatal CPE

7.6.8 show cpe mac

[Command]

show cpe mac *mac-address*

[View]

enable view, config view, cmts view

[Parameter]

mac-address : MAC address of CPE, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

This command is used to display the information of CPE with MAC address specified.

[Example]

View the CPE information with MAC address 0000.9463.0201:

```
BT(config)# show cpe mac 0000.9463.0201
CPE MAC         CMC Index  CM MAC          CPE IP Address Dual IP CPE Type
Lease Time   Learned
0000.9463.0201  C1         0025.f1fd.9463  20.99.2.11      Y        Host
10800s       N
0000.9463.0201  C1         0025.f1fd.9463  2000:6300::201  Y        Host
10800s       N
Host IP count             :    2(IPv4:   1, IPv6:   1)
MTA IP count              :    0(IPv4:   0, IPv6:   0)
STB IP count              :    0(IPv4:   0, IPv6:   0)
Extension device IP count :    0(IPv4:   0, IPv6:   0)
Other device IP count     :    0(IPv4:   0, IPv6:   0)
Total IP count            :    2(IPv4:   1, IPv6:   1)
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
CPE MAC	MAC address of CPE
CMC Index	CMTS registration ID
CM MAC	MAC address of CM to which CPE belongs
IP Address	IP address of CPE
Dual IP	Identifies whether the CPE supports dual IP
CPE Type	Type of CPE, supporting PC, STB, MTA and user-defined device
Lease Time	Lease time of IP address of CPE
Learned	Whether the CPE's IP address is obtained through learning
Host IP count	Nuber of host
MTA IP count	Nuber of MTA
STB IP count	Nuber of STB
Extension device IP count	Nuber of user-defined device
Other device IP count	Nuber of other device
Total IP count	Nuber of tatal CPE

7.6.9 show cpe summary

[Command]

show cpe summary

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the number of online CPE of all types.

[Example]

Display the number of online CPE of all types in the config view:

```
BT(config)# show cpe summary
CMC Index     Host     MTA     STB     Extension Device   IAPD
C1            1        0       0       0                  0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
CMC Index	Local CMTS of CM
host	CPE type as host

Parameter	Description
mta	CPE type as mta
stb	CPE type as stb
extension device	CPE type as extension device
IAPD	CPE type as Identity Association for Prefix Delegation

7.6.10 show cpe vlan

[Command]

show cpe vlan (all | untag | *vlan-id***)**

[View]

enable view, config view, cmts view

[Parameter]

all: All VLAN

untag: VLAN as untag

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

This command is used to display the VLAN information of CPEs.

[Example]

View VLAN information of all CPEs:

```
BT(config)# show cpe all
CPE IP Address      VLAN      CPE MAC           CMC Index CM MAC
10.10.28.239        100       60eb.69e2.d21d    1           a4a8.0fa9.607c
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
CPE IP Address	IP address of CPE
VLAN	VLAN information
CPE MAC	MAC address of CPE
CMC Index	CMTS registration ID
CM MAC	MAC address of CM to which CPE belongs

Chapter 8 Load Balance Configuration

8.1 Conventional Load Balance

8.1.1 cable load-balance

[Command]

cable load-balance (enable | disable)

[View]

config view

[Parameter]

enable: Enable the load balance

disable: Disable the load balance

[Description]

This command is used to enable or disable the load balance function. By default, the load balance function is enabled.

[Example]

Enable the load balance function of CMTS:

```
BT(config)# cable load-balance enable
BT(config)# show running-config verbose | include load-balance enable
 cable load-balance enable
```

8.1.2 cable load-balance exclude modem

[Command]

cable load-balance exclude modem [*index***] mac** *mac-address* **[***mac-mask***]**

no cable load-balance exclude modem (all | *index-list***)**

[View]

cmts view

[Parameter]

all: All CMs in the load-balance group

index: CM index, type: numerical value; range: 1-1000.

index-list : CM index list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-1001. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF

mac-mask: MAC mask, with format as AA:BB:CC:DD:EE:FF; default: FFFF.FFFF.FFFF

[Description]

The command "**cable load-balance exclude cm**" is used to add the CM to the load-balance exception list. CM in the exception list will be exempted from load balance. Each CMTS allows adding at most 32 MACRange. You can view the configuration information of load-balance exception list with command "**show cable load-balance exclude active cm**".

The command "**no cable load-balance exclude cm** *mac-start mac-end*" is used to delete the CM from the load-balance exception list. After deleting a MACRange, CM with the MACRangewill continue the load balance.

The command "**no cable load-balance exclude cm all**" is used to delete all the CM from the load-balance exception list. After finishing the configuration, all CM will begin load balance.

[Example]

Add MACRange a4a7.0fa9.607c to the load-balance exception list:

```
BT(config-if-cmts-1)# cable load-balance exclude modem mac a4a7.0fa9.607c
BT(config-if-cmts-1)# show running-config verbose | include exclude cable load-
balance exclude modem 1 mac a4a7.0fa9.607c ffff.ffff.ffff
```

8.1.3 cable load-balance interval

[Command]

cable load-balance interval *interval*

[View]

cmts view

[Parameter]

interval : time interval for the load balance to move the same CM, in second. Type: numerical value; range: 0-3600; default: 240s.

[Description]

This command is used to configure the time interval for the load balance to move the same CM.

[Example]

Configure the time interval for load balance of CMTS to move the same CM as 100s:

```
BT(config-if-cmts-1)# cable load-balance interval 100
BT(config-if-cmts-1)# show running-config verbose | include balance interval
 cable load-balance interval 100
```

8.1.4 cable load-balance method

[Command]

cable load-balance method (utilization | service-flows | modem)

cable load-balance method upstream (utilization | service-flows | modem) downstream (utilization | service-flows | modem)

[View]

cmts view

[Parameter]

utilization: Real-time flow based load balance

service-flow: Active service flow based load balance

modem: CM number based load balance

[Description]

The command "**cable load-balance method (utilization | service-flows | modem)**" is used to configure the load balance method. The selected method will be applied to both upstream and downstream. The default is utilization.

The command "**cable load-balance method upstream (utilization | service-flows | modem) downstream (utilization | service-flows | modem)**" is used to configure the load balance method of the downstream and the upstream. This command allows to set a different load balance method for the upstream and downstream.

[Example]

Configure the load balance mode of CMTS as real-time statistics-based load balance:

```
BT(config-if-cmts-1)# cable load-balance method utilization
BT(config-if-cmts-1)# show running-config verbose | include method
 cable load-balance method upstream utilization downstream utilization
```

8.1.5 cable load-balance modem-moved

[Command]

cable load-balance modem-moved *modem-num*

[View]

cmts view

[Parameter]

modem-num: Maximum number of CM that the load balance can move each time. Type: numerical value; range: 1-1000; default: 16

[Description]

This command is used to configure the maximum number of CM that the load balance can move each time.

[Example]

Configure the maximum number of CM that the load balance can move each time as 10:

```
BT(config-if-cmts-1)# cable load-balance modem-moved 10
BT(config-if-cmts-1)# show running-config verbose | include modem-moved
 cable load-balance modem-moved 10
```

8.1.6 cable load-balance number

[Command]

cable load-balance number (1 | 2 | 4)

[View]

cmts view

[Parameter]

1 | 2 | 4: Number of periods for real-time statistics collection. Type: numerical value; range: 1, 2, 4; default: 4

[Description]

This command is used to configure the number of intervals for real-time statistics collection.

[Example]

Configure the number of CMTS real-time statistics collection period as 4:

```
BT(config-if-cmts-1)# cable load-balance number 4
BT(config-if-cmts-1)# show running-config verbose | include number
 cable load-balance number 4
```

8.1.7 cable load-balance period

[Command]

cable load-balance period *period*

[View]

cmts view

[Parameter]

period: Period for real-time statistics collection, in seconds. Type: numerical value; range: 60-3600; default: 60

[Description]

This command is used to configure the period of real-time statistics collection.

[Example]

Configure the period for CMTS real-time statistics collection as 60 s:

```
BT(config-if-cmts-1)# cable load-balance period 60
BT(config-if-cmts-1)# show running-config verbose | include period
 cable load-balance period 60
```

8.1.8 cable load-balance policy rule

[Command]

cable load-balance policy *policy-id* **rule** *rule-id*

no cable load-balance policy *policy-id* **rule** *rule-id*

no cable load-balance policy *policy-list*

[View]

config view

[Parameter]

policy-id: policy ID. Type: numerical value; range: 1-200

rule-id: rule ID . Type: numerical value; range: 1-100

policy-list: policy ID list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-200. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

[Description]

The command "**cable load-balance policy rule**" is used to Create load balancing policies and add rules and policy associations for load balancing. Before configuration, it requires configuring the load-balance rules first, refer to the section of command "**cable load-balance rule**".

The command "**no cable load-balance policy rule**" is used to delete the relevancy between load-balance policy and rule.

The command "**no cable load-balance policy**" is used to delete one or more policies while deleting the association of the policy with all rules.

[Example]

Configure the rule with rule ID as 10 to the policy with policy ID as 1:

```
BT(config)# cable load-balance policy 1 rule 10
BT(config)# show running-config | include policycable
load-balance policy 1 rule 10
```

8.1.9 cable load-balance ranging-override

[Command]

cable load-balance ranging-override (enable | disable)

[View]

cmts view

[Parameter]

enable: Enable the channel override against RNG-RSP message

disable: Disable the channel override against RNG-RSP message

[Description]

This command is used to configure enabling or disabling the function of channel override against RNG-RSP message. By default, the function is enabled.

[Example]

Enable the channel override against RNG-RSP message of CMTS device:

```
BT(config-if-cmts-1)# cable load-balance ranging-override enable
BT(config-if-cmts-1)# show running-config verbose | include ranging-override
 cable load-balance ranging-override enable
```

8.1.10 cable load-balance rule

[Command]

cable load-balance rule *rule-id* **(enable | disable)**

cable load-balance rule *rule-id* **disable-period dis-start** *dis-start* **dis-end** *dis-end*

no cable load-balance rule *rule-list*

[View]

config view

[Parameter]

enable: Enable the rule

disable: Disable the rule

rule-id: rule ID . Type: numerical value; range: 1-100

rule-list: rule ID list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-100. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

dis-start: Start time for period disabled, with format as HH:MM:SS

dis-end: End time for period disabled, with format as HH:MM:SS

Requirements on parameter configuration: The start time shall be less than the end time, which means that the load-balance rule is disabled from the start time to the end time each day; the start time is equal to the end time, which means that the load-balance rule is entirely not disabled; the start time is greater than the end time, which means that the load-balance rule is disabled from the start time of the first day to the end time of the second day.

[Description]

cable load-balance rule (enable | disable): This command is used to add the load-balance rule and configure whether to enable it. If the rule has already existed, just configure whether to enable the rule.

cable load-balance rule disable-period: This command is used to configure the period of load-balance disabled.

no cable load-balance rule: This command is used to delete the load-balance rule.

[Example]

Configure the rule 100 disable between 10:00:00 and 17:00:00 every day:

```
BT(config)# cable load-balance rule 100 disable-period dis-start 10:00:00 dis-end
17:00:00
BT(config)# show running-config verbose | include rule 100
 cable load-balance rule 100 disable-period dis-start 10:00:00 dis-end 17:00:00
```

Delete the rule 10,99-100:

```
BT(config)# show running-config verbose | include rule
 cable load-balance rule 10 enable
 cable load-balance rule 99 enable
```

```
 cable load-balance rule 100 disable-period dis-start 10:00:00 dis-end 17:00:00
BT(config)# no cable load-balance rule 10,99-100
BT(config)# show running-config verbose | include rule
BT(config)#
```

8.1.11 cable load-balance system threshold

[Command]

cable load-balance system threshold *threshold-low threshold-high*

[View]

cmts view

[Parameter]

threshold-low: threshold for low-traffic mode of the system in percentage. Type: numerical value; range: 0-99; default: 0

threshold-high: threshold for high-traffic mode of the system in percentage. Type: numerical value; range: 0-100; default: 0

[Description]

This command is used to configure the traffic threshold of the system. When the load-balance mode is “utilization” and the system utilization exceeds the threshold for high-traffic mode, CMTS will perform the real-time traffic statistics-based load balance; in other cases, it just performs the active service flow -based load balance. *threshold-low* cannot be greater than *threshold-high*.

[Example]

Set the threshold for low-traffic mode of the load-balance system as 5% and the threshold for high-traffic mode as 50%:

```
BT(config-if-cmts-1)# cable load-balance system threshold 5 50
BT(config-if-cmts-1)# show running-config verbose | include system threshold
 cable load-balance system threshold 5 50
```

8.1.12 cable load-balance threshold load minimum

[Command]

cable load-balance threshold load minimum *num*

[View]

cmts view

[Parameter]

num: The maximum difference value (CM number based CM load balance or service flow number based active service flow load balance) allowed between channels, numerical value; range: 1-100; default: 5

[Description]

This command is used to configure the maximum difference value allowed between channels. When the CM number or service flow number exceeds the value, the CMTS device will begin load balance. This command does not apply to real-time load balancing.

[Example]

The maximum CM number allowed as 10, load balancing exceeds this value:

```
BT(config-if-cmts-1)# cable load-balance method modem BT(config-if-cmts-
1)# cable load-balance threshold load minimum 10BT(config-if-cmts-1)# show
running-config | include minimum
 cable load-balance threshold load minimum 10
```

8.1.13 cable load-balance threshold trigger diff

[Command]

cable load-balance threshold trigger *trigger* **diff** *diff*

[View]

cmts view

[Parameter]

trigger: Channel overload threshold represented in channel utilization. Type: numerical value; range: 1-100; default: 75

diff: Mobile CM threshold represented in channel utilization difference. Type: numerical value; range: 1-100, not exceeding the trigger value; default: 15

[Description]

This command is used to configure the overload threshold of load balance and mobile CM threshold represented in channel utilization difference.

[Example]

Configure the channel overload threshold of CMTS as 70% of the channel utilization, and the difference threshold of mobile CM as 10%:

```
BT(config-if-cmts-1)# cable load-balance threshold trigger 70 diff 10
BT(config-if-cmts-1)# show running-config verbose | include threshold trigger
 cable load-balance threshold trigger 70 diff 10
```

8.1.14 show cable load-balance dynamic

[Command]

show cable load-balance dynamic

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the history of dynamic load balancing moved CM , maximum 100 records.

[Example]

Display the history of dynamic load balancing moved CM:

```
BT(config-if-cmts-1)# show cable load-balance dynamic
Mac Address     Upstream    Downstream      Initialize          Message Result     Time
                Channel(s)  Channel(s)      Technique           Type
4432.c83c.868f 2-5 -> 4-7 17-24 -> 17-24 direct(SC-QAM)/--- dbc      success    2019-
03-27 08:46:10
4432.c83c.87bb 4-7 -> 1-4 25-32 -> 25-32 direct(SC-QAM)/--- dbc      success    2019-
03-27 08:46:10
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of CM
Upstream Channel(s)	Mobile recording of upstream channel
Downstream Channel(s)	Mobile recording of downstream channel
Initialize Technique	initialization technique of mobile channel
Message Type	Message type
Result	The results of dynamic load balancing occurs
Time	The time of dynamic load balancing occurs

8.1.15 show cable load-balance exclude active cm

[Command]

show cable load-balance exclude active cm

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the CM excluded by the load balance. For configuration of the exception list, refer to the section for command "**cable load-balance exclude cm**".

[Example]

Display the CM in the load-balance exception list:

```
BT(config-if-cmts-1)# show cable load-balance exclude active cm
I/F      CM ID       CM MAC
C1       1           0024.6800.0005
Total CMs : 1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
I/F	CMTS ID
CM ID	CM ID
CM MAC	MAC address of CM
Total CMs	Number of active CM excluded by the load balance

8.1.16 show cable load-balance load

[Command]

show cable load-balance load

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the channel load of load balance.

Note:

The capacity and load calculation of load balancing are described as follows:

1. The upstream capacity is calculated according to the occupied physical bandwidth, including the bandwidth occupied by DOCSIS overhead (mainly FEC header), which is not effective bandwidth. For SC channel, the upstream physical bandwidth is about 30.72 Mbps, the effective bandwidth is about 27 Mbps, the downstream physical bandwidth is about 42.88 Mbps, the effective bandwidth is about 38 Mbps, the European standard physical bandwidth is about 55.62 Mbps, and the effective bandwidth is about 50 Mbps. The proportion of upstream packets DOCSIS overhead is larger and the proportion of effective bandwidth is smaller. Downstream capacity refers to the effective bandwidth of the channel.
2. The load of load balancing refers to the bandwidth occupied by the channel, not the bandwidth of the flow passing through. The upstream is calculated according to grant. As long as the bandwidth has grant, whether CM does not send out packets or wrong packets, it will occupy the bandwidth, and it will be calculated as the load.

[Example]

Display the upstream/downstream channel load of current load-balance group:

```
BT (config-if-cmts-1)# show cable load-balance load
 Upstream  Capacity(Kbps) DynamicLoad(Kbps) Loaded%  StaticLoad(Kbps)  Modems  Flows
 1         5120           0                 0        50                1       1
 2         5120           0                 0        250               3       3
  --------  -------------  ------------          ------
 Total      10240            0                     0
Downstream Capacity(Kbps) DynamicLoad(Kbps) Loaded%  StaticLoad(Kbps) Modems  Flows
 1         51253          383               1        113              2       2
 2         51253          383               1        13               1       1
 3         51253          383               1        113              2       2
 4         51253          383               1        13               1       1
 5         51253          383               1        13               1       1
 6         51253          383               1        13               1       1
 7         51253          383               1        13               1       1
 8         51253          383               1        13               1       1
 9         51253          383               1        0                0       0
 10        51253          383               1        0                0       0
 11        51253          383               1        0                0       0
 12        51253          383               1        0                0       0
 13        51253          383               1        0                0       0
 14        51253          383               1        0                0       0
 15        51253          383               1        0                0       0
 16        51253          383               1        0                0       0
 --------  --------------  ------------          ------
 Total     820048         6128              1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Upstream	Upstream channel ID
Downstream	Downstream channel ID
Capacity(Kbps)	Channel capacity, in Kbps
DynamicLoad/Static Load (Kbps)	Channel dynamic load or static load, in Kbps
Static Load(Kbps)	Channel static load or static load, in Kbps
Loaded%	Channel load percentage
Modems	The number of the CM on the channel
Flows	The number of active service flow on the channel
Total	Statistics respectively the sum channel capacity, the sum channel dynamic load, the total dynamic load and percentage of the sum channel capacity.

Note:

The command will only display the load of the enabled channels . To enable or disable a channel, refer to the command "**cable downstream shutdown**" and "**cable upstream shutdown**".

8.1.17 show cable load-balance policy

[Command]

show cable load-balance policy

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display the load-balance policy.

