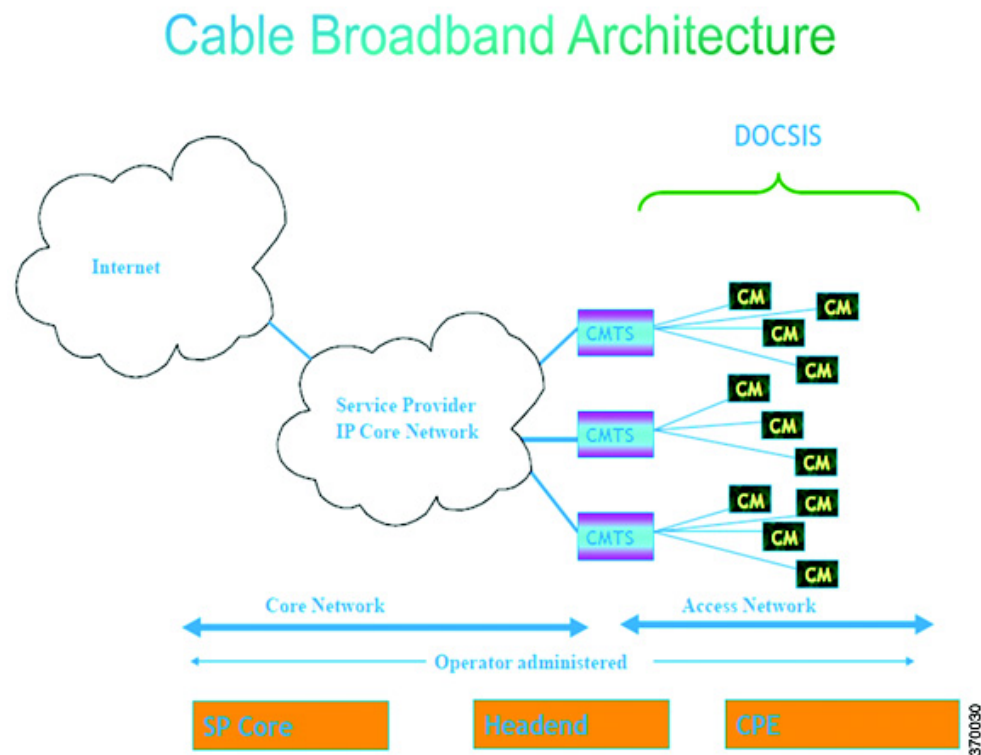




Monitoring Cable Technologies

Cable broadband communication operates in compliance with the Data Over Cable Service Interface Specification (DOCSIS) standard which prescribes multivendor interoperability and promotes a retail model for the consumer's direct purchase of a cable modem (CM) of choice. Figure 27-1 depicts the architecture of the cable broadband in compliance with this standard:

Figure 27-1 Cable Broadband Architecture



DOCSIS defines two key devices necessary for broadband cable communication:

- Cable Modem Termination System (CMTS) is a piece of equipment typically located in a cable company's headend or hubsite, and used to provide high speed data services, such as cable Internet or voice over Internet Protocol, to cable subscribers. A CMTS provides many of the same functions provided by the DSLAM in a DSL system. In order to provide these high speed data services, a cable company will connect its headend to the Internet via very high capacity data links to a network

service provider. On the subscriber side of the headend, the CMTS enables the communication with subscribers' cable modems. A single CMTS can accommodate thousands of cable modems, and provides the connection point to the Internet backbone.

- Cable Modem (CM) is a type of network bridge and modem that provides bi-directional data communication via radio frequency channels on a hybrid fiber-coaxial (HFC) and RFoG infrastructure. Cable modems are primarily used to deliver broadband Internet access in the form of cable Internet, taking advantage of the high bandwidth of a HFC and RFoG network. Usually located at the customer premises, terminates the cable line, and modulates/demodulates signals to and from the CMTS.

Data flowing from the CMTS to the Cable Modem is deemed downstream traffic. Data from the Cable Modem to the CMTS is upstream traffic. A DOCSIS binary configuration file provides the appropriate ISP parameters for cable modems to connect to the network.

There are two types of CMTS systems, which are explained below:

- Integrated CMTS (I-CMTS)—In this type of CMTS, the contents of the downstream channel are directly modulated and transmitted by the Downstream RF Port.
- Modular CMTS (M-CMTS)—In this type of CMTS, the contents of the downstream channel are encapsulated into a DEPI tunnel for transmission.