[Example]

Display the load-balance policy:

```
BT(config)# show cable load-balance policy
cable load-balance policy 1 rule 100
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
cable load-balance policy X rule Y	State of load balance policy

Note:

This command echo only display the channel which enabled. For enable or disable the channels, refer to the command "**cable downstream shutdown**" and "**cable upstream shutdown**".

8.1.18 show cable load-balance rule

[Command]

show cable load-balance rule

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display the rule for configuring the load balance.

[Example]

Display the load-balance rule:

```
BT(config)# show cable load-balance rule
cable load-balance rule 100 enable
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
cable load-balance rule 100 enable	Configuration of load-balance rule

8.1.19 show cable load-balance running-config

[Command]

show cable load-balance running-config

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display the current configuration of load balancing.

[Example]

Display the current configuration:

```
BT(config)# show cable load-balance running-config
cable load-balance disable
 cable load-balance general group default enable
 no cable load-balance general group default policy
 cable load-balance general group default init-tech 0,1,2,3,4
```

8.1.20 show cable load-balance statistics

[Command]

show cable load-balance statistics

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to display statistics of RMD load balancing mobile records.

[Example]

View CMTS device load balancing mobile record statistics:

```
BT(config)#show cable load-balance statistics
Index        State       Transfers
                         Complete          Pending    Failures
1            enable       150              0          0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Index	Index ID of CMTS
state	The state of CMTS, the possible values are: Enable: Dynamic load balancing enable state Disabled: Load balancing disable state
Transfers	Load balancing mobile record statistics: Complete: Number of successful mobile results during load balancing Pending: Load Balancing Mobile Incomplete Count

Parameter	Description
	Failures: Number of mobile failures during load balancing

8.2 General Load-balance Group

8.2.1 cable load-balance general group

[Command]

cable load-balance general group (disable | enable)

[View]

configview

[Parameter]

enable: Enable the load balance of general group

disable: Disable the load balance of general group

[Description]

This command is used to enable or disable the load balance of general group. If the CMTS general load balance group switch and the default general load-balance group do not have the same switching behavior, the CMTS uses its own switching behavior.

[Example]

Disable the general load-balance group:

```
BT(config-if-cmts-1)# cable load-balance general group disable
BT(config-if-cmts-1)# show running-config | include group
 cable load-balance general group disable
```

8.2.2 cable load-balance general group default

[Command]

cable load-balance general group default (disable | enable)

[View]

configview

[Parameter]

enable: Enable the load balance of general group

disable: Disable the load balance of general group

[Description]

This command is used to enable or disable the load balance of default general group.

[Example]

Disable the default general load-balance group:

```
BT(config-if-cmts-1)# cable load-balance general group default disable
BT(config-if-cmts-1)# show running-config | include general
 cable load-balance general group default disable
```

8.2.3 cable load-balance general group default init-tech

[Command]

cable load-balance general group default init-tech *init-tech-list*

no cable load-balance general group default init-tech

[View]

config view

[Parameter]

init-tech-list : Load-balance group ID list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 0-4. default: 0,1,2,3,4. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,4 or 1,3-4.

[Description]

The command "**cable load-balance general group default init-tech**" is used to configure the initialization technique of general load balance group.

The command "**no cable load-balance general group default init-tech**" is used to restore the default initialization technique of general load balance group.

[Example]

Configure the initialization technique 0,1,3 of general load balance group:

```
BT(config-if-cmts-1)# cable load-balance general group default default init-tech
0,1,3
BT(config-if-cmts-1)# show running-config | include init-tech
 cable load-balance general group default default init-tech 0,1,3
```

8.2.4 cable load-balance general group default policy

[Command]

cable load-balance general group default policy *policy-id*

no cable load-balance general group default policy

[View]

configview

[Parameter]

policy-id : Policy ID, type: numerical value; range: 1-200.

[Description]

The command "**cable load-balance general group default policy**" is used to configure the associated policy of general load balance group. If the configured policy ID does not exist, it indicates that the group has no policy. Default general load balancing group no policy.

The command "**no cable load-balance general group default policy**" is used to restore the default associated policy of general load balance group.

[Example]

Configure the associated policy 13 of general load balance group:

```
BT(config-if-cmts-1)# cable load-balance general group default default policy13
BT(config-if-cmts-1)# show running-config | include policy
 cable load-balance general group default default policy 13
```

8.3 Restricted Load-balance Group

8.3.1 cable load-balance group

[Command]

cable load-balance group *group-list*

no cable load-balance group (all | *group-list***)**

[View]

configview

[Parameter]

all: All load-balance groups

group-list : Restricted load-balance group ID list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-16. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

The command "**cable load-balance group**" is used to create a single or multiple restricted load-balance groups. If input only one group ID, the cmts-lb-group view will be entered.

The command "**no cable load-balance group**" is used to delete a single or multiple restricted load-balance groups.

[Example]

Add the restricted load-balance group with group ID as 1:

```
BT(config-if-cmts-1)# cable load-balance group 1,3,5-9
BT(config-if-cmts-1)# show running-config | include group
 cable load-balance group 1
 cable load-balance group 3
 cable load-balance group 5
 cable load-balance group 6
 cable load-balance group 7
 cable load-balance group 8
 cable load-balance group 9
```

Enter the cmts-lb-group view:

```
BT(config-if-cmts-1)# cable load-balance group 1
BT(cmts-lb-group-1)#
```

8.3.2 cable load-balance restrict modem

[Command]

cable load-balance restrict modem [*index***] *mac-address* [***mac-mask***] group** *group-id*

cable load-balance restrict modem [*index***] *mac-address* [***mac-mask***] service-type-id** *service-type-id*

no cable load-balance restrict modem *index* **(group** *group-id* **| service-type-id** *service-type-id***)**

no cable load-balance restrict modem (*index-list* **| all) cmts** *cmts-id*

[View]

config view

[Parameter]

all: All CMs in the load-balance group

index: CM index, type: numerical value; range: 1-500500.

index-list: CM index list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-500500. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF

mac-mask: MAC mask, with format as AA:BB:CC:DD:EE:FF; default: FFFF.FFFF.FFFF

group-id: Load-balance group ID. Type: numerical value; range: 1-512

service-type-id: Service type ID. Type: string; length: 1-16 bytes

cmts-id: CMTS ID. It is fixed as 1.

[Description]

The command "**cable load-balance restrict modem**" is used to add the CM to restrict load balance group. If the MAC mask is specified, the actually added CM is the MAC address and mask calculated value. If the index value of the restricted CM is not specified, the CMTS will allocate an unused minimum index value.

The command "**cable load-balance restrict modem service-type-id**" is used to add the CM to service type ID.

The command "**no cable load-balance restrict modem**" is used to delete the CM from load balance group.

[Example]

Add the MAC address 0024.6800.0000 of the CMs to load balance group 1:

```
BT(config)# cable load-balance restrict modem 1 0024.6800.0000 group 1
BT(config)# show running-config | include restrict modem
cable load-balance restrict modem 1 0024.6800.0000 ffff.ffff.ffff group 1
```

8.3.3 cm-type

[Command]

cm-type (d20 | d30)

no cm-type (d20 | d30)

[View]

cmts-lb-group view

[Parameter]

d20: Support CM with DOCSIS 2.0 mode

d30: Support CM with DOCSIS 3.0 mode

[Description]

The command "**cm-type**" is used to bind the CM of DOCSIS 2.0 version or DOCSIS 3.0 version to the restricted load balancing group.

The command "**no cm-type**" is used to cancel the binding CM of a DOCSIS version to to the restricted load balancing group.

[Example]

Bind the CM of DOCSIS 2.0 version to the restricted load balancing group:

```
BT(cmts-lb-group-1)# cm-2.0
BT(cmts-1-lb-group-1)# show running-config
 cm-type d20
```

Note:

Do not allow two or more load balancing groups to configure the same DOCSIS version type.

Adding CM DOCSIS version types to the load balancing group conflicts with the following features:

Based on CM MAC address.

Include all CM.

8.3.4 description

[Command]

description *description*

no description

[View]

cmts-lb-group view

[Parameter]

description: Restricted load balancing group description. Type: string; range: 0-60 characters.

[Description]

The "**description**" command is used to configure the description of a constrained load balancing group and to describe the business type.

The "**no description**" command is used to delete the description of a restricted load balancing group.

[Example]

Configuration constrained load balancing group is described as "VipClient" :

```
BT(cmts-1-lb-group-1)# description VipClient
BT(cmts-1-lb-group-1)# show running-config | include description
 description "VipClient"
```

8.3.5 disable

[Command]

disable

[View]

cmts-lb-group view

[Parameter]

N/A

[Description]

This command is used to disable a load-balance group.

Note:

This function is only used in cmts-lb-group view, which is different from disable command in enable view.

[Example]

Disable the load-balance group 1:

```
BT(cmts-lb-group-1)# disable
```

8.3.6 downstream

[Command]

downstream *channel-list*

no downstream *channel-list*

[View]

cmts-lb-group view

[Parameter]

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

The command "**downstream**" is used to add downstream channel of the load-balance group.

The command "**no downstream**" is used to delete downstream channel of the load-balance group.

[Example]

Add the downstream channel 1-4 to a specific group in batch:

```
BT(cmts-lb-group-1)# downstream 1-4
BT(cmts-lb-group-1)# show running-config | include downstream
 downstream 1
 downstream 2
 downstream 3
 downstream 4
```

8.3.7 enable

[Command]

enable

[View]

cmts-lb-group view

[Parameter]

N/A

[Description]

This command is used to enable a load-balance group.

Note:

This function is only used in cmts-lb-group view, which is different from the enable command in view view.

[Example]

Enable the load-balance group 1:

```
BT(cmts-lb-group-1)# enable
```

8.3.8 exclude modem

[Command]

exclude modem [*index***] mac** *mac-address* **[***mac-mask***]**

no exclude modem (*index-list* **| all)**

[View]

cmts-lb-group view

[Parameter]

all: All CMs in the load-balance group

index: CM index, type: numerical value; range: 1-1000.

index-list: CM index list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-1001. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF

mac-mask: MAC mask, with format as AA:BB:CC:DD:EE:FF; default: FFFF.FFFF.FFFF

[Description]

The command "**exclude modem**" is used to add the exclude CM to load balance group. If the MAC mask is specified, the actually added CM is the MAC address and mask calculated value. If the index value of the restricted CM is not specified, the CMTS will allocate an unused minimum index value.

The command "**no exclude modem**" is used to delete the exclude CM of load balance group.

[Example]

Add the MAC address 0014.7d01.a010, MAC mask ffff.ffff.ff00 of the exclude CMs to load balance group1:

```
BT(cmts-lb-group-1)# exclude modem mac 0014.7d01.fe10 ffff.ffff.ff00BT(cmts-
lb-group-1)# show running-config | include exclude modem exclude modem 1
0014.7d01.fe00 ffff.ffff.ff00
```

Note:

Adding CM DOCSIS version types to the load balancing group conflicts with the following features:

Based on CM MAC address.

Include all CM.

8.3.9 include all cm

[Command]

include all cm

no include all cm

[View]

cmts-lb-group view

[Parameter]

N/A

[Description]

The command "**include all cm**" is used to complement the CM MAC address segments of the exclusion list of the restricted load balancing group and bind them to the restricted load balancing group. That is, according to the exclusion list of the restricted load balancing group, the legitimate remaining CM MAC address segments are calculated and bound to the specified restricted load balancing group. If CM is not excluded in the group, the range of the remaining MAC address segments calculated is 0000.0000.0000-FFFFFF.FFFFFF.

The command "**no include all cm**" is used to delete CM MACRange from the load-balance group.

[Example]

Configure gets with the MACRange 0000.0000.0000-ffff.ffff.ffff subtract the exclude MACRange to the load-balance group:

```
BT(cmts-lb-group-1)# exclude modem mac a4a7.0fa9.6000 ffff.ffff.ff00
BT(cmts-lb-group-1)# include all cm
BT(cmts-lb-group-1)# show running-configexclude
 modem 1 a4a7.0fa9.6000 ffff.ffff.ff00 include
 all cm
```

Note:

Do not allow two or more load balancing groups to configure include all CM.

Adding include all CM to the load balancing group conflicts with the following features:

Based on CM MAC address.

The same DOCSIS version type

8.3.10 init-tech

[Command]

init-tech *init-tech-list*

no init-tech

[View]

cmts view, cmts-lb-group view

[Parameter]

all: All load-balance groups

init-tech-list : Load-balance group ID list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 0-4. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,4 or 1,3-4.

[Description]

cmts view: The "**init-tech**" command is used to configure the initialization technology used in mobile CM of general load balancing group.

cmts-lb-group view: The "**init-tech**" command is used to configure the initialization technology usedwhen configuring the mobile CM of the restricted load balancing group.

Initialization technique 0: The use of initialization technique 0 (reinitialize the MAC), results in the longest interruption of service.

Initialization technique 1: (All upstream channel types) Perform broadcast initial ranging (IUC3) on new channel before normal operation.

Initialization technique 2: (S-CDMA and TDMA channels only) Perform unicast ranging (IUC3 or IUC4) on new channel before normal operation.

Initialization technique 3: (S-CDMA and TDMA channels only) Perform either broadcast (IUC3) or unicast (IUC3 or IUC4) ranging on new channel before normal operation.

Initialization technique 4: (S-CDMA and TDMA channels only) Use new channel directly without reinitializing or ranging.

The command "**no init-tech**" is used to restore the default initialization technique of load balance group.

[Example]

Configure the initialization technique 0,1,3 of load balance group:

```
BT(cmts-lb-group-1)# init-tech 0,1,3
```

```
BT(cmts-lb-group-1)# show running-config | include init-tech
 init-tech 0,1,3
```

8.3.11 policy

[Command]

policy *policy-id*

no policy

[View]

cmts view, cmts-lb-group view

[Parameter]

policy-id : Policy ID, type: numerical value; range: 1-200.

[Description]

cmts view: The "**policy**" command is used to configure the load balancing policies associated with the generic load balancing group. If the policy ID of the configuration does not exist, the group has no policy. The default generic load balancing group has no policy.

cmts-lb-group view: The "**policy**" command is used to configure the load balancing policies associated with the constrained load balancing group. If the policy ID of the configuration does not exist, it means that the group has no policies. The default restricted load balancing group has no policy.

The command "**no policy**" is used to restore the default associated policy of load balance group.

[Example]

Configure the associated policy 13 of load balance group:

```
BT(cmts-lb-group-1)# policy 13
BT(cmts-lb-group-1)# show running-config | include policy
 policy 13
```

8.3.12 service-type-id

[Command]

service-type-id *service-type-id*

no service-type-id [*service-type-id*]

[View]

cmts-lb-group view

[Parameter]

service-type-id: ID value of service type, Type: string (except space); range: 1-16 characters.

[Description]

The "**service-type-id**" command is used to add a service type ID to the load balancing group.

The "**no service-type-id** *service-type-id* "command is used to delete the service type ID specified in the load balancing group.

The"**no service-type-id**" command is used to delete all service type IDs in the load balancing group.

[Example]

Setting the service type ID in Load Balancing Group 1 contains 123 and 321:

```
BT(cmts-1-lb-group-1)# service-type-id 123
BT(cmts-1-lb-group-1)# service-type-id 321
BT(cmts-1-lb-group-1)# show running | include service-type-id
service-type-id 123
service-type-id 321
```

Note:

1. A restricted load balancing group can have multiple service type IDs separated by spaces, but the total length is not more than 255 bytes.
2. 5. CMTS can determine the only restricted load balancing group through the service type ID.

8.3.13 show active cm

[Command]

show active cm

[View]

cmts-lb-group view

[Parameter]

N/A

[Description]

This command is used to display active CM in the load-balance group.

[Example]

Display currently active CM in the load-balance group 1:

```
BT(cmts-lb-group-1)# show active cm
Group ID    I/F       CM ID      CM MAC
1           C1        1          0016.9259.779c
Total CMs: 1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Group ID	Load-balance group ID
I/F	CMTS ID
CM ID	ID of active CM in the load-balance group
CM MAC	MAC address of active CM in the load-balance group
Total CMs	Number of active CM in the load-balance group

8.3.14 show cable load-balance group

[Command]

show cable load-balance group [*group-id***]**

[View]

enable view, config view, cmts view

[Parameter]

group-id: Load-balance group ID. Type: numerical value; range: 1-512

[Description]

enable view, config view: The "**show cable load-balance group [***group-id***]**" command is used to display restricted load balancing group information.

cmts view: The "**show cable load-balance group**" command is used to display all restricted load balancing group information. Currently, it is not supported to display general group load balancing information.

[Example]

Display the information of the load-balance group:

```
BT(config-if-cmts-1)# show cable load-balance group
  Group ID              : 10
  I/F                   : C1
  Description           :
  Group Type            : Restricted
  Status                : Enabled
  Init-tech             : 0,1,2,3,4
  Policy ID             : 0
```

```
Upstream Channels     :
Downstream Channels   :
Service Type IDs      :
CM Type               :
Restricted CM MACs    : 0000.0000.0000-0014.7d01.fdff
                        0014.7d01.ff00-ffff.ffff.ffff
Total Group Number    : 1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Group ID	Load-balance group ID
I/F	CMTS ID
Description	Load-balance group ID description
Group Type	Load-balance group type
Status	Load-balance group status
Init-tech	Load-balance group init-tech
Policy ID	Load-balance group policy ID
Upstream Channels	Upstream channel ID of the load-balance group
Downstream Channels	Downstream channel ID of the load-balance group
Service Type IDs	Load-balance group service type IDs
CM Type	Load-balance group CM type
Restricted CM MACs	MACRange of the load-balance group

8.3.15 show cable load-balance group active cm

[Command]

show cable load-balance group *group-id* **active cm**

[View]

enable view, config view

[Parameter]

group-id: Load-balance group ID. Type: numerical value; range: 1-512

[Description]

Display active CM in the load-balance group.

[Example]

Display currently active CM in the load-balance group with ID as 1:

```
BT(config)# show cable load-balance group 1 active cm
Group ID    I/F      CM ID      CM MAC
1           C1       1          0016.9259.779c
```

```
Total CMs: 1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Group ID	Load-balance group ID
I/F	CMTS ID
CM ID	ID of active CM in the load-balance group
CM MAC	MAC address of active CM in the load-balance group
Total CMs	Number of active CM in the load-balance group

8.3.16 upstream

[Command]

upstream *channel-list*

no upstream *channel-list*

[View]

cmts-lb-group view

[Parameter]

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

The command "**upstream**" is used to add upstream channel of the load-balance group.

The command "**no upstream**" is used to delete upstream channel of the load-balance group.

[Example]

Add upstream channel 1 to the load-balance group 1:

```
BT(cmts-lb-group-1)# upstream 1
BT(cmts-lb-group-1)# show running-config | include upstream
 upstream 1
```

8.4 Manual Load Balance

8.4.1 cable move cm downstream

[Command]

cable move cm *mac-address* **downstream to** *channel-list* **[init-tech** *init-tech-list***] [sfid** *sfid bdg-id***] [trans-id** *trans-id***]**

[View]

cmts view

[Parameter]

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF

channel-list: Downstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-32. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

init-tech-list: Initialization technique list. support a single ID or multiple IDs. For a single ID, type: numerical value; range: 0-4. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,4 or 1,3-4.

sfid: CM server flow ID, type: numerical value; range: 65537-4294967295.

bdg-id: Bonding group ID, type: numerical value; range: 1-65535.

trans-id: Transaction ID of DBC-REQ or DCC-REQ, type: numerical value; range: 32768-65535.

[Description]

This command is used to move CM to the downstream channel list and adopted initialization technique. For 2.0 CM, the list is only a single channel; and for 3.0 CM, the list are any a subset of the maximum channels bonding capacity.

[Example]

Move CM with MAC address as 4432.c83c.88e4 to downstream channel 9-16:

```
BT(config-if-cmts-1)# show cable modem 4432.c83c.88e4 primary-channel
MAC Address     IP Address    I/F    MAC        Primary Upstream       Downstream
                                     State      Sid     Primary(list)  Primary(list)
4432.c83c.88e4  192.168.10.2  C1/U1  w-online   2       1(2)           1(2,3,4,5,6,7,8)
BT(config-if-cmts-1)#  cable move cm 4432.c83c.88e4 downstream to 9-16
BT(config-if-cmts-1)#  show cable modem 4432.c83c.88e4 primary-channel MAC
Address  IP Address  I/F  MAC  Primary Upstream  Downstream
                                     State     Sid     Primary(list)     Primary(list)
4432.c83c.88e4 192.168.10.2 C1/U1 w-online 2  1(2)  9(10,11,12,13,14,15,16)
```

8.4.2 cable move cm rcp-id rcc-id

[Command]

cable move cm *mac-address* **rcp-id** *rcp-id* **rcc-id** *rcc-id* **[init-tech** *init-tech-list***] [sfid** *sfid bdg-id***] [trans-id** *trans-id***]**

[View]

cmts view

[Parameter]

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF.

rcp-id: RCP ID. 5-byte hexadecimal characters, range of values per byte: 0x0-0xFF.

rcc-id: RCC ID. type: numerical value; range: 1-255.

init-tech-list: Initialization technique list. support a single ID or multiple IDs. For a single ID, type: numerical value; range: 0-4. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,4 or 1,3-4.

sfid: CM server flow ID, type: numerical value; range: 65537-4294967295.

bdg-id: Bonding group ID, type: numerical value; range: 1-65535.

trans-id: Transaction ID of DBC-REQ or DCC-REQ, type: numerical value; range: 32768-65535.

[Description]

This command is used to manually move 3.0 CM to a specified downstream channel. The meanings of *rcp-id* and *rcc-id* values can be referred to in the 6.12 RCC Management Section.

[Example]

Move CM with MAC address as 4432.c83c.88e4 to downstream channel 9-16:

```
BT(config-if-cmts-1)# show cable modem 4432.c83c.88e4 primary-channel
MAC Address     IP Address    I/F    MAC        Primary Upstream       Downstream
                                     State      Sid     Primary(list)  Primary(list)
4432.c83c.88e4  192.168.10.2  C1/U1  w-online   2       1(2)           1(2,3,4,5,6,7,8)
BT(config-if-cmts-1)# cable move cm 4432.c83c.88e4 rcp-id 00 10 18 83 81 rcc-
id 1 init-tech 1
BT(config-if-cmts-1)# show cable modem 4432.c83c.88e4 primary-channel
MAC Address     IP Address    I/F    MAC       Primary  Upstream       Downstream
                                     State     Sid      Primary(list)  Primary(list)
4432.c83c.88e4  192.168.10.2  C1/U1  w-online  2        1(2)    9(10,11,12,13,14,15,16)
```

8.4.3 cable move cm upstream

[Command]

cable move cm *mac-address* **upstream to** *channel-list* **[init-tech** *init-num***] [sfid** *sfid bdg-id***] [trans-id** *trans-id***]**

[View]

config view, cmts view

[Parameter]

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF

channel-list: Upstream channel list, support a single ID or multiple IDs. For a single ID, type: numerical value; range: 1-8. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3-4 or 1-2,4.

init-tech-list: Initialization technique. support a single ID or multiple IDs. For a single ID, type: numerical value; range: 0-4; default: 0. For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,4 or 1,3-4.

sfid: CM server flow ID, type: numerical value; range: 1-65536.

bdg-id: Bonding group ID, type: numerical value; range: 1-65535.

trans-id: Transaction ID of DBC-REQ or DCC-REQ, type: numerical value; range: 32768-65535.

[Description]

This command is used to move CM to the upstream channel list and adopted initialization technique. For 2.0 CM, the list is only a single channel; and for 3.0 CM, the list are any a subset of the maximum channels bonding capacity.

[Example]

Move CM with MAC address as 4432.c83c.88e4 to upstream channel 5-6 and adopted initialization technology 3:

```
BT(config-if-cmts-1)# show cable modem 4432.c83c.88e4 primary-channel
MAC Address     IP Address    I/F    MAC        Primary Upstream       Downstream
                                     State      Sid     Primary(list)  Primary(list)
4432.c83c.88e4  192.168.10.2  C1/U1  w-online   2       1(2)           1(2,3,4,5,6,7,8)
BT(config-if-cmts-1)# cable move cm 4432.c83c.88e4 uptream to 5-6 BT(config-if-
cmts-1)# show cable modem 4432.c83c.88e4 primary-channel MAC Address  IP Address
                I/F           MAC    Primary  Upstream                Downstream
                                     State      Sid      Primary(list) Primary(list)
4432.c83c.88e4  192.168.10.2  C1/U1  w-online   2        5(6)          1(2,3,4,5,6,7,8)
```

Chapter 9 ACL Configuration Management

9.1 ACL Conventional Management

9.1.1 acl

[Command]

acl *acl-id*

no acl (*acl-id* | **all**)

no acl *acl-begin acl-end*

[View]

config view

[Parameter]

all: All the ACL.

acl-id: ACL ID. Type: numerical value; range: 1-192

acl-begin: Start ACL ID. Type: numerical value; range: 1-192

acl-end: End ACL ID. Type: numerical value; range: 1-192

Requirements on parameter configuration: *acl-begin* shall be smaller than *mac-end*.

[Description]

The command "**acl**" is used to create ACL and enter the acl view from the config view. If this ACL has already existed, enter the acl view directly, without any additional acl created.

The command "**no acl**" is used to delete ACL.

[Example]

Create a new ACL 1 and enter the acl view

```
BT(config)# acl 1 BT(config-if-acl-
1)#
```

9.1.2 description

[Command]

description *description*

no description

[View]

acl view

[Parameter]

description: ACL descriptions. Type: string; range: 1-64 characters

[Description]

The command "**description**" is used to configure the description information of ACL. By default, it is of acl-ID form;

The command "**no description**" is used to restore the default description information of ACL.

[Example]

Set the description information of ACL 1 as acl-test

```
BT(config-if-acl-1)# description acl-test
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 5, desc: acl-test
|   +----Rule :
|   |   + --- Action:
|   |   |   + --- Permit
|   |   +----Match: none
BT(config-if-acl-1)# exit
BT(config)# show running-config | include description
  description acl-test
```

9.1.3 priority

[Command]

priority *priority*

no priority

[View]

acl view

[Parameter]

priority: ACL priority. Type: numerical value; range: 1-10; default: 5

[Description]

The command "**priority**" is used to configure the priority of ACL;

The command "**no priority**" is used to restore the default priority of ACL.

[Example]

Set the priority of ACL 1 as 6

```
BT(config-if-acl-1)# priority 6
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-1
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   +----Match: none
```

9.1.4 show acl

[Command]

show acl [(all | *acl-id*)]

[View]

show acl: acl view

show acl (all | *acl-id*): config view, enable view

[Parameter]

acl-id: ACL ID. Type: numerical value; range: 1-192

[Description]

This command is used to display the details of the specified ACL.

[Example]

Display the state information of current all ACL

```
BT(config)# show acl all
[1]
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
|   |       +----Source MAC 0025.f293.242e  ffff.ffff.ff00
|   |       +----Destination IPV4 address 172.16.7.33 255.255.255.0
[2]
+----ACL: 2, prio: 5, desc: acl-2
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
```

```
|   |   |   +---- Add vlan: vid = 122, pri = 3, tpid = 0x0200
|   |   + ---Match:
|   |       +----IP protocol 2
[23]
+----ACL: 23, prio: 5, desc: acl-23
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   +----Match: none
```

9.2 ACL Matching Conditions

9.2.1 match dscp

[Command]

match dscp *dscp*

no match dscp

[View]

acl view

[Parameter]

dscp: DSCP value. Type: numerical value; range: 0-63.

[Description]

The command "**match dscp**" is used to configure DSCP matching conditions of ACL;

The command "**no match dscp**" is used to delete DSCP matching conditions of ACL.

[Example]

Set the matching condition for matching DSCP 30

```
BT(config-if-acl-1)# match dscp 30
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
|   |       +----DSCP 30
BT(config-if-acl-1)# exit
BT(config)# show running-config | include dscp
  match dscp 30
```

9.2.2 match dst-ip

[Command]

match dst-ip *ip-address netmask*

no match dst-ip

match dst-ipv6 *ipv6-mask*

no match dst-ipv6

[View]

acl view

[Parameter]

ip-address: IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

netmask: subnet mask, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ipv6-mask: IPv6 address and mask, with format as X:X::X:X/M.

[Description]

The command "**match dst-ip**" is used to configure destination IP address matching conditions of ACL.

The command "**no match dst-ip**" is used to delete destination IP address matching conditions of ACL.

The command "**match dst-ipv6**" is used to configure destination IPv6 address matching conditions of ACL.

The command "**no match dst-ipv6**" is used to delete destination IPv6 address matching conditions of ACL.

[Example]

Set the matching rule for matching the destination IP address network section as 172.16.7.0/24

```
BT(config-if-acl-1)# match dst-ip 172.16.7.33 255.255.255.0
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
|   |       +----Destination IPV4 address 172.16.7.33 255.255.255.0
BT(config-if-acl-1)# exit
BT(config)# show running-config | include dst-ip
  match dst-ip 172.16.7.33 255.255.255.0
```

9.2.3 match dst-mac

[Command]

match dst-mac *mac-address mask*

no match dst-mac

[View]

acl view

[Parameter]

mac-address: MAC address, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

mask: MAC mask, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

The command "**match dst-mac**" is used to configure destination MAC address matching conditions of ACL.

The command "**no match dst-mac**" is used to delete destination MAC address matching conditions of ACL.

[Example]

Set the matching rule for matching destination MAC address as 0025.f293.2400-0025.f293.24ff

```
BT(config-if-acl-1)# match dst-mac 0025.f293.242e ffff.ffff.ff00
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
|   |       +----Destination MAC 0025.f293.242e ffff.ffff.ff00
BT(config-if-acl-1)# exit
BT(config)# show running-config | include dst-mac
  match dst-mac 0025.f293.242e ffff.ffff.ff00
```

9.2.4 match dst-port

[Command]

match dst-port *dst-port*

no match dst-port

[View]

acl view

[Parameter]

src-port Destination port number. Type: numerical value; range: 0-65535

[Description]

The command "**match dst-port**" is used to configure destination port number matching conditions of ACL.

The command "**no match dst-port**" is used to delete destination port number matching conditions of ACL.

[Example]

Set the matching rule for matching destination port number as 23

```
BT(config-if-acl-1)# match dst-port 23
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
|   |       +----L4 destination port 23
BT(config-if-acl-1)# exit
BT(config)# show running-config | include dst-port
  match dst-port 23
```

9.2.5 match ether-type

[Command]

match ether-type *ether-type*

no match ether-type

[View]

acl view

[Parameter]

ether-type: Ethernet type, hexadecimal type, range: 1-ffff

[Description]

The command "**match ether-type**" is used to configure Ethernet protocol matching conditions of ACL.

The command "**no match ether-type**" is used to delete Ethernet protocol matching conditions of ACL.

[Example]

Set the matching rule for matching ether type 0x800

```
BT(config-if-acl-1)# match ether-type 800
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test, uninstall
|   +----Rule :
|   |   +----Action:  none
|   |   + ---Match:
|   |       +----Ethernet frame type 0x800
BT(config-if-acl-1)# exit
BT(config)# show running-config | include ether-type
  match ether-type 800
```

9.2.6 match ip-protocol

[Command]

match ip-protocol *protocol*

no match ip-protocol

[View]

acl view

[Parameter]

protocol: IP protocol number. Type: numerical value; range: 0-255

[Description]

The command "**match ip-protocol**" is used to configure IP protocol matching conditions of ACL.

The command "**no match ip-protocol**" is used to delete IP protocol matching conditions of ACL.

[Example]

Set the matching rule for matching IP protocol 16

```
BT(config-if-acl-1)# match ip-protocol 16
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
```

```
|   |       +----IP protocol 16
BT(config-if-acl-1)# exit
BT(config)# show running-config | include ip-protocol
  match ip-protocol 16
```

9.2.7 match ipv6-flow-label

[Command]

match ipv6-flow-label *ipv6-flow-label*

no match ipv6-flow-label

[View]

acl view

[Parameter]

ipv6-flow-label: IP protocol flow tag. Type: numerical value; range: 0 - 1048575.

[Description]

The command "**match ipv6-flow-label**" is used to configure IP protocol flow label matching conditions of ACL. The usage of the Flow Label field enables efficient IPv6 flow classification based only on IPv6 main header fields in fixed positions. Packet classifiers can use the triplet of Flow Label, Source Address, and Destination Address fields to identify the flow to which a particular packet belongs.

The command "**no match ipv6-flow-label**" is used to delete IP protocol flow tag matching conditions of ACL.

[Example]

Set the matching rule for matching IP protocol flow tag 0

```
BT(config-if-acl-1)# match ipv6-flow-label 0
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
|   |       +----IPV6 flow label 0
```

9.2.8 match src-ip

[Command]

match src-ip *ip-address netmask*

no match src-ip

match src-ipv6 *ipv6-mask*

no match src-ipv6

[View]

acl view

[Parameter]

ip-address: IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

netmask: subnet mask, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ipv6-mask: IPv6 address and mask, with format as X:X::X:X/M.

[Description]

The command "**match src-ip**" is used to configure source IP address matching conditions of ACL.

The command "**no match src-ip**" is used to delete source IP address matching conditions of ACL.

The command "**match src-ipv6**" is used to configure source IPv6 address matching conditions of ACL.

The command "**no match src-ipv6**" is used to delete source IPv6 address matching conditions of ACL.

[Example]

Set the matching rule for matching source IP address network section as 172.17.7.0/24

```
BT(config-if-acl-1)# match src-ip 172.17.7.33 255.255.255.0
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
|   |       +----Source IPV4 address 172.17.7.33 255.255.255.0
|   |       +----IPV6 flow label 0
BT(config-if-acl-1)# exit
BT(config)# show running-config | include src-ip
  match src-ip 172.17.7.33 255.255.255.0
```

9.2.9 match src-mac

[Command]

match src-mac *mac-address mask*

no match src-mac

[View]

acl view

[Parameter]

mac-address: MAC address, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

mask: MAC mask, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

The command "**match src-mac**" is used to configure source MAC address matching conditions of ACL.

The command "**no match src-mac**" is used to delete source MAC address matching conditions of ACL.

[Example]

Set the matching rule for matching source MAC address as 0026.f293.2400-0026.f293.24ff

```
BT(config-if-acl-1)# match src-mac 0026.f293.242e ffff.ffff.ff00
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
|   |       +----Source MAC 0026.f293.242e ffff.ffff.ff00
BT(config-if-acl-1)# exit
BT(config)# show running-config | include src-mac
  match src-mac 0026.f293.242e ffff.ffff.ff00
```

9.2.10 match src-port

[Command]

match src-port *src-port*

no match src-port

[View]

acl view

[Parameter]

src-port: Source port number. Type: numerical value; range: 0-65535

[Description]

The command "**match src-port**" is used to configure the source port number matching conditions of ACL.

The command "**no match src-port**" is used to delete the source port number matching conditions of ACL.

[Example]

Set the matching rule for matching source port number as 23

```
BT(config-if-acl-1)# match src-port 23
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
|   |       +----L4 source port 23
BT(config-if-acl-1)# exit
BT(config)# show running-config | include src-port
  match src-port 23
```

9.2.11 match vlan

[Command]

match vlan *vlan-id* **[priority** *priority***]**

match vlan any

no match vlan

[View]

acl view

[Parameter]

any: All VLAN ID

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

priority: VLAN priority. Type: numerical value; range: 0-7; default: 0

[Description]

The command "**match vlan**" is used to configure VLAN ID matching conditions of ACL.

The command "**no match vlan**" is used to delete VLAN ID matching conditions of ACL.

[Example]

Set the matching rule for matching VLAN ID as 100

```
BT(config-if-acl-1)# match vlan 100
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 5, desc: acl-1
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
|   |       +----Vlan ID 100
BT(config-if-acl-1)# exit
BT(config)# show running-config | include match vlan
  match vlan 100
```

9.2.12 no match all

[Command]

no match all

[View]

acl view

[Parameter]

N/A

[Description]

The command "**no match all**" is used to delete all matching conditions of ACL.

[Example]

Delete all matching conditions of ACL

```
BT(config-if-acl-1)# no match all
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
```

9.3 ACL Action

9.3.1 action add-vlan

[Command]

action add-vlan *vlan-id* **[priority** *priority***] [tpid** *tpid***]**

no action add-vlan

[View]

acl view

[Parameter]

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

priority: VLAN priority. Type: numerical value; range: 0-7; default: 0

tpid: hexadecimal 4-digit TPID (Tag Protocol Identifier), hexadecimal type; range: 1-fffe; default: 8100

[Description]

The command "**action add-vlan**" is used to add VLAN ID, and initialize VLAN priority and TPID.

The command "**no action add-vlan**" is used to delete add-vlan action added by ACL.

[Example]

Set the action of ACL as adding VLAN 100, and VLAN priority as 3, and TPID as 0x8100:

```
BT(config-if-acl-1)# action add-vlan 100 priority 3 tpid 8100
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 5, desc: acl-1
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   |   +---- Add vlan: vid = 100, pri = 3, tpid = 0x8100
|   |   + ---Match:
|   |       +----Vlan ID 100
BT(config-if-acl-1)# exit
BT(config)# show running-config | include add-vlan
  action add-vlan 100 priority 3 tpid 8100
```

9.3.2 action deny

[Command]

action deny

[View]

acl view

[Parameter]

N/A

[Description]

The command "**action deny**" is used to set ACL processing action against the packets as "deny".

[Example]

Configure ACL action as "deny"

```
BT(config-if-acl-1)# action deny
BT(config-if-acl-1)# exit
BT(config)# show running-config | include deny
  action deny
```

9.3.3 action permit

[Command]

action permit

[View]

acl view

[Parameter]

N/A

[Description]

The command "**action permit**" is used to set ACL processing action against the packets as "permit".

[Example]

Set the ACL action as "permit"

```
BT(config-if-acl-1)# action permit
BT(config-if-acl-1)# exit
BT(config)# show running-config | include permit
  action permit
```

9.3.4 action remove-vlan

[Command]

action remove-vlan

no action remove-vlan

[View]

acl view

[Parameter]

N/A

[Description]

The command "**action remove-vlan**" is used to set ACL processing action for deleting VLAN tag;

The command "**no action remove-vlan**" is used to delete ACL processing action for deleting VLAN tag;

[Example]

Set the ACL action as deleting VLAN tag

```
BT(config-if-acl-1)# action remove-vlan
BT(config-if-acl-1)# exit
BT(config)# show running-config | include remove
  action remove-vlan
```

9.3.5 action replace-ip-dscp

[Command]

action replace-ip-dscp *dscp*

no action replace-ip-dscp

[View]

acl view

[Parameter]

dscp: New DSCP value. Type: numerical value; range: 0-63

[Description]

The command "**action replace-ip-dscp**" is used to set ACL to replace DSCP in IP protocol packet;

The command "**no action replace-ip-dscp**" is used to delete ACL action for replacing DSCP in IP protocol packet;

[Example]

Configure the ACL action as replacing DSCP 1

```
BT(config-if-acl-1)# action replace-ip-dscp 1
BT(config-if-acl-1)# exit
BT(config)# show running-config | include replace-ip-dscp
  action replace-ip-dscp 1
```

9.3.6 action replace-vlan-id

[Command]

action replace-vlan-id *vlan-id*

no action replace-vlan-id

[View]

acl view

[Parameter]

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

The command "**action replace-vlan-id**" is used to set ACL processing action for replacing VLAN ID in the VLAN tag;

The command "**no action replace-vlan-id**" is used to delete ACL processing action for replacing VLAN ID in the VLAN tag;

[Example]

Configure the ACL action as replacing VLAN ID 100 in the VLAN tag:

```
BT(config-if-acl-1)# action replace-vlan-id 100
BT(config-if-acl-1)# exit
BT(config)# show running-config | include replace-vlan-id
  action replace-vlan-id 100
```

9.3.7 action replace-vlan-priority

[Command]

action replace-vlan-priority *priority*

no action replace-vlan-priority

[View]

acl view

[Parameter]

priority: VLAN priority. Type: numerical value; range: 0-7

[Description]

The command "**action replace-vlan-priority**" is used to set ACL processing action for replacing VLAN priority;

The command "**no action replace-vlan-priority**" is used to delete ACL processing action for replacing VLAN priority;

[Example]

Configure the ACL action as replacing VLAN priority 7

```
BT(config-if-acl-1)# action replace-vlan-priority 7
BT(config-if-acl-1)# exit
BT(config)# show running-config | include priority
  action replace-vlan-priority 7
```

9.3.8 action replace-vlan-tpid

[Command]

action replace-vlan-tpid *tpid*

no action replace-vlan-tpid

[View]

acl view

[Parameter]

tpid: new TPID, hexadecimal type, range: 1-fffe

[Description]

The command "**action replace-vlan-tpid**" is used to set ACL processing action for replacing VLAN TPID;

The command "**no action replace-vlan-tpid**" is used to delete ACL processing action for replacing VLAN TPID;

[Example]

Configure the ACL action as replacing VLAN TPID 9100

```
BT(config-if-acl-1)# action replace-vlan-tpid 9100
BT(config-if-acl-1)# exit
BT(config)# show running-config | include replace-vlan-tpid
```

```
action replace-vlan-tpid 9100
```

9.3.9 no action all

[Command]

no action all

[View]

acl view

[Parameter]

N/A

[Description]

The command "**no action all**" is used to restore the execution action to permit.

[Example]

Restore the execution action to permit

```
BT(config-if-acl-1)# no action all
BT(config-if-acl-1)# show acl
+----ACL: 1, prio: 6, desc: acl-test
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   + ---Match:
```

9.4 ACL Node Placement

9.4.1 acl install cable ingress

[Command]

acl install cable ingress

acl *acl-id* **install interface** *cmts-id* **cable ingress**

no acl install cable ingress

no acl *acl-id* **install interface** *cmts-id* **cable ingress**

no acl all install

no acl interface *cmts-id* **all install**

[View]

[no] acl *acl-id* **install interface** *cmts-id* **cable ingress**: config view

no acl all install: config view

no acl interface *cmts-id* **all install**: config view

[no] acl install cable ingress: acl view

[Parameter]

acl-id: ACL ID. Type: numerical value; range: 1-192.

cmts-id: CMTS ID. It is fixed as 1.

[Description]

The command "**acl install cable ingress**" is used to install ACL to ingress direction of cable port;

The command "**no acl install cable ingress**" is used to remove ACL from ingress direction of cable port.

[Example]

Install ACL to ingress position of cable port:

```
BT(config-if-acl-1)# acl install cable ingress
BT(config-if-acl-1)# exit
BT(config)# show acl cable ingress
+----ACL: 1, prio: 5, desc: acl-1,
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   |   +---- Add vlan: vid = 100, pri = 3, tpid = 0x8100
|   |   + ---Match:
|   |       + ---Vlan ID 100
|   |       + ----Pv6 nexthdr 100
|   +----Installed on port
|   |   + ---Cable/Ingress
```

9.4.2 acl install uplink ingress

[Command]

acl install uplink ingress

acl *acl-id* **install interface** *cmts-id* **uplink ingress**

no acl install uplink ingress

no acl *acl-id* **install interface** *cmts-id* **uplink ingress**

[View]

[no] acl *acl-id* **install interface** *cmts-id* **uplink ingress**: config view

[no] acl install uplink ingress: acl view

[Parameter]

acl-id: ACL ID. Type: numerical value; range: 1-192.

cmts-id: CMTS ID. It is fixed as 1.

[Description]

The command "**acl install uplink ingress**" is used to install ACL to ingress direction of uplink port.

The command "**no acl install uplink ingress**" is used to remove ACL from ingress direction of uplink port.

[Example]

Install ACL to ingress position of uplink port

```
BT(config-if-acl-1)# acl install uplink ingress
BT(config-if-acl-1)# exit
BT(config)# show acl uplink ingress
+----ACL: 1, prio: 5, desc: acl-1,
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   |   +---- Add vlan: vid = 100, pri = 3, tpid = 0x8100
|   |   + ---Match:
|   |       + ---Vlan ID 100
|   |       + ----Pv6 nexthdr 100
|   +----Installed on port
|   |   + ---Uplink/Ingress
```

9.4.3 show acl cable ingress

[Command]

show acl cable ingress

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display ACL installed in the ingress direction of cable port.

[Example]

Display ACL installed in ingress direction of the cable port:

```
BT(config)# show acl cable ingress
+----ACL: 1, prio: 5, desc: acl-1,
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   |   +---- Add vlan: vid = 100, pri = 3, tpid = 0x8100
|   |   + ---Match:
|   |       + ---Vlan ID 100
|   |       + ----Pv6 nexthdr 100
|   +----Installed on port
|   |   + ---Cable/Ingress
```

9.4.4 show acl uplink ingress

[Command]

show acl uplink ingress

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display ACL installed in the ingress direction of uplink port.

[Example]

Display ACL installed in ingress direction of uplink port:

```
BT(config)# show acl uplink ingress
+----ACL: 1, prio: 5, desc: acl-1,
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Permit
|   |   |   +---- Add vlan: vid = 100, pri = 3, tpid = 0x8100
|   |   + ---Match:
|   |       + ---Vlan ID 100
|   |       + ----Pv6 nexthdr 100
```

```
|   +----Installed on port
|   |   + ---Uplink/Ingress
```

9.4.5 show acl install

[Command]

show acl all install

show acl *acl-id* **install**

[View]

config view, enable view

[Parameter]

acl-id: ACL ID. Type: numerical value; range: 1-192.

[Description]

This command is used to display all installed of the specified ACL.

[Example]

Display all installed of ACL 1:

```
BT(config)# show acl 1 install
AclId      Cmts              Port              Direction
1           1                 Uplink            ingress
1           1                 Cable             ingress
```

9.5 ACL Fast Installation

9.5.1 acl match dst-ip

[Command]

acl *acl-id* **(permit | deny) match dst-ip** *ip-address netmask*

[View]

config view

[Parameter]

permit: Configure ACL action as permit

deny: Configure ACL action as deny

acl-id: ACL ID. Type: numerical value; range: 1-192.

ip-address: Destination IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

netmask: Subnet mask of destination address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

[Description]

This command is used to configure ACL quickly, including ACL ID, ACL action, and destination IP address.

[Example]

Configure quickly the matching conditions of ACL with ACL ID as 1, action as deny and destination IP address as 192.168.2.50/24

```
BT(config)# acl 1 deny match dst-ip 192.168.2.50 255.255.255.0
BT(config)# show acl 1
+----ACL: 1, prio: 5, desc: acl-1
|   +----Rule :
|   |   + --- Action:
|   |   |   + --- Deny
|   |   + --- Match:
|   |       +----Destination IPV4 address 192.168.2.50 255.255.255.0
```

9.5.2 acl match dst-port

[Command]

acl *acl-id* **(permit | deny) match dst-port** *dst-port*

[View]

config view

[Parameter]

permit: Configure ACL action as permit

deny: Configure ACL action as deny

acl-id: ACL ID. Type: numerical value; range: 1-192.

dst-port: Destination port number. Type: numerical value; range: 0-65535

[Description]

This command is used to configure ACL quickly, including ACL ID, ACL action, and destination port number.

[Example]

Configure quickly the matching conditions of ACL with ACL ID as 1 and action as deny as 24-30

```
BT(config)# acl 1 deny match dst-port 24
BT(config)# show acl 1
+----ACL: 1, prio: 5, desc: acl-1
```

```
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Deny
|   |   + ---Match:
|   |       +----L4 destination port 24
```

9.5.3 acl match ether-type

[Command]

acl *acl-id* **(permit | deny) match ether-type** *ether-type*

[View]

config view

[Parameter]

permit: Configure ACL action as permit

deny: Configure ACL action as deny

acl-id: ACL ID. Type: numerical value; range: 1-192

ether-type: Ethernet type, hexadecimal type, range: 1-ffff

[Description]

This command is used to configure ACL quickly, including ACL ID, ACL action, and Ethernet type.

[Example]

Configure quickly the matching conditions of ACL with ACL ID as 1, action as deny and Ethernet type as ffff

```
BT(config)# acl 1 deny match ether-type ffff
BT(config)# show acl 1
+----ACL: 1, prio: 5, desc: acl-1
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Deny
|   |   + ---Match:
|   |       +----Ethernet frame type 0xffff
```

9.5.4 acl match ip-protocol

[Command]

acl *acl-id* **(permit | deny) match ip-protocol** *protocol*

[View]

config view

[Parameter]

permit: Configure ACL action as permit

deny: Configure ACL action as deny

acl-id: ACL ID. Type: numerical value; range: 1-192

protocol: IP protocol. Type: numerical value; range: 0-255

[Description]

This command is used to configure ACL quickly, including ACL ID, ACL action, and IP protocol.

[Example]

Configure quickly the matching conditions of ACL with ACL ID as 1, action as deny and IP protocol as IGMP

```
BT(config)# acl 1 deny match ip-protocol 2
BT(config)# show acl 1
+----ACL: 1, prio: 5, desc: acl-1
|   +----Rule :
|   |   + --- Action:
|   |   |   + --- Deny
|   |   + --- Match:
|   |       +----IP protocol 2
```

9.5.5 acl match src-ip

[Command]

acl *acl-id* **(permit | deny) match src-ip** *ip-address netmask*

[View]

config view

[Parameter]

permit: Configure ACL action as permit

deny: Configure ACL action as deny

acl-id: ACL ID. Type: numerical value; range: 1-192

ip-address: Source P address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

netmask: Subnet mask of source address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

[Description]

This command is used to configure ACL quickly, including ACL ID, ACL action, and source IP address.

[Example]

Configure quickly the matching conditions of ACL with ACL ID as 1, action as deny and destination IP address as 192.168.3.0/24

```
BT(config)# acl 1 deny match src-ip 192.168.3.0 255.255.255.0
BT(config)# show acl 1
+----ACL: 1, prio: 5, desc: acl-1
|   +----Rule :
|   |   + --- Action:
|   |   |   + --- Deny
|   |   + --- Match:
|   |       +----Source IPV4 address 192.168.3.0 255.255.255.0
```

9.5.6 acl match src-ip dst-ip

[Command]

acl *acl-id* **(permit | deny) match src-ip** *src-ip src-netmask* **dst-ip** *dst-ip dst-netmask*

[View]

config view

[Parameter]

permit: Configure ACL action as permit

deny: Configure ACL action as deny

acl-id: ACL ID. Type: numerical value; range: 1-192

src-ip: Source IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

src-netmask: Subnet mask of source address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

dst-ip: Destination IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

dst-netmask: Subnet mask of destination address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

[Description]

This command is used to configure ACL quickly, including ACL ID, ACL action, source IP address and destination IP address.

[Example]

Configure quickly the matching conditions of ACL with ACL ID as 1, action as deny, source IP address as 192.168.3.0/24 and destination IP address as 192.168.2.0/24:

```
BT(config)# acl 1 deny match src-ip 192.168.3.0 255.255.255.0 dst-ip
192.168.2.0 255.255.255.0
BT(config)# show acl 1
+----ACL: 1, prio: 5, desc: acl-1
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Deny
|   |   + ---Match:
|   |       +----Source IPV4 address 192.168.3.0 255.255.255.0
|   |       +----Destination IPV4 address 192.168.2.0 255.255.255.0
```

9.5.7 acl match src-port

[Command]

acl *acl-id* **(permit | deny) match src-port** *src-port*

[View]

config view

[Parameter]

permit: Configure ACL action as permit

deny: Configure ACL action as deny

acl-id: ACL ID. Type: numerical value; range: 1-192

src-port: Source port number. Type: numerical value; range: 0-65535

[Description]

This command is used to configure ACL quickly, including ACL ID, ACL action, and source port number.

[Example]

Configure quickly the matching conditions of ACL with ACL ID as 1, action as deny and source port number as 21

```
BT(config)# acl 1 deny match src-port 21
BT(config)# show acl 1
+----ACL: 1, prio: 5, desc: acl-1
|   +----Rule :
|   |   + ---Action:
|   |   |   + ---Deny
|   |   + ---Match:
|   |       +----L4 source port 21
```

9.5.8 acl match src-port dst-port

[Command]

acl *acl-id* **(permit | deny) match src-port** *src-port* **dst-port** *dst-port*

[View]

config view

[Parameter]

permit: Configure ACL action as permit

deny: Configure ACL action as deny

acl-id: ACL ID. Type: numerical value; range: 1-192

src-port: Source port number. Type: numerical value; range: 0-65535

dst-port: Destination port number. Type: numerical value; range: 0-65535

[Description]

This command is used to configure ACL quickly, including ACL ID, ACL action, source port number and destination port number.

[Example]

Configure quickly the matching conditions of ACL with ACL ID as 1, action as deny, source port number as21 and destination port number as 24

```
BT(config)# acl 1 deny match src-port 21 dst-port 24
BT(config)# show acl 1
+----ACL: 1, prio: 5, desc: acl-1
|   +----Rule :
|   |   + --- Action:
|   |   |   + --- Deny
|   |   + --- Match:
|   |       +----L4 source port 21
|   |       +----L4 destination port 24
```

Chapter 10 Network Security Management

10.1 BPI+ Management

10.1.1 cable privacy ak-life-time

[Command]

cable privacy ak-life-time *second*

no cable privacy ak-life-time

[View]

cmts view

[Parameter]

text: AK life time, in seconds. Numeric type, range: 300-6048000, default: 604800.

[Description]

The command "**cable privacy ak-life-time**" is used to configure the AK(Authorization Key) life time of the BPI+ sent by the CMTS device.

The command "**no cable privacy ak-life-time**" is used to restore the default AK life time of the BPI+ sent by the CMTS device.

[Example]

Configure the AK life time as 36000 s:

```
BT(config-if-cmts-1)# cable privacy ak-life-time 36000
BT(config-if-cmts-1)# show running-config | include ak-life-time
 cable privacy ak-life-time 36000
```

10.1.2 cable privacy bpi-plus-exclude

[Command]

cable privacy bpi-plus-exclude *exclude-id mac-address mac-mask*

no cable privacy bpi-plus-exclude *exclude-id*

[View]

cmts view

[Parameter]

exclude-id: exclude ID of BPI+. Numeric type, range: 1-4294967295.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF

mac-mask: MAC mask, with format as AA:BB:CC:DD:EE:FF; default: FFFF.FFFF.FFFF

[Description]

The command "**cable privacy bpi-plus-exclude**" is used to configure the exclude list of BPI+.

The command "**no cable privacy bpi-plus-exclude**" is used to delete a record of the exclude list of BPI+.

[Example]

Configure the exclude list of BPI+:

```
BT(config-if-cmts-1)# cable privacy bpi-plus-exclude 1 0024.6800.0001
ffff.ffff.0000
BT(config-if-cmts-1)# show running-config | include bpi-plus-exclude
 cable privacy bpi-plus-exclude 1 0024.6800.0001 ffff.ffff.0000
```

10.1.3 cable privacy bpi-plus-policy

[Command]

cable privacy bpi-plus-policy (disable-enforcement | d11-capable-enforcement | d11-enabled-enforcement | d11-enforcement | total-enforcement)

[View]

cmts view

[Parameter]

disable-enforcement: disable the BPI+ process.

d11-capable-enforcement: The CM of configuration file as DOCSIS 1.1 style configure, enable BPI+ function and support BPI+ function, forcing the BPI+ process.

d11-enabled-enforcement: The CM of configuration file as DOCSIS 1.1 style configure and enable BPI+ function, forcing the BPI+ process.

d11-enforcement: The CM of configuration file as DOCSIS 1.1 style configure, forcing the BPI+ process.

total-enforcement: enable the BPI+ process.

[Description]

This command configure to enable/disable the EAE (Early Authentication and Encryption) function of CMTS; CM matching the the conditions will force the BPI+ process. by default, it is disabled.

[Example]

All CM forcing the BPI+ process:

```
BT(config-if-cmts-1)# cable privacy bpi-plus-policy total-enforcement
BT(config-if-cmts-1)# show running-config | include bpi-plus-policy
 cable privacy bpi-plus-policy total-enforcement
```

10.1.4 cable privacy eae-exclude

[Command]

cable privacy eae-exclude *exclude-id mac-address mac-mask*

no cable privacy eae-exclude *exclude-id*

[View]

cmts view

[Parameter]

exclude-id: exclude ID of EAE. Numeric type, range: 1-4294967295.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF

mac-mask: MAC mask, with format as AA:BB:CC:DD:EE:FF; default: FFFF.FFFF.FFFF

[Description]

The command "**cable privacy eae-exclude**" is used to configure the exclude list of EAE(Early Authentication and Encryption) function.

The command "**no cable privacy eae-exclude**" is used to delete a record of the exclude list of EAE.

[Example]

Configure the exclude list of EAE:

```
BT(config-if-cmts-1)# cable privacy eae-exclude 1 0024.6800.0001
ffff.ffff.0000
BT(config-if-cmts-1)# show running-config | include eae-exclude
 cable privacy eae-exclude 1 0024.6800.0001 ffff.ffff.0000
```

10.1.5 cable privacy eae-policy

[Command]

cable privacy eae-policy (disable-enforcement | capability-enforcement | ranging-enforcement | total-enforcement)

[View]

cmts view

[Parameter]

disable-enforcement: disable the EAE encrypted function.

capability-enforcement: The CM of the ranging request message type is B-INIT-RNG-REQ, forcing the EAE encryption function.

ranging-enforcement: The CM of the ranging request message type is B-INIT-RNG-REQ and EAE capability flag in the message, forcing the EAE encryption function.

total-enforcement: enable the EAE encrypted function.

[Description]

This command configure to enable/disable the EAE function of CMTS; “total-enforcement” indicates that the function is enabled, while ” disable-enforcement” indicates that the function is disabled; by default, it is disabled.

The feature is only compatible with DOCSIS 3.0 CM, the device registers immediately after the CM ranging procedure and is encrypted for all communication data afterwards.

[Example]

Enable the EAE encrypted function:

```
BT(config-if-cmts-1)# cable privacy eae-policy total-enforcement
BT(config-if-cmts-1)# show running-config | include eae-policy
 cable privacy eae-policy total-enforcement
```

10.1.6 cable privacy tek-life-time

[Command]

cable privacy tek-life-time *second*

no cable privacy tek-life-time

[View]

cmts view

[Parameter]

text: AK life time, in seconds. Numeric type, range: 180-604800, default: 43200.

[Description]

The command "**cable privacy tek-life-time**" is used to configure the TEK (Traffic Encryption Key) life time of the BPI+ sent by the CMTS device.

The command "**no cable privacy tek-life-time**" is used to restore the default TEK life time of the BPI+ sent by the CMTS device.

[Example]

Configure the TEK life time as 3600 s:

```
BT(config-if-cmts-1)# cable privacy tek-life-time 3600
BT(config-if-cmts-1)# show running-config | include tek-life-time
 cable privacy tek-life-time 3600
```

10.2 CM Certificate Management

10.2.1 ca state

[Command]

ca *index* **state (root | trust | untrust | chained)**

[View]

enable view

[Parameter]

root | trust | untrust | chained: Certificate status. Root means the root file, trust | untrust | chained are MFG files

index: Certificate index. Type: numerical value; range: 1-268435455.

[Description]

This command is used to change the status of the certificate to one of root|untrust|trust|chain. The root certificate is usually imported from the server and will not be configured under normal circumstances. The system supports 5 root certificates, 3 of which are owned by the system; the system supports 10 MFG certificates.

[Example]

Change the status of the certificate 254 to trust.

```
BT(enable)# ca 254 state trust
BT(enable)# show cable privacy 254Index:
254
State: trust
Source: other
RowStatus: active
```

```
Subject: C = US, O = BT, OU = TEST, CN = MFG10
Issuer: C = CN, ST = BeiJing, L = BeiJing, O = BT, OU = TEST, CN = ROOT5
SerialNumber:  17:92:0c:ea:d2
Thumbprint: b4:5d:c3:3a:cb:d8:af:7d:db:9e:d8:89:a6:92:2e:90:38:64:64:e8
Validity Date:
    Start date: 2018/01/19 16:37:35
    End date: 2018/06/18 16:37:35
```

10.2.2 cable privacy crl url

[Command]

cable privacy crl url *url*

no cable privacy crl url *url*

[View]

config view

[Parameter]

url: CRL response address. Type: string; range:1-255 bytes.

[Description]

The command "**cable privacy crl url**" is used to configure the CRL response address.

The command "**no cable privacy crl url**" is used to delete the CRL response address.

[Example]

Configure the CRL response address as http://172.16.2.61/mycrl.crl.

```
BT(config)# cable privacy crl url http://172.16.2.61/mycrl.crl
BT(config)# show running-config | include url
 cable privacy crl url http://172.16.2.61/mycrl.crl
```

10.2.3 cable privacy crl timval

[Command]

cable privacy crl timval *minute*

[View]

config view

[Parameter]

minute: CRL update interval, in minutes. Type: numerical value; range: 1-524160; default: 10080.

[Description]

This command is used to configure the CRL update interval.

[Example]

Configure theCRL update interval as 5000 minutes.

```
BT(config)# cable privacy crl timval 5000
BT(config)# show running-config | include crl timval
 cable privacy crl timval 5000
```

10.2.4 cable privacy revocation methods

[Command]

cable privacy revocation methods (none | crl | ocsp | both)

[View]

config view

[Parameter]

none : No revocation verification

crls: Certificate revocation list method for revocation verification

ocsp: Online Certificate Status Protocol method for revocation verification

both: Both of crls and ocsp methods

[Description]

This command is used to configure the method of revocation verification.

[Example]

Configure the method of revocation verification as no revocation verification.

```
BT(config)# cable privacy revocation methods none
BT(config)# show running-config verbose | include revocation methods
 cable privacy revocation methods none
```

10.2.5 cable privacy revocation timeout

[Command]

cable privacy revocation timeout *second*

[View]

config view

[Parameter]

second: OCSP timeout , in seconds. Type: numerical value; range: 1-29.

[Description]

This command is used to configure the OCSP timeout period. When this time is exceeded, it will not wait any longer. Before configuring this command, you need to configure certificate revocation authentication as OCSP first, that is, the command is "cable privacy revocation methods ocsp".

[Example]

Configure the OCSP timeout period as 5 secondsn.

```
BT(config)# cable privacy revocation timeout 5
BT(config)# show running-config | include revocation timeout
 cable privacy revocation timeout 5
```

10.2.6 cable privacy revocation ocsp skip-sig-check

[Command]

cable privacy revocation ocsp skip-sig-check

no cable privacy revocation ocsp skip-sig-check

[View]

config view

[Parameter]

N/A

[Description]

The command "**cable privacy revocation ocsp skip-sig-check**" is used to configure the skip CM signature authentication check. This check is skipped by default.

The command "**no cable privacy revocation ocsp skip-sig-check**" is used to configure not to skip the CM signature authentication check.

[Example]

Configure not to skip the CM signature authentication check.

```
BT(config)# no cable privacy revocation ocsp skip-sig-check
BT(config)# show running-config | include skip-sig-check
 no cable privacy revocation ocsp skip-sig-check
```

10.2.7 cable privacy skip-cm-cert

[Command]

cable privacy skip-cm-cert

no cable privacy skip-cm-cert

[View]

config view

[Parameter]

N/A

[Description]

The command "**cable privacy skip-cm-cert**" is used to configure the skip CM certificate check. This check is not to skipped by default.

The command "**no cable privacy skip-cm-cert**" is used to configure not to skip the CM certificate check. Only the CM that passed the check can go online and use the network.

[Example]

Configure skip the CM certificate check.

```
BT(config)# cable privacy skip-cm-cert
BT(config)# show running-config | include skip-cm-cert
 cable privacy skip-cm-cert
```

10.2.8 cable privacy skip-validity

[Command]

cable privacy skip-validity

no cable privacy skip-validity

[View]

config view

[Parameter]

N/A

[Description]

The command "**cable privacy skip-validity**" is used to configure the skip check the validity period of the CM certificate. This check is skipped by default.

The command "**no cable privacy skip-validity**" is used to configure not to skip check the validity period of the CM certificate.

[Example]

Configure not to skip check the validity period of the CM certificate.

```
BT(config)# no cable privacy skip-validity
BT(config)# show running-config | include skip-validity
 no cable privacy skip-validity
```

10.2.9 load mfg-ca-cer

[Command]

load mfg-ca-cer ftp *ip-address username password remote-filename* **[***local-filename***]**

load mfg-ca-cer tftp *ip-address remote-filename* **[***local-filename***]**

[View]

enable view

[Parameter]

ip-address: FTP/TFTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

username: FTP username. Type: string; range: 1-50 characters.

password: FTP password. Type: string; range: 1-50 characters.

remote-filename: MFG file name acquired from FTP/TFTP server. Type: string; range: 1-64characters.

local-filename: MFG file name in the CMTS device. Type: string; range: 1-64characters.

[Description]

The command "**load mfg-ca-cer ftp**" is used to download the MFG file on the FTP server into the CMTS file system.

The command "**load mfg-ca-cer tftp**" is used to download the MFG file on the TFTP server into the CMTS file system.

[Example]

Import the MFG file on the FTP server into the CMTS file system:

```
BT# load mfg-ca-cer tftp 172.16.2.61 mfg.crt
```

```
BT# show cable privacy manufacture-cert-list
Cable Manufacturer Certificates:
Index: 6
State: chained
Source: other
RowStatus: active
Subject: C = EN, ST = TEST, L = MFG
Issuer: C = CN, ST = BeiJing, L = HaiDian, O = BT, OU = SumaVision, CN =
SinFaint, emailAddress = lisaifeng@dvt.dvt.com
SerialNumber:  123456789 (0x75bcd15)
Thumbprint: a0:3f:6e:30:64:ee:b6:87:59:26:af:46:d0:33:cf:e7:cf:43:94:b1
Validity Date:
    Start date: 2017/11/14 17:08:14
    End date: 2018/11/14 17:08:14
Index: 7
State: chained
Source: other
RowStatus: active
Subject: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert SHA2 Extended
Validation Server CA
Issuer: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert High Assurance
EV Root CA
SerialNumber: 0c:79:a9:44:b0:8c:11:95:20:92:61:5f:e2:6b:1d:83
Thumbprint: 7e:2f:3a:4f:8f:e8:fa:8a:57:30:ae:ca:02:96:96:63:7e:98:6f:3f
Validity Date:
    Start date: 2013/10/22 12:00:00
    End date: 2028/10/22 12:00:00
```

10.2.10 load root-ca-cer

[Command]

load root-ca-cer ftp *ip-address username password remote-filename* **[***local-filename***]**

load root-ca-cer tftp *ip-address remote-filename* **[***local-filename***]**

[View]

enable view

[Parameter]

ip-address: FTP/TFTP server IP address, it can be configured as IPv4 address or IPv6 address, with format as A.B.C.D or X:X::X:X.

username: FTP username. Type: string; range: 1-50 characters.

password: FTP password. Type: string; range: 1-50 characters.

remote-filename: Root file name acquired from FTP/TFTP server. Type: string; range: 1-64 characters.

local-filename: Root file name in the CMTS device. Type: string; range: 1-64 characters.

[Description]

The command "**load root-ca-cer ftp**" is used to download the root file on the FTP server into the CMTS file system.

The command "**load root-ca-cer tftp**" is used to download the root file on the TFTP server into the CMTS file system.

[Example]

Import the root file on the FTP server into the CMTS file system:

```
BT# load root-ca-cer ftp 172.16.2.61 admin 123456 root1.der
BT# show cable privacy root-cert-list
Cable Root Certificates:
Index: 4
State: chained
Source: auth
RowStatus: active
Subject: C = US, O = "Arris Interactive, L.L.C.", OU = DOCSIS, OU = "Suwanee,
Georgia", CN = Arris Cable Modem Root Certificate Authority
Issuer: C = US, O = Data Over Cable Service Interface Specifications, OU = Cable
Modems, CN = DOCSIS Cable Modem Root Certificate Authority
SerialNumber:  45:52:9c:26:54:79:7e:16:23:c6:e7:23:18:0a:9e:9c
Thumbprint: 0e:db:f2:a9:8b:45:43:6b:6e:4b:46:47:97:c0:8a:32:f2:a2:cd:66
Validity Date:
    Start date: 2001/09/12 00:00:00
    End date: 2021/09/11 23:59:59
Index: 5
State: root
Source: other
RowStatus: active
Subject: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert Assured ID
Root CA
Issuer: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert Assured ID
Root CA
SerialNumber: 0c:e7:e0:e5:17:d8:46:fe:8f:e5:60:fc:1b:f0:30:39
Thumbprint: 05:63:b8:63:0d:62:d7:5a:bb:c8:ab:1e:4b:df:b5:a8:99:b2:4d:43
Validity Date:
    Start date: 2006/11/10 00:00:00
```

```
    End date: 2031/11/10 00:00:00
```

10.2.11 remove mfg-ca-cer

[Command]

remove mfg-ca-cer *index*

[View]

config view

[Parameter]

index: MFG file index. Type: numerical value; range: 1-268435455.

[Description]

This command is used to remove MFG file from the CMTS file system.

[Example]

Remove MFG file 6.

```
BT(config)# remove mfg-ca-cer 6
BT(config)# show cable privacy manufacture-cert-list
Cable Manufacturer Certificates:
Index: 7
State: chained
Source: other
RowStatus: active
Subject: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert SHA2 Extended
Validation Server CA
Issuer: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert High Assurance
EV Root CA
SerialNumber: 0c:79:a9:44:b0:8c:11:95:20:92:61:5f:e2:6b:1d:83
Thumbprint: 7e:2f:3a:4f:8f:e8:fa:8a:57:30:ae:ca:02:96:96:63:7e:98:6f:3f
Validity Date:
    Start date: 2013/10/22 12:00:00
    End date: 2028/10/22 12:00:00
```

10.2.12 remove root-ca-cer

[Command]

remove root-ca-cer *index*

[View]

config view

[Parameter]

index: MFG file index. Type: numerical value; range: 1-268435455.

[Description]

This command is used to remove root file from the CMTS file system.

[Example]

Remove root file 6.

```
BT(config)# remove root-ca-cer 4 BT(config)# show
cable privacy root-cert-listCable Root Certificates:
Index: 5
State: root
Source: other
RowStatus: active
Subject: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert Assured ID
Root CA
Issuer: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert Assured ID
Root CA
SerialNumber: 0c:e7:e0:e5:17:d8:46:fe:8f:e5:60:fc:1b:f0:30:39
Thumbprint: 05:63:b8:63:0d:62:d7:5a:bb:c8:ab:1e:4b:df:b5:a8:99:b2:4d:43
Validity Date:
    Start date: 2006/11/10 00:00:00
    End date: 2031/11/10 00:00:00
```

10.2.13 show cable privacy

[Command]

show cable privacy (list | manufacture-cert-list | root-cert-list | *index*)

[View]

enable view

[Parameter]

list: All certificate files

manufacture-cert-list: MFG certificate files

root-cert-list: Root certificate files

index: Certificate file index. Type: numerical value; range: 1-268435455.

[Description]

This command is used to display the certificate file of the CMTS.

[Example]

Display all the certificate file:

```
BT(config)# show cable privacy list
Cable Certificate:
Index: 1
State: root
Source: other
RowStatus: active
Subject: C = BE, O = tComLabs - Euro-DOCSIS, OU = Cable Modems, CN = Euro-DOCSIS
Cable Modem Root CA
Issuer: C = BE, O = tComLabs - Euro-DOCSIS, OU = Cable Modems, CN = Euro-DOCSIS Cable
Modem Root CA
SerialNumber: 63:4b:59:63:79:0e:81:0f:3b:54:45:b3:71:4c:f1:2c
Thumbprint: 6a:fc:c7:7d:c4:e6:0c:ea:3c:65:44:17:14:c9:29:77:39:b6:59:0a
Validity Date:
    Start date: 2001/09/21 00:00:00
    End date: 2031/09/20 23:59:59
Index: 7
State: trust
Source: other
RowStatus: active
Subject: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert SHA2 Extended
Validation Server CA
Issuer: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert High Assurance
EV Root CA
SerialNumber: 0c:79:a9:44:b0:8c:11:95:20:92:61:5f:e2:6b:1d:83
Thumbprint: 7e:2f:3a:4f:8f:e8:fa:8a:57:30:ae:ca:02:96:96:63:7e:98:6f:3f
Validity Date:
    Start date: 2013/10/22 12:00:00
    End date: 2028/10/22 12:00:00
```

Display the MFG certificate file:

```
BT(config)# show cable privacy manufacture-cert-list
Cable Manufacturer Certificates:
Index: 7
State: trust
Source: other
RowStatus: active
```

```
Subject: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert SHA2 Extended
Validation Server CA
Issuer: C = US, O = DigiCert Inc, OU = www.digicert.com, CN = DigiCert High Assurance
EV Root CA
SerialNumber: 0c:79:a9:44:b0:8c:11:95:20:92:61:5f:e2:6b:1d:83
Thumbprint: 7e:2f:3a:4f:8f:e8:fa:8a:57:30:ae:ca:02:96:96:63:7e:98:6f:3f
Validity Date:
    Start date: 2013/10/22 12:00:00
    End date: 2028/10/22 12:00:00
```

Display the root certificate file:

```
BT(config)# show cable privacy root-cert-list
Cable Root Certificates:
Index: 1
State: root
Source: other
RowStatus: active
Subject: C = BE, O = tComLabs - Euro-DOCSIS, OU = Cable Modems, CN = Euro-DOCSIS
Cable Modem Root CA
Issuer: C = BE, O = tComLabs - Euro-DOCSIS, OU = Cable Modems, CN = Euro-DOCSIS Cable
Modem Root CA
SerialNumber: 63:4b:59:63:79:0e:81:0f:3b:54:45:b3:71:4c:f1:2c
Thumbprint: 6a:fc:c7:7d:c4:e6:0c:ea:3c:65:44:17:14:c9:29:77:39:b6:59:0a
Validity Date:
    Start date: 2001/09/21 00:00:00
    End date: 2031/09/20 23:59:59
```

10.2.14 show crl latest-update-time

[Command]

show crl latest-update-time

[View]

enable view

[Parameter]

N/A.

[Description]

This command is used to display the last update time of the CRL.

[Example]

Display last update time of the CRL:

```
BT(config)# show crl latest-update-time
Crl latest update time: 2017/11/27 04:36:24
```

10.3 Black/White List Management

10.3.1 access-deny

[Command]

access-deny (telnet | ssh | web | snmp) *ip-address* [*netmask*]

no access-deny (telnet | ssh | web | snmp) *ip-address* [*netmask*]

access-deny (telnet | ssh | web | snmp) (*ipv6-address* | *ipv6-mask*)

no access-deny (telnet | ssh | web | snmp) (*ipv6-address* | *ipv6-mask*)

[View]

line view

[Parameter]

telnet: Access the device via telnet protocol

ssh: Access the device via SSH protocol (recommended)

web: Access the device via WEB protocol

snmp: Access the device via SNMP protocol

ip-address: Blacklist IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

netmask: Blacklist subnet mask, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ipv6-address: IPv6 address, with format as X:X::X:X.

ipv6-mask: IPv6 address and mask, with format as X:X::X:X/M.

[Description]

The command " **access-deny**" is used to add a network blacklist, and prohibit the host with specified IP address or network section to access the device.

The command "**no access-deny**" is used to delete the specified IP address or network section from the network blacklist, and restore its permission to access the device.

[Example]

List the network section 192.168.0.0 255.255.255.0 in the blacklist, and prohibit the host in this network section to access the device

```
BT(config-line)# access-deny ssh 192.168.0.0 255.255.255.0
```

```
BT(config-line)# show running-config | include access-deny
access-deny ssh 192.168.0.0 255.255.255.0
```

Note:

After adding the mask by using the command "**access-deny**", by default, it is regarded by the system as a network section, for example, the user configures access-deny 192.168.2.13 255.255.255.0. After executing the command, access-deny 192.168.2.0 255.255.255.0 network section will be displayed in the result of display by using command "**show running-config**", that is, the host number will be removed from IP address automatically, but leaving the network number. The blacklist is configured one by one record, which includes a single IP address and the network section. In case of any overlapping of network section among records, they are not exclusive, and the whole blacklist will take effect. When the added record is entirely identical to the existing record in the blacklist, the system will reject the configuration and print prompts.

10.3.2 access-permit

[Command]

access-permit (telnet | ssh | web | snmp) *ip-address* [*netmask*]

no access-permit (telnet | ssh | web | snmp) *ip-address* [*netmask*]

access-permit (telnet | ssh | web | snmp) (*ipv6-address* | *ipv6-mask*)

no access-permit (telnet | ssh | web | snmp) (*ipv6-address* | *ipv6-mask*)

[View]

line view

[Parameter]

telnet: Access the device via telnet protocol

ssh: Access the device via SSH protocol (recommended)

web: Access the device via WEB protocol

snmp: Access the device via SNMP protocol

ip-address: Whitelist IP address, dotted decimal type; range: 0.0.0.0-255.255.255.255.

netmask: Whitelist subnet mask, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ipv6-address: Whitelist IPv6 address, with format as X:X::X:X.

ipv6-mask: Whitelist IPv6 address and mask, with format as X:X::X:X/M.

[Description]

The command " **access-permit**" is used to add a whitelist to the IP address firewall list.

The command " **no access-permit**" is used to delete a whitelist from the IP address firewall list.

[Example]

List the network section 192.168.0.0 255.255.255.0 in the whitelist via SSH access, and allow the host in this network section to access the device

```
BT(config-line)#   access-permit   ssh   192.168.0.0   255.255.255.0
BT(config-line)# show running-config | include access-permitaccess-
permit ssh 192.168.0.0 255.255.255.0
```

Note:

After adding the mask by using the command "**access-permit**", by default, it is regarded by the system as a network section, for example, the user configures access-permit ssh 192.168.2.13 255.255.255.0. After executing the command, access-permit ssh 192.168.2.0 255.255.255.0 network section will be displayed in the result of display by using command "**show running-config**", that is, the host number will be removed from IP address automatically, but leaving the network number. The whitelist is configured one by one record, which includes a single IP address and the network section. In case of any overlapping of network section among records, they are not exclusive, and the whole whitelist will take effect. When the added record is entirely identical to the existing record in the whitelist, the system will reject the configuration and print prompts.

10.3.3 clear firewall-list

[Command]

clear firewall-list

[View]

line view

[Parameter]

N/A

[Description]

Clear the IP address firewall list.

[Example]

Clear the IP address firewall:

```
BT(config-line)# clear firewall-list
BT(config-line)# exit BT(config)# show
firewall-list ACCESS    MODE
                IPADDRESS/MASKBITS

 ------------------------------------------------------------------
```

```
-------------------------------------------------------------
ip-firewall   telnet   disable
ip-firewall   ssh      disable
ip-firewall   snmp     disable
ip-firewall   web      disable
```

10.3.4 ip-firewall

[Command]

ip-firewall (telnet | ssh | snmp | web) (enable | disable)

[View]

line view

[Parameter]

telnet: Access the device via telnet protocol

ssh: Access the device via SSH protocol (recommended)

web: Access the device via WEB protocol

snmp: Access the device via SNMP protocol

enable: Enable the firewall

disable: Disable the firewall

[Description]

Enable or disable all kinds of IP address access mode function of IP address firewall.

[Example]

Configure enabling the telnet firewall function, and devices IP address 10.10.20.0/24 can be accessed through the telnet mode:

```
BT(config)# line vty
BT(config-line)# access-permit telnet 10.10.20.0 255.255.255.0
BT(config-line)# ip-firewall telnet enable
BT(config-line)# show running-config
!
line vty
access-permit telnet 10.10.20.0 255.255.255.0
 ip-firewall telnet enable
exit
BT(config)# show firewall-list
 ACCESS         MODE      IPADDRESS/MASKBITS
 -------------------------------------------------------------
```

```
 permit         telnet    10.10.20.0/24
 ------------------------------------------------------------------------------
 ip-firewall    telnet    enable
 ip-firewall    ssh       disable
 ip-firewall    snmp      disable
 ip-firewall    web       disable
```

Note:

It must be configuring the whitelist before enable the access method.

10.3.5 show firewall-list

[Command]

show firewall-list

[View]

enable view, config view, line view

[Parameter]

N/A

[Description]

View the IP address firewall list.

[Example]

View the IP address firewall list:

```
BT(config)# show firewall-list
ACCESS          MODE       IPADDRESS/MASKBITS
------------------------------------------------------------------------------
 permit         telnet     10.10.20.0/24
------------------------------------------------------------------------------
 ip-firewall    telnet     enable
 ip-firewall    ssh        disable
 ip-firewall    snmp       disable
 ip-firewall    web        disable
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
ACCESS	Firewall access rule, including permit and deny
MODE	Firewall access mode, including telnet, SSH, SNMP and web
IPADDRESS/MASKBITS	Firewall IP address and subnet mask

Parameter	Description
Firewall state	All kinds of firewall state

10.4 SAV Management

10.4.1 cable modem static ip

[Command]

cable modem *mac-address* **static ip** *ip-address*

no cable modem *mac-address* **static ip** *ip-address*

[View]

config view

[Parameter]

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

ip-address: Static IPv4 address or IPv6 address of CPE, with format as A.B.C.D or X:X::X:X

[Description]

The command "**cable modem static ip**" is used to configure static IP address of CPE under CM. After successful configuration, the IP address will not be subject to the anti-static IP address function. The CMTS supports 50 static IP. After successful execution of the command, you can view the information of static IP address of CPE under CM by using the command "show cpe static config". User can configure 50 at most static ipv4 address totally by CLI, and 1024 for static ipv6 address.

The command "**no cable modem static ip**" is used to cancel the static IP address of CPE under CM. After cancelling, the IP address will be subject to the anti-static IP address function.

[Example]

Configure the static IP address of CPE under CM in the config view:

```
BT(config)# cable modem 0016.9259.779c static ip 192.168.1.1
BT(config)# show cpe static ip
 CMC Index     CM MAC            CPE IP
 C1            0016.9259.779c    192.168.1.1
Total CM :1,Total Static CPE IP:1
```

10.4.2 cable source verify

[Command]

cable source verify (enable | disable | dhcp)

[View]

cable source verify (enable | disable): config view, bundle view

cable source verify dhcp: bundle view

[Parameter]

enable: Enable SAV function, unauthorized static IP address is not permitted

disable: Disable SAV function, unauthorized static IP address is permitted

dhcp: Enable SAV function and DHCPLEASEQUERY function, CPE traffic which sav failed will cause dhcp re-authentication

[Description]

The command "**cable source verify (enable | disable)**" is used to enable or disable SAV (Source Address Verification) function. SAV function is to implement the security verification against source IP address, to prevent DOCSIS network from malicious attacks by any unauthorized user. When it requires filtering the data sent by the specified IP address or the specified IP address network section at user side, enable SAV function.

The command "**cable source verify dhcp**" is used to enable SAV function and DHCPLEASEQUERY function. DHCPLEASEQUERY function is to re-authentication which SAV was failure. SAV was failure only in the whole network anomalies, such as the network CMTS – CM – SWITCH – CPE, if the CM reset , the CPE which connected it will link down the network, then we need re-authentication the DHCPLEASEQUERY packets and make sure the CPE connect the network.

Where, when **cable source verify** is in the config view, it functions on all global CM, with default as disable; when **cable source verify** is in the bundle view, it functions only on the CM online via bundle, with default as enable.

[Example]

Set to permit the unauthorized IP address:

```
BT(config-if-bundle1)# cable source verify disable
BT(config-if-bundle1)# show running-config | include verify
 cable source verify disable
```

10.4.3 cable source verify enable-sav-static

[Command]

cable source verify enable-sav-static

no cable source verify enable-sav-static

[View]

config view

[Parameter]

N/A

[Description]

The command "**cable source verify enable-sav-static**" is used to enable the static SAV function.

The command "**no cable source verify enable-sav-static**" is used to disable the static SAV function.

[Example]

Enable the static SAV function:

```
BT(config)# cable source verify enable-sav-static
BT(config)# show running-config verbose  | include sav-static
!sav-static configuration:
cable source verify enable-sav-static
```

10.4.4 cable source verify exception

[Command]

cable source verify exception ip *ip-address netmask*

cable source verify exception ipv6 *ipv6-address/prefix*

no cable source verify exception ip *ip-address*

no cable source verify exception ipv6 *ipv6-address*

[View]

cmts view

[Parameter]

ip-address: IP address, dotted decimal type; range: unicast ip address.

netmask: Subnet mask, dotted decimal type; range: 0.0.0.0-255.255.255.255.

ipv6-address: IPv6 address, with format as X:X::X:X.

prefix: IPv6 address prefix. Type: numerical value; range: 1-128.

[Description]

The command "**cable source verify exception**" is used to add a record to the exception list. When a record is included in the exception list, it will not be excluded from SAV function. The CMTS supports max 10 records of sav exception list.

When add, if the record to add is included in some record already exist, or include some record already exist, user should remove the conflict record first, then add.

The command "**no cable source verify exception**" is used to delete a record from the exception list.

[Example]

Add a record to the exception list:

```
BT (config-if-cmts-1)# cable source verify exception ip 192.168.100.1
255.255.255.255
BT (config-if-cmts-1)# cable source verify exception ipv6 1000::1000/64BT
(config-if-cmts-1)# show cable source verify exception config IP_Address
                    IP_Mask
192.168.100.1       255.255.255.255
1000::1000          ffff:ffff:ffff:ffff::
```

Delete records from the exception list:

```
BT (config-if-cmts-1)# no cable source verify exception ip 192.168.100.1BT
(config-if-cmts-1)# no cable source verify exception ipv6 1000::1000 BT (config-
if-cmts-1)# show cable source verify exception config IP_Address   IP_Mask
```

10.4.5 cable source verify dhcp server

[Command]

cable [ipv6] source verify dhcp server *ip-address*

[View]

bundle view

[Parameter]

ipv6: IPv6 function. Default IPv4 function when not take the parameter.

ip-address: DHCP Server which receive the DHCPLEASEQUERY packets, with format as A.B.C.D or X:X::X:X.

[Description]

This command is used to add DHCP Server which receive the DHCPLEASEQUERY packets. After successfully executing this command, the device will send the DHCPLEASEQUERY packets to re-authentication, to ensure the normal communication of CPE .

[Example]

Add DHCP Server which receive the DHCPLEASEQUERY packets:

```
BT(config-if-bundle1)# cable source verify dhcp server 10.10.28.209
BT(config-if-bundle1)# show running-config | include server
 cable source verify dhcp server 10.10.28.209
```

Note:

1. Do ensure enable the DHCPLEASEQUERY function before using the command; enable the function refer to the command "**cable source verify**".
2. It only support one ip address each bundle. When exceeding the maximum supporting number of commands, the old records will be covered by the new ones.

10.4.6 cable source verify group

[Command]

cable source verify group *group*

no cable source verify group *group*

[View]

config view

[Parameter]

group: SAV group name. Type: string; range: 1-15 characters

[Description]

The command "**cable source verify group**" is used to add an SAV group and enter the SAV view. If the SAV group name has already existed, enter the SAV view directly.

The command "**no cable source verify group**" is used to delete an SAV group.

[Example]

Add an SAV group with name as SAVGROUPNAME

```
BT(config)# cable source verify group SAVGROUPNAME
BT(config-sav)#
```

10.4.7 cable source verify leasequery-filter

[Command]

cable source verify leasequery-filter upstream *threshold [interval]*

[View]

cable source verify leasequery-filter upstream *threshold*: config view

cable source verify leasequery-filter upstream *threshold interval*: bundle view

[Parameter]

threshold: the device processing the number of dhcpleasequery requests. Type: numerical value; range: 0-255; default: 1(config view) or 5(bundle view)

interval: the device processing time of dhcpleasequery requests, in second.. Type: numerical value; range: 1-10; default: 10

[Description]

This command is used to set the processing speed of DHCPLEASEQUERY function.

In config view this command is used to set the processing speed of DHCPLEASEQUERY function. That is the device processing the number of dhcpleasequery requests each second.

In bundle view this command is used to set the forwarding speed of DHCPLEASEQUERY function That is the device processing the number of dhcpleasequery requests in specified time.

[Example]

Set the forwarding speed of DHCPLEASEQUERY function:

```
BT(config-if-bundle1)# cable source verify leasequery-filter upstream 10 10
BT(config-if-bundle1)# show running-config | include leasequery-filter
 cable source verify leasequery-filter upstream 10 10
```

10.4.8 cable vpn source verify

[Command]

cable vpn [ipv6] source verify (enable|disable)

[View]

config view

[Parameter]

ipv6: Specified for IPv6 packets, IPv4 packets specified by default if no parameter input

enable: Enable SAV function for CM with L2VPN, unauthorized static IP address is not permitted

disable: Enable SAV function for CM with L2VPN, unauthorized static IP address is permitted

[Description]

The command is used to configure SAV function for CMs with L2VPN. L2VPN SAV function only takes effect on CMs with L2VPN configuration. If CM belongs to a bundle, then the command will control SAV together with SAV switch within the bundle, and the SAV function works only when the two switches are both enabled; if CM does not belong to any bundle, the command will independently control SAV whether to take effect.

[Example]

Configure the anti static ip function for CMs with L2VPN to shut down:

```
BT(config)# cable vpn source verify disable BT(config)#
cable vpn ipv6 source verify disableBT(config)# show
running-config | include verifycable vpn source verify
disable
cable vpn ipv6 source verify disable
```

10.4.9 clear cpe illegal

[Command]

clear cpe illegal (ipv4 | ipv6)

[View]

enable view, config view

[Parameter]

ipv4: IPv4 network

ipv6: IPv6 network

[Description]

The command is used to clear all the CPE records not obtained by SAV certification. IPv4 and IPv6 parameters are to specified for the records under the IPv4 or IPv6 network.

[Example]

Clear all the IPv4 illegal CPE records:

```
BT(config)# show cpe illegal ipv4
 CPE MAC          CMC Index  CM MAC           CPE IP           Drop Time
 0102.0304.0005   C1         2476.7d06.bcb8   100.200.201.101  2019-01-01 02:39:07 Thu
 0102.0304.000a   C1         2476.7d06.b4ec   100.200.201.101  2019-01-01 02:39:07 Thu
 0102.0304.0015   C1         2476.7d06.ce96   100.200.201.101  2019-01-01 02:39:07 Thu
BT(config)# clear cpe illegal ipv4
BT(config)# show cpe illegal ipv4
 CPE MAC          CMC Index  CM MAC           CPE IP           Drop Time
```

10.4.10 prefix

[Command]

prefix *ip-address (netmask | prefix)*

no prefix *ip-address (netmask | prefix)*

[View]

sav view

[Parameter]

ip-address: IP address of SAV, it supports IPv4 address and IPv6 address, with format as A.B.C.D or X:X::X:X.

netmask: The IP netmask length of SAV for the IPv4 address. Type: numerical value; range: 0-32.

prefix: The IP prefix length of SAV for the IPv6 address. Type: numerical value; range: 0-128.

[Description]

The command "**prefix**" is used to add a rule to the SAV group.

The command "**no prefix**" is used to delete a rule from the SAV group.

[Example]

Add the address segment 192.168.0.X to the SAV group:

```
BT(config-sav)# prefix 192.168.0.0 24
BT(config-sav)# show running-config | include prefix
 prefix 192.168.0.0 24
```

10.4.11 show cable modem cpe illegal

[Command]

show cable modem (*ip-address | mac-address***) cpe illegal (ipv4 | ipv6)**

[View]

enable view, config view

[Parameter]

ipv4: IPv4 network

ipv6: IPv6 network

ip-address: IPv4 address or IPv6 address of CM, with format as A.B.C.D or X:X::X:X

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF

[Description]

This command is used to display the records of CPE under the cable modem of not obtained SAV certification. IPv4 and IPv6 parameters are to specify for the recording under the IPv4 or IPv6 network.

This command lists the MAC address, IP address, the packet is discarded SAV regular time, and belongs to the CM MAC address and CMC index information.

[Example]

Display all the records of CPE under the CM 4432.c83c.88ac:

```
BT(config)# show cable modem 4432.c83c.88ac cpe illegal ipv6
 CPE MAC          CMC Index  CM MAC           CPE IP                          Drop Time
 0102.0304.0501   C1         4432.c83c.88ac   2001:172::653f:bf4d:bd1:9876    2019-01-01
02:37:54 Thu
 0102.0304.0502   C1         4432.c83c.88ac   2001:172::653f:bf4d:bd1:9876    2019-01-01
02:37:55 Thu
 0102.0304.0503   C1         4432.c83c.88ac   2001:172::653f:bf4d:bd1:9876    2019-01-01
02:37:56 Thu
```

- **Description of this command output:**

Parameter	Description
CPE MAC	MAC address of CPE
CMC Index	Local CMTS (1) of CPE
CM MAC	MAC address of CM
CPE IP	IP address of CPE
Drop Time	The time of packet was been discarded by SAV regular

10.4.12 show cable modem static-sav-config

[Command]

show cable modem [*mac-address***] static-sav-config**

show cable modem *ipv4-address* **vlan (untag | *vlan-id*) static-sav-config**

[View]

enable view, config view, cmts view

[Parameter]

untag: VLAN as untag

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF

ipv4-address: IPv4 address of management port, dotted decimal type; range: 0.0.0.0-255.255.255.255; default: 192.168.0.10.

vlan-id: VLAN ID. Type: numerical value; range: 1-4094

[Description]

This command is used to display the SAV configuration information in cable modem configuration file.

[Example]

Display the SAV configuration information of all CMs:

```
BT(config)# show cable modem static-sav-config
Mac Address         I/F      GroupName           PrefixIpAddr
0026.5ba6.47fc      C1       123456789abcdef     0.0.0.0/0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Mac Address	MAC address of CM
I/F	CMTS upstream interface, including CMTS ID and upstream channel ID
GroupName	SAV group name
PrefixIpAddr	SAV rule IP address

10.4.13 show cable source verify sav-static

[Command]

show cable source verify sav-static

[View]

enable view, config view

[Parameter]

N/A

[Description]

Display the function of static SAV.

[Example]

Display the function of static SAV:

```
BT(config)# show cable source verify sav-static
The static SAV is enabled
```

10.4.14 show cable source verify exception config

[Command]

show cable source verify exception config

[View]

cmts view

[Parameter]

N/A

[Description]

This command is used to display the records of the exception list.

[Example]

Display the records of the exception list:

```
BT(config-if-cmts-1)# show cable source verify exception config
IP_Address            IP_Mask
1000::1000            ffff:ffff:ffff:ffff::
```

- **Description of this command output:**

Parameter	Description
IP_Address	IP address of the record
IP_Mask	IP mask of the record

10.4.15 show cable source verify group

[Command]

show cable source verify group [*group*]

[View]

enable view, config view

[Parameter]

group: SAV group name. Type: string; range: 1-15 characters

[Description]

Display the configuration information of SAV group.

[Example]

Display the configuration information of all SAV groups:

```
BT(config)# show cable source verify group
GroupName        PrefixIpAddr
123              123.0.0.0/23
SAVGROUPNAME     192.168.0.0/24
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
GroupName	SAV group name
PrefixIpAddr	SAV rule IP address

10.4.16 show cpe static config

[Command]

show cpe static config

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the CPE static config on the system.

[Example]

Display the config of static CPE in the config view:

```
BT(config)# show cpe static config
 CMC Index      CM MAC              Source          CPE IP
 C1             001c.1df5.5e66      CLI/SNMP        100.1.2.3
                                    CONFIG          10.11.0.1
                                    CONFIG          172.12.12.12
                                    CONFIG          2001::1002
                                    CONFIG          2001::1003
 C1             001c.1df5.734c      CLI/SNMP        100.1.2.4
                                    CONFIG          10.11.0.1
                                    CONFIG          172.12.12.12
                                    CONFIG          2001::1002
                                    CONFIG          2001::1003
```

- **Description of this command output:**

Parameter	Description
CMC Index	Local CMTS (1) of CM
CM MAC	MAC address of CM
Source	Configuration source
CPE IP	IP address of CPE

10.4.17 show cpe illegal

[Command]

show cpe illegal (ipv4 | ipv6)

[View]

enable view, config view

[Parameter]

ipv4: IPv4 network

ipv6: IPv6 network

[Description]

This command is used to display all the CPE records of not obtained SAV certification. IPv4 and IPv6 parameters are to specify for the recording under the IPv4 or IPv6 network.

This command lists the MAC address, IP address, the packet is discarded SAV regular time, and belongs to the CM MAC address and CMC index information.

[Example]

Display all the CPE records:

```
BT(config)# show cpe illegal ipv4
 CPE MAC          CMC Index  CM MAC          CPE IP           Drop Time
 0102.0304.0401   C1         0025.f294.43e9  100.200.201.101  2019-01-01 02:33:35 Thu
 0102.0304.0402   C1         0025.f294.43e9  100.200.201.101  2019-01-01 02:33:36 Thu
```

- **Description of this command output:**

Parameter	Description
CPE MAC	MAC address of CPE
CMC Index	Local CMTS (1) of CPE
CM MAC	MAC address of CM
CPE IP	IP address of CPE
Drop Time	The time of packet was been discarded by SAV regular

10.4.18 show cpe static ip

[Command]

show cpe static ip

[View]

enable view, config view

[Parameter]

N/A

[Description]

This command is used to display the CPE static IP address actually work on the system.

[Example]

Display the static ip address actually work on system.

```
BT(config)# show cpe static ip
CM MAC              Source      CPE IP           mask
001c.1df5.734c      CONFIG      10.11.0.1        255.255.255.255
001c.1df5.734c      CONFIG      172.12.12.12     255.255.255.255
001c.1df5.5e66      CONFIG      10.11.0.1        255.255.255.255
001c.1df5.5e66      CONFIG      172.12.12.12     255.255.255.255
001c.1df5.734c      CONFIG      2001::1002       128
001c.1df5.734c      CONFIG      2001::1003       128
001c.1df5.5e66      CONFIG      2001::1002       128
001c.1df5.5e66      CONFIG      2001::1003       128
```

- **Description of this command output:**

Parameter	Description
CM MAC	MAC address of CM
Source	Configuration source
CPE IP	IP address of CPE
mask	Mask of the CPE IP address

10.5 IPv6 Router Advertisement Guard

10.5.1 ipv6 ra-guard

[Command]

ipv6 ra-guard (enable | disable)

[View]

config view

[Parameter]

enable: Enable IPv6 RA Guard (IPv6 Router Advertisement Guard) function

disable: Disable IPv6 RA Guard function

[Description]

This command is used to enable or disable IPv6 RA Guard (IPv6 Router Advertisement Guard) function. This function allows the RA packet to pass through the configuration of the filtering rules, and block the illegal RA packets. By default, the IPv6 RA Guard function is disabled.

[Example]

Enable IPv6 RA Guard function:

```
BT(config)# ipv6 ra-guard enable
It will take a while to set all rules, use "show ipv6 ra-guard config" command to
check configure status!
BT(config)# show ipv6 ra-guard config
 RA Guard Switch Config Finished. Rules Setting Success.
 ipv6 ra-guard enable
 no ipv6 ra-guard hop-limit
 ipv6 ra-guard managed-config-check disable
 ipv6 ra-guard other-config-check disable
```

10.5.2 ipv6 ra-guard hop-limit

[Command]

ipv6 ra-guard hop-limit *limit-min limit-max*

no ipv6 ra-guard hop-limit

[View]

config view

[Parameter]

limit-min: The minimum Cur Hop Limit in Router Advertisement, Type: numerical value; range: 1-255

limit-max: The maxmum Cur Hop Limit in Router Advertisement, Type: numerical value; range: 1-255

Requirements on parameter configuration: when configuring, the value of *limit-min* shall be less than that of *limit-max*.

[Description]

The command "**ipv6 ra-guard hop-limit**" is used to enable the legal value check of the Cur Hop Limit in Router Advertisement and set the range of it. If the value of the Cur Hop Limit out of the range, the RA packet will be discarded. By default, the legal value check of the Cur Hop Limit in Router Advertisement is disabled.

The command "**no ipv6 ra-guard hop-limit**" is used to restore the default legal value check of the Cur Hop Limit in Router Advertisement, that is the function is disabled. Then the RA Guard will cancel the Cur Hop Limit check and directly the next check.

[Example]

Set the range of the Cur Hop Limit in Router Advertisement:

```
BT(config)# ipv6 ra-guard hop-limit 21 31
BT(config)# show ipv6 ra-guard config | include hop-limit
 ipv6 ra-guard hop-limit 21 31
```

10.5.3 ipv6 ra-guard managed-config-check

[Command]

ipv6 ra-guard managed-config-check (enable | disable)

[View]

config view

[Parameter]

enable: Enable check the value of Managed address configuration

disable: Disable check the value of Managed address configuration

[Description]

This command is used to enable or disable check the value of Managed address configuration of the packets, when enable the check and the value is "1", the CMTS device will discard the packets; else the device will forwarding the packets. By default, the check the value of Managed address configuration is disabled.

[Example]

Enable the check the value of Managed address configuration:

```
BT(config)# ipv6 ra-guard managed-config-check enable
BT(config)# show ipv6 ra-guard config | include managed-config-check
 ipv6 ra-guard managed-config-check enable
```

10.5.4 ipv6 ra-guard other-config-check

[Command]

ipv6 ra-guard other-config-check (enable | disable)

[View]

config view

[Parameter]

enable: Enable check the value of Other configuration

disable: Disable check the value of Other configuration

[Description]

This command is used to enable or disable check the value of Other configuration of the packets, when enable the check and the value is "1", the CMTS device will discard the packets; else the device will forwarding the packets. By default, the check the value of Other configuration is disabled.

[Example]

Enable the check the value of Other configuration:

```
BT(config)# ipv6 ra-guard other-config-check enable
BT(config)# show ipv6 ra-guard config | include other-config-check
 ipv6 ra-guard other-config-check enable
```

10.5.5 ipv6 ra-guard prefix-list

[Command]

ipv6 ra-guard prefix-list *ipv6-address/prefix* **(permit | deny)**

no ipv6 ra-guard prefix-list *ipv6-address/prefix*

[View]

config view

[Parameter]

permit: Set the action of the current record as permit

deny: Set the action of the current record as deny

ipv6-address: The network IPv6 address of the Router Advertisement , with format as X:X::X:X.

prefix: IPv6 address prefix, Type: numerical value; range: 1-128.

[Description]

The command "**ipv6 ra-guard prefix-list**"is used to add a record to the ra-guard network prefix list and set the action of the current record as permit or deny . If the packet matches permit in the ra-guard network prefix list, it will be forwarding, else it will be discarded. The deny is priority than permit in the ra-guard network prefix list.

The command "**no ipv6 ra-guard prefix-list**"is used to delete a record from the ra-guard network prefix list .

[Example]

Add a record to the ra-guard network prefix list and set the action of it as permit:

```
BT(config)# ipv6 ra-guard prefix-list 2001:1009:1009::12/96 permit
BT(config)# show running-config | include prefix-list
 ipv6 ra-guard prefix-list 2001:1009:1009::12/96 permit
```

10.5.6 ipv6 ra-guard router-list

[Command]

ipv6 ra-guard router-list *ipv6-address* **(permit | deny)**

no ipv6 ra-guard router-list

[View]

config view

[Parameter]

permit: Set the action of the current record as permit

deny: Set the action of the current record as deny

ipv6-address: The network IPv6 address of the Router Advertisement , with format as X:X::X:X.

[Description]

The command "**ipv6 ra-guard router-list**"is used to add a record to the ra-guard router address list and set the action of the current record as permit or deny . If the packet matches permit in the ra-guard router address list, it will be forwarding, else it will be discarded. The deny is priority than permit in the ra-guard router address list.

The command "**no ipv6 ra-guard router-list**"is used to delete a record from the ra-guard router address list.

[Example]

Add a record to the the ra-guard router address list and set the action of it as permit:

```
BT(config)# ipv6 ra-guard router-list add fe80::82f6:2eff:fe11:af23 permit
BT(config)# show running-config | include router-list
 ipv6 ra-guard router-list fe80::82f6:2eff:fe11:af23 permit
```

10.5.7 show ipv6 ra-guard config

[Command]

show ipv6 ra-guard config

[View]

config view

[Parameter]

N/A

[Description]

This command is used to display the configuration of IPv6 Router Advertisement Guard and the configuration Successful or not.

[Example]

Display the configuration of IPv6 Router Advertisement Guard:

```
BT(config)# show ipv6 ra-guard config
 RA Guard Switch Config Finished. Rules Setting Success.
 ipv6 ra-guard disable
 no ipv6 ra-guard hop-limit
 ipv6 ra-guard managed-config-check disable
 ipv6 ra-guard other-config-check disable
```

10.6 WEB Proxy

10.6.1 webproxy

[Command]

webproxy *webproxyid ip-address*

no webproxy *webproxyid*

[View]

config view

[Parameter]

webproxyid: WEB proxy ID. Type: numerical value; range: 1-3

ip-address: Proxy forwards the slave device IP address, dotted decimal type, range: IPv4 unicast address

Note:

1-3 in the value range of webproxy ID corresponds to port 81-83.

[Description]

The command "**webproxy** *webproxyid ip-address"* is used to modify the configure and enable the proxy forward function, or modify the forward slave device IP address.

The command "**no webproxy** *webproxyid"* is used to disable the proxy forward function.

[Example]

Configure the No.1 proxy's slave device IP to 10.10.28.145:

```
BT(config)# webproxy 1 10.10.28.145
```

Disable the proxy forward 1:

```
BT(config)# no webproxy 1
```

10.7 CM Loopback Detection

10.7.1 cable loopback-detect enable

[Command]

cable loopback-detect enable

no cable loopback-detect enable

[View]

config view

[Parameter]

N/A

[Description]

The command "**cable loopback-detect enable**" is used to enable the CM loopback detection function.

The command "**no cable loopback-detect enable**" is used to turn off the CM loopback detection function.

[Example]

Enable the CM loopback detection function:

```
BT(config)# cable loopback-detect enable
```

Turn Off the CM loopback detection function:

```
BT(config)# no cable loopback-detect enable
```

10.7.2 cable loopback-detect packet-interval

[Command]

cable loopback-detect packet-interval *interval-time*

[View]

config view

[Parameter]

interval-time: The interval time between sending the detection message, Unit: second. Type: numerical value; range: 1-300; default: 30.

[Description]

By default, after the CM loopback detection function is turned on, the detection message is sent every 30 seconds. After the user configures the interval time, the detection message is sent according to the new interval time.

After changing the configuration, the next detection message will take effect after sending.

[Example]

Specifies an interval of 60 seconds for CM environment detection:

```
BT(config)# cable loopback-detect packet-interval 60
BT(config-if-cmts-1)#
```

10.7.3 no cable loopback-detect black-list

[Command]

no cable loopback-detect black-list [all | *mac-address*]

[View]

config view

[Parameter]

all: All the CMs.

mac-address: MAC address of CM, with format as AA:BB:CC:DD:EE:FF.

[Description]

The command "**no cable loopback-detect black-list all**" is used to remove all blacklists.

The command "**no cable loopback-detect black-list** *mac-address*" is used to remove the CM of the specified MAC address from the blacklist.

[Example]

Remove cm of specified MAC address from blacklist:

```
BT(config)# no cable loopback-detect black-list 0024.68a1.b2c3
BT(config)#
```

Remove all blacklists:

```
BT(config)# no cable loopback-detect black-list all
BT(config)#
```

10.7.4 show cable loopback-detect config

[Command]

show cable loopback-detect config

[View]

config view、enable view

[Parameter]

N/A

[Description]

This command is used to view the loopback detection configuration.

[Example]

View the loopback detection configuration:

```
BT(config)# show cable loopback-detect config
cable loopback-detect enable
cable loopback-detect packet- interval 60
```

10.7.5 show cable loopback-detect black-list

[Command]

show cable loopback-detect black-list

[View]

config view

[Parameter]

N/A

[Description]

This command is used to view CM added to blacklist due to loopback.

[Example]

View the loopback cm blacklist:

```
BT(config)# show cable loopback-detect black-list
MAC Address         Loop-back Time
0024.0000.1112      1970-01-01 00:09:32
4432.c83c.88e4      2019-08-29 10:15:53
BT(config)#
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
MAC Address	MAC address of the detected cm with loopback
Loop-back Time	The time when cm loopback is detected is based on the system time on the CMTS device

Chapter 11 DSG Management

11.1.1 cable dsg tunnel

[Command]

cable dsg tunnel *tunnel-index* **mac-address** *mac-address* **tunnel-group** *group-index* **client-list** *client-list-id* **[service-class** *class-name***]**

cable dsg tunnel *tunnel-index* **[mac-address** *mac-address***] [tunnel-group** *group-index***] [client-list** *client-list-id***] [service-class** *class-name***]**

no cable dsg tunnel *tunnel-index* **[service-class]**

[View]

config view

[Parameter]

tunnel-index: Tunnel index, Uniquely identifies a DSG Tunnel. Type: numerical value; range: 1-65535.

mac-address: MAC address of destination, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF.

group-index: Tunnel group ID. Type: numerical value; range: 1-65535.

client-list-id: DSG Clients ID. Type: numerical value; range: 1-65535.

class-name: Name of Service Class. Type: string; range: 1-15 characters.

[Description]

This command is used to configure DSG Tunnel related information and associate DSG Tunnel with Tunnel Group.

The command "**cable dsg tunnel mac-address tunnel-group client-list**" is used to create a new DSG Tunnel. You can set other configurations of the Tunnel after creating a new DSG Tunnel.

The command "**no cable dsg tunnel service-class**" is used to delete the association with the corresponding Service Class.

[Example]

Configure tunnel group 1 to associate with tunnel 1 and map to destination MAC 0024.6811.a001:

```
BT(config)#cable dsg tunnel 1 mac-address 0024.6811.a001 tunnel-group 1client-
list 1
BT(config)# show running-config | include dsg tunnel
cable dsg tunnel 1 mac-address 0024.6811.a001 tunnel-group 1 client-list 1
```

11.1.2 cable dsg classifier

[Command]

cable dsg classifier *class-id* **tunnel** *tunnel-index* **dest-ip** *dest-ip* **[priority** *priority***] [src-ip** *src-ip* **src-ip-prefix-len** *src-ip-prefix-len***] [dest-port** *dest-port-start dest-port-end***] [in-dcd | no-in-dcd]**

cable dsg classifier *class-id* **tunnel** *tunnel-index* [**dest-ip** *dest-ip*] [**priority** *priority*] [**src-ip** *src-ip* **src-ip-prefix-len** *src-ip-prefix-len*] [**dest-port** *dest-port-start dest-port-end*] [**in-dcd | no-in-dcd**]

no cable dsg classifier *class-id* **tunnel** *tunnel-index* [**src-ip**] [**dest-port**]

[View]

config view

[Parameter]

class-id: DSG-class number. Type: numerical value; range: 1-65535.

tunnel-index: DSG Tunnel index. Type: numerical value; range: 1-65535.

dest-ip: Destination IP address, multicast IP address is required, range: 224.0.1.0-239.255.255.255.

priority: Classifier priority. Type: numerical value; range: 0-255 (the higher the number, the higher the priority).

src-ip: Source IP address, range: 0.0.0.0-255.255.255.255.

src-ip-prefix-len: Source IP address prefix length. Type: numerical value; range: 1-32

dest-port-start: Destination port start value. Type: numerical value; range: 0-65535

dest-port-end: Destination port end value. Type: numerical value; range: 1-65535

in-dcd: Identify that the classifier is carried in the DCD message, which is not carried by default.

no-in-dcd: Identify that the classifier is not carried in the DCD message. It is not carried by default.

[Description]

This command is used to configure the DSG Tunnel classifier, which can classify the flows sent from the DSG Server into the appropriate DSG Tunnel.

Up to 32 classifiers can be set.

[Example]

Configure DSG classifier with classifier ID of 1 and destination IP of 239.10.10.10:

```
BT(config)# cable dsg classifier 1 tunnel 1 dest-ip 239.10.10.10
```

```
BT(config)#show running | include dsg classifier
cable dsg classifier 1 tunnel 1 dest-ip 239.10.10.10 priority 0
```

11.1.3 cable downstream dsg tunnel-group channel

[Command]

cable downstream *channel-id* **dsg tunnel-group** *group-index* **channel** *channel-index*

no cable downstream *channel-id* **dsg tunnel-group** *group-index* **channel** *channel-index*

[View]

cmts view

[Parameter]

channel-id: Downstream channel ID. Type: numerical value; range: 1-32.

group-index: DSG Tunnel group index. Type: numerical value; range: 1-65535.

channel-index: DSG Tunnel group channel index. Type: numerical value; range: 1-65535.

[Description]

This command is used to configure DOCSIS downstream channel association with DSG tunnel channel.

[Example]

Configure DSG Tunnel Group 1 and channel index 1. The associated downstream channel of DOCSIS is 1:

```
BT(config-if-cmts-1)#cable downstream 1 dsg tunnel-group 1 channel 1
BT(config-if-cmts-1)#show running | include dsg tunnel-group
 cable downstream 1 dsg tunnel-group 1 channel 1
```

11.1.4 cable dsg tunnel-group channel

[Command]

cable dsg tunnel-group *group-index* **channel** *channel-index* **[rule-priority** *rule-priority***] [vendor-param** *param-group-id***]**

no cable dsg tunnel-group *group-index* **channel** *channel-index* **[rule-priority] [vendor-param]**

[View]

config view

[Parameter]

group-index: DSG Tunnel group index. Type: numerical value; range: 1-65535.

channel-index: DSG Tunnel group channel index. Type: numerical value; range: 1-65535.

rule-priority: DSG rule priority. Type: numerical value; range: 0-255, The higher the value, the higher the priority.

param-group-id: DSG vendor group ID. Type: numerical value; range: 1-65535.

[Description]

This command is used to configure the DSG tunnel group and DSG channels.

The maximum number of tunnel groups supported is 256 (no separate distinction between group and channel index).

[Example]

Configure DSG Tunnel Group ID as 1 and DSG channel as 1-2:

```
BT(config)#cable dsg tunnel-group 1 channel 1
BT(config)#cable dsg tunnel-group 1 channel 2
BT(config)#show running | include dsg tunnel-groupcable
dsg tunnel-group 1 channel 1
cable dsg tunnel-group 1 channel 2
```

11.1.5 cable downstream dsg dcd-enable

[Command]

cable downstream (*channel-id* | *channel-list***) dsg dcd-enable**

no cable downstream (*channel-id* | *channel-list***) dsg dcd-enable**

[View]

cmts view

[Parameter]

channel-id: Downstream channel ID. Type: numerical value; range: 1-32.

channel-list : Downstream channel list. Type: numerical value; range: 1-32, For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

[Description]

This command is used to configure whether the downstream channel is allowed to send DCD messages. If there is DSG tunnel in the downstream channel, it is enabled by default.

After the downstream channel is associated with tunnel-group, the DCD message is enabled by default and cannot be set to non enabled.

[Example]

Configure downstream channel 1 to send DCD messages:

```
BT(config-if-cmts-1)#cable downstream 1 dsg dcd-enable
BT(config-if-cmts-1)# show cable dsg running-config verbose | include cable downstream 1 dsg
 cable downstream 1 dsg dcd-enable
```

11.1.6 cable dsg client-list client

[Command]

cable dsg client-list *client-list-index* **client** *client-index* **(application-id** *application-id* **| broadcast** *broadcast-id* **| ca-system-id** *ca-system-id* **| mac-address** *mac-address* **) [vendor-param** *param-group-id***]**

no cable dsg client-list *client-list-index* **client** *client-index* **[vendor-param]**

[View]

config view

[Parameter]

client-list-index: DSG Clients -index. Type: numerical value; range: 1-65535

client-index: DSG Client ID. Type: numerical value; range: 1-65535

application-id: Application ID. Type: numerical value; range: 1-FFFF

broadcast-id: Broadcast ID. Type: numerical value; range: 1-65535

ca-system-id: CA System ID. Type: numerical value; range: 1-FFFF

mac-address: MAC address of destination, with format as AA:BB:CC:DD:EE:FF or AABB.CCDD.EEFF.

param-group-id: DSG vendor group ID. Type: numerical value; range: 1-65535.

[Description]

The command "**cable dsg client-list client (application-id | broadcast | ca-system-id | mac-address) [vendor-param]**" is used to configure the corresponding client type in the DSG Client list.

The maximum number of configurations supported is 256, and client-list and client-id are not limited separately.

The command "**no cable dsg client-list client vendor-param**" is used to delete only DSG vendor group configuration.

[Example]

Configure customer list 1 and customer ID 1. The type is Application ID and the value is 1111:

```
BT(config)#cable dsg client-list 1 client 1 application-id 1111
BT(config)#show running | include client-list
 cable dsg client-list 1 client 1 application-id 1111
```

Note:

1. Application ID and CA System ID have corresponding standard definition values and representative meanings.
2. The Broadcast ID is defined in the DOCSIS standard as follows.

1	Contains [SCTE 65] - Delivery as defined in Annex D of this document.
2	Contains [SCTE 18] - Delivery as defined in Annex D of this document.
3	Contains OCAP Object Carousel [OCAP]; the use of this Value is deprecated.*
4	Contains OpenCable Common Download Carousel [OC-CDL]; the use of this Value is deprecated.*
5	Contains XAIT and/or CVT data as specified in [OC-CDL] - Delivery as defined in Annex D of this document.
6-55534	Reserved for future use.
55535-65535	Reserved for MSO specific use.

11.1.7 cable downstream dsg vendor-param

[Command]

cable downstream (*channel-id* | *channel-list***) dsg vendor-param** *param-group-id*

no cable downstream (*channel-id* | *channel-list***) dsg vendor-param**

[View]

cmts view

[Parameter]

channel-id: Downstream channel ID. Type: numerical value; range: 1-32.

channel-list: Downstream channel list. Type: numerical value; range: 1-32, For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

param-group-id: DSG vendor group ID. Type: numerical value; range: 1-65535.

[Description]

This command is used to configure the vendor parameter group ID referenced by the DCD message of the CMTS downstream channel.

[Example]

Configure the vendor parameter group ID in the DCD message of CMTS downstream channel 1 as 1:

```
BT(config-if-cmts-1)#cable downstream 1 dsg vendor-param 1
BT(config-if-cmts-1)#show running | include dsg vendor-param
 cable downstream 1 dsg vendor-param 1
```

11.1.8 cable dsg vendor-param

[Command]

cable dsg vendor-param *param-group-id* **vendor** *vendor-index* **oui** *oui* **[value** *value***]**

no cable dsg vendor-param *param-group-id* **vendor** *vendor-index* **[value]**

[View]

config view

[Parameter]

param-group-id: DSG vendor group ID. Type: numerical value; range: 1-65535.

vendor-id: DSG vendor index. Type: numerical value; range: 1-65535.

oui: Vendor's oui value. Type: numerical value; range: 0x000000-0xFFFFFF

value: Vendor specific parameter value, hexadecimal string type, value range: 1-100 characters

[Description]

The command "**cable dsg vendor-param vendor oui [value]**" is used to configure DSG vendor specific information. The maximum number of configurations supported is 256, and the vendor group and vendor ID are not restricted separately.

The command "**no cable dsg vendor-param vendor value**" is used todelete vendor specific parameter values.

[Example]

Configure DSG vendor parameter group 1, vendor index 1, OUI 002468:

```
BT(config)#cable dsg vendor-param 1 vendor 1 oui 002468
BT(config)#show running | include vendor-param
 cable dsg vendor-param 1 vendor 1 oui 002468
```

11.1.9 cable downstream dsg channel-list

[Command]

cable downstream (*channel-id* **|** *channel-list***) dsg channel-list** *list-index*

no cable downstream (*channel-id* **|** *channel-list***) dsg channel-list**

[View]

cmts view

[Parameter]

channel-id: Downstream channel ID. Type: numerical value; range: 1-32.

channel-list: Downstream channel list. Type: numerical value; range: 1-32, For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

list-index: DSG channel list index. Type: numerical value; range: 1-65535.

[Description]

This command is used to configure the DOCSIS downstream channel to associate with the DSG channel list.

[Example]

Configure the downstream channel of cmts to associate with DSG channel list 1:

```
BT(config-if-cmts-1)#cable downstream 1 dsg channel-list 1
BT(config-if-cmts-1)#show running | include dsg channel-list
 cable downstream 1 dsg channel-list 1
```

11.1.10 cable dsg channel-list channel-index

[Command]

cable dsg channel-list *list-index* **channel-index** *channel-index* **frequency** *dsg-frequency*

no cable dsg channel-list *list-index* **channel-index** *channel-index*

[View]

config view

[Parameter]

list-index: DSG channel list index. Type: numerical value; range: 1-65535.

channel-index: DSG Tunnel group channel index. Type: numerical value; range: 1-65535.

dsg-frequency: Downstream channel central frequency of DSG. Unit: Hz. Type: numerical value; range: European standard: (87000000 + bandwidth /2)-(1006000000 - bandwidth /2); American Standard: (54000000+bandwidth/2)-(1002000000-bandwidth/2). And is a multiple of 62500Hz.

[Description]

This command is used to configure the DSG channel list. A DSG channel list can have more than one DSG channel. It supports a maximum of 256 configurations and does not limit **channel-list** and **channel-index**. separately.

[Example]

Configure the center frequency of DSG channel list 1 and channel index 1 to 440000000:

```
BT(config)#cable dsg channel-list 1 channel-index 1 frequency 440000000
BT(config)#show running | include dsg channel-list
 cable dsg channel-list 1 channel-index 1 frequency 440000000
```

11.1.11 cable downstream dsg timer

[Command]

cable downstream (*channel-id* **|** *channel-list***) dsg timer** *timer-index*

no cable downstream (*channel-id* | *channel-list***) dsg timer**

[View]

cmts view

[Parameter]

channel-id: Downstream channel ID. Type: numerical value; range: 1-32.

channel-list: Downstream channel list. Type: numerical value; range: 1-32, For multiple IDs, support the range indicated by "-" and ",", and symbols must be followed by numbers, such as: 1,3,5-7 or 1-5,7.

timer-index: DSG timer index. Type: numerical value; range: 1-65535

[Description]

This command is used to configure the DSG timer index referenced by the downstream channel.

[Example]

Configure the DSG timer index of CMTS downstream channel 1 to be 1:

```
BT(config-if-cmts-1)#cable downstream 1 dsg timer 1
BT(config-if-cmts-1)#show running | include dsg timer
 cable downstream 1 dsg timer 1
```

11.1.12 cable dsg timer

[Command]

cable dsg timer *timer-index* **[tdsg1** *tdsg1***] [tdsg2** *tdsg2***] [tdsg3** *tdsg3***] [tdsg4** *tdsg4***]**

no cable dsg timer *timer-index* **[tdsg1** *tdsg1***] [tdsg2** *tdsg2***] [tdsg3** *tdsg3***] [tdsg4** *tdsg4***]**

[View]

config view

[Parameter]

timer-index: DSG timer index. Type: numerical value; range: 1-65535

tdsg1: DSG initialization timer, unit: second. Type: numerical value; range: 1-65535, The default value is 2.

tdsg2: DSG normal operation timer, unit: second. Type: numerical value; range: 1-65535, The default value is 600.

tdsg3: DSG retry bidirectional mode timer, unit: second. Type: numerical value; range: 0-65535, The default value is 300.

tdsg4: DSG retry one way mode timer, unit: second. Type: numerical value; range: 0-65535, The default value is 1800.

[Description]

This command is used to configure the DSG timer timeout.

[Example]

Configure tdsg2 timer with DSG timer index number of 1 for 1200s:

```
BT(config)#cable dsg timer 1 tdsg2 1200
BT(config)#show running | include tdsg2
cable dsg timer 1 tdsg1 2 tdsg2 1200 tdsg3 300 tdsg4 1800
```

11.1.13 clear cable dsg config

[Command]

clear cable dsg config

clear cable dsg config interface cmts *cmts-id*

[View]

config view

[Parameter]

cmts-id: CMTS ID. It is fixed as 1.

[Description]

clear cable dsg config interface cmts: Delete the DSG configuration in the CMTS view.

clear cable dsg config: Delete all DSG configurations.

[Example]

Delete all DSG configurations:

```
BT(config)# clear cable dsg config
```

11.1.14 show cable dsg tunnel statistics

[Command]

show cable dsg tunnel *tunnel-index* **statistics**

[View]

cmts view

[Parameter]

tunnel-index: Tunnel index, which uniquely identifies a DSG Tunnel. Type: numerical value; range: 1-65535.

[Description]

This command is used to view statistics for the specified Tunnel.

[Example]

View statistics for DSG tunnel 10:

```
BT(config-if-cmts-1)# show cable dsg tunnel 10 statistics
Tunnel Index      : 10
DSID              : 3331
Total Packets     : 0
Total Octets      : 0
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Tunnel Index	DSG tunnel index
DSID	Dsid associated with DSG tunnel
Total Packets	The total number of messages processed by tunnel

Parameter	Description
Total Octets	The total number of bytes of the message processed by tunnel

11.1.15 show cable dsg running-config

[Command]

show cable dsg running-config

[View]

enable view, config view, cmts view

[Parameter]

N/A

[Description]

This command is used to view DSG configuration information.

[Example]

View DSG configuration information:

```
BT(config)#show cable dsg running-config
 cable dsg client-list 1 client 1 broadcast 3
cable dsg tunnel-group 1 channel 1
 cable dsg tunnel 1 mac-address 0025.1515.1121 tunnel-group 1 client-list 1
 …
```

11.1.16 show cable dsg tunnel

[Command]

show cable dsg tunnel [*tunnel-index*]

[View]

enable view, config view

[Parameter]

tunnel-index: Tunnel index, which uniquely identifies a DSG Tunnel. Type: numerical value; range: 1-65535.

[Description]

This command is used to view DSG specified or all tunnel configuration information.

[Example]

This command is used to view DSG specified or all tunnel configuration information:

```
BT(config)#show cable dsg tunnel 1
Tunnel    MAC             Tunnel    Classifier Classifier Client    Service
Index     Address         Group     ID         In DCD     List ID  Class
1        0025.1515.1111    1        1          yes        1        dsg_qos
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Tunnel Index	DSG tunnel index
MAC Address	DSG tunnel MAC address
Tunnel Group	DSG Tunnel Group ID
Classifier ID	DSG classifier ID
Classifier In-DCD	Configure whether classifier configuration information is included in the DCD message
Client List ID	DSG customer list index
Service Class	Service class name referenced by DSG tunnel

11.1.17 show cable dsg tunnel classifier

[Command]

show cable dsg tunnel *tunnel-index* **classifier**

[View]

enable view, config view

[Parameter]

tunnel-index: Tunnel index, which uniquely identifies a DSG Tunnel. Type: numerical value; range: 1-65535

[Description]

This command is used to view the classifier information of the Tunnel specified by DSG.

[Example]

View classifier information for DSG Tunnel 1.

```
BT(config)#show cable dsg tunnel 1 classifier
Tunnel Classifier In DCD Priority Dst IP      Src IP       Src IP    Dst Port Dst
Port
Index  ID                                                 PrefixLen Start    End
1      1         No     1        239.10.10.10 192.168.10.10 32       10001    10010
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Tunnel Index	DSG tunnel index
Classifier ID	DSG classifier ID
In DCD	Identifies whether the classifier is carried in a DCD message
Priority	Classifier priority
Dst IP	Destination multicast IP address
Src IP	Source IP address
Src IP PrefixLen	Source IP address prefix length
Dst Port Start	Destination port start value
Dst Port End	Destination port end value

11.1.18 show cable dsg tunnel client-list

[Command]

show cable dsg tunnel *tunnel-index* **client-list**

[View]

enable view, config view

[Parameter]

tunnel-index: Tunnel index, which uniquely identifies a DSG Tunnel. Type: numerical value; range: 1-65535

[Description]

This command is used to view the customer list information of the Tunnel specified by DSG.

[Example]

View the customer list information for DSG tunnel 1:

```
BT(config)#show cable dsg tunnel 1 client-list
Tunnel  Client    Client   Client          Client          Vendor
Index   List ID   Index    ID Type         Value           Param
1       1         1        Application ID  0x0001
1       1         2        MAC Addr        0024.6811.00af
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Tunnel Index	DSG tunnel index
Client List ID	DSG customer list index
Client Index	DSG customer ID index
Client ID Type	There are four types of DSG customer ID: Broadcast, MAC Addr, CA System ID, Application ID
Client Value	The value corresponding to the DSG customer ID

Parameter	Description
Vendor Param	DSG vendor parameter group ID

11.1.19 show cable dsg tunnel-group

[Command]

show cable dsg tunnel-group [*group-index***]**

[View]

enable view, config view

[Parameter]

group-index: DSG Tunnel group index. Type: numerical value; range: 1-65535.

[Description]

This command is used to view DSG specified or all Tunnel Group configuration information.

[Example]

View information for DSG tunnel group 1:

```
BT(config)#show cable dsg tunnel-group 1
Group Index    Channel Index  I/F         Rule Priority  Vendor Param
1              1              C1/D1       1               1
```

- **In the example, the command echo parameters are explained in the following table:**

Parameter	Description
Group Index	DSG Tunnel Group ID
Channel Index	DSG channel index
I/F	Downstream channel associated with DSG tunnel group
Rule Priority	DSG rule priority
Vendor Param	DSG vendor parameter group index

Annex 1 Abbreviations

AAA	Authentication Authorization Accounting
ACK	Acknowledge
ACL	Access Control List
AGC	Automatic Gain Control
ARP	Address Resolution Protocol
ATDMA	Advanced Time Division Multiple Access
AVG	Average
BE	Best Effort
CFI	Canonical Format Indicator
CLI	Command Line Interface
CMTS	Cable Modem Terminal Systems
CM	Cable Modem
CMC	Cable Media Converter
COS	Class of Service
CPE	Customer Premises Equipment
CRC	Cyclic Redundancy Check
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
DOCSIS	Data-over-Cable Service Interface Specification
DS	Downstream
DSA	Dynamic Service Addition
DSCP	Differentiated Services Code Point
DSG	DOCSIS Set-top Gateway
DSID	Downstream Identification
EAE	Early Authentication and Encryption
EPON	Ethernet Passive Optical Network
EQAM	Edge Quadrature Amplitude Modulation
FEC	Forward Error Correction
FTP	File Transfer Protocol
GPON	Gigabit Passive Optical Network
HCS	Header Check Sequence
HTTP	Hyper Text Transfer Protocol
HTTPS	Hyper Text Transfer Protocol over Secure Socket Layer
IAPD	Identity Association for Prefix Delegation
ICMP	Internet Control Messages Protocol
ID	Identification
IGMP	Internet Group Management Protocol
IP	Internet Protocol
IPDR	IP Detail Recording
IUC	Interval Usage Code
LLC	Logical Link Control
MAC	Media Access Control

MDD	MAC Domain Descriptor
MD-DS-SG	MAC Domain Downstream Service Group
MDF	Multicast DSID Forwarding
MD-US-SG	MAC Domain Upstream Service Group
MIC	Message Integrity Check
MRC	Multiple Receive Channel
MTA	Media Transport Agent
MTC	Multiple Transmit Channel
NCP	Next Codeword Pointer
NRTPS	Non-Real-Time Polling Service
NTP	Network Time Protocol
OCSP	Online Certificate Status Protocol
OMCC	ONT Management and Control Channel
OLT	Optical Line Terminal
OUI	Organizationally Unique Identifier
PON	Passive Optical Network
pps	packets per second
ProvAttrMask	Provisioned Attribute Mask
QAM	Quadrature Amplitude Modulation
QoS	Quality of Service
QPSK	Quad-Phase Shift Key
RADIUS	Remote Authentication Dial in User Service
RF	Radio Frequency
RTPS	Real-Time Polling Service
SAV	Source Address Verification
SCDMA	Synchronous Code Division Multiple Access
SFP	Small Form-factor Pluggables
SNMP	Simple Network Management Protocol
SNR	Signal to Noise Ratio
SSH	Secure Shell
STB	Set Top Box
TFTP	Trivial File Transfer Protocol
TOS	Type of Service
TPID	Tag Protocol Identifier
UCD	Upstream Channel Descriptor
UDC	Upstream Drop Classifier
UDP	User Datagram Protocol
UGS	Unsolicited Grant Service
UGS-AD	Unsolicited Grant Service with Activity Detection
US	Upstream
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
VTY	Virtual Type Terminal