Cisco Systems offers a complete portfolio of standards-based cable products, solutions, and network management systems that enable integration of data, voice, and video services on a single multiservice cable IP network. Cisco offers the following CMTS systems:

- The Cisco uBR7100 Series, Cisco uBR7200 Series, and Cisco uBR10012 Universal Broadband Routers combine a CMTS with a fully integrated Cisco IOS® Software router.
- Cisco RF Switch works with the Cisco uBR10012 to offer a new level of high availability suited for DOCSIS, EuroDOCSIS, or PacketCable applications. Together with the Cisco uBR10012, the Cisco RF Switch enables a fully redundant CMTS with no single point of failure, including the upconverter.

Topics covered in this section are:

- [User Roles Required to Work with Cable Technologies, page 27-2](#)
- [Configure Cable Ports and Interfaces, page 27-11](#)
- [View Upstream and Downstream Configuration for Cable, page 27-12](#)
- [Configure QAM, page 27-12](#)
- [View QAM Configurations, page 27-13](#)
- [Configure DEPI and L2TP, page 27-14](#)

User Roles Required to Work with Cable Technologies

[Table 27-1](#) identifies the GUI default permission or device scope security level that is required to work with Prime Network Vision. Prime Network Vision determines whether you are authorized to perform a task as follows:

- For GUI-based tasks (tasks that do not affect devices), authorization is based on the default permission that is assigned to your user account.
- For element-based tasks (tasks that do affect elements), authorization is based on the default permission that is assigned to your account. That is, whether the element is in one of your assigned scopes and whether you meet the minimum security level for that scope.

For more information on user authorization, see the [Cisco Prime Network 4.0 Administrator Guide](#).

By default, users with the Administrator role have access to all managed elements. To change the Administrator user scope, see the topic on device scopes in the [Cisco Prime Network 4.10 Administrator Guide](#).

Table 27-1 Default Permission/Security Level Required for the Data Center Configurations

Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
Viewing the Cable Broadband Configuration Details	X	X	X	X	X
Viewing the DTI Configuration Details	X	X	X	X	X
Viewing the QAM Domain Configuration Details	X	X	X	X	X
Viewing the MAC Domain Configuration Details	X	X	X	X	X
Viewing the Narrowband Channels Configuration Details	X	X	X	X	X
Viewing the Wideband Channels Configuration Details	X	X	X	X	X
Viewing the Fiber Node Configuration Details	X	X	X	X	X

Viewing the Cable Broadband Configuration Details

You can view the following Cable technology configurations:

- **DTI Client**—The DOCSIS Timing Interface (DTI) client collects DTI server master clock, DOCSIS timestamp, and Time of Day information from the DTI Server. It interfaces with the DTI Server to provide Time, Frequency and Management interfaces to the Modular Cable Modem Termination System (M-CMTS) device.
- **QAM Domain**—Quadrature Amplitude Modulation (QAM) domain
- **MAC Domain**—A MAC domain is a logical subcomponent of a Cisco CMTS router and is responsible for implementing all DOCSIS functions on a set of downstream and upstream channels. The CMTS MAC domain typically includes one or more downstream paths and one or more upstream paths. Depending on the CMTS configuration, the CMTS MAC domain can be defined to have its downstream on one cable interface line card with its upstreams on another card, or one or more CMTS MAC domains per cable interface line card.
- **Narrowband Channels**—A Narrowband Channel is a logical representation of a non-bonded channel that is a standard DOCSIS 1.x/2.0 protocol downstream channel that contains one RF channel. The wideband protocol utilizes the existing narrowband downstream channel for carrying the MAC management and signaling messages and the associated narrowband upstream for return data traffic and signaling.

- **Wideband Channels**—A Wideband Channel or Bonded Group (BG) is a logical grouping of one or more physical RF channels over which MPEG-TS packets are carried. Wideband channel carries DOCSIS bonded packets encapsulated in MPEG-TS packets from a WCMTS to one or more WCMs. The wideband channel, comprising of one or more RF channels on the EQAM device, is used for DS data traffic. The US channels on the Cisco uBR-MC3GX60V or Cisco uBR10-MC5X20 cable interface line cards are used for US traffic.
- **Fiber Node**—A Fiber Node allows the Multiple Server Operator (MSO) or service provider to configure the CMTS to be more intelligent by making Cisco IOS aware of how the cable plant is wired. The downstream channels of the cable plant must be accurately configured in the CMTS fiber nodes. This allows the CMTS to accurately signal the wideband modems on which the wideband channels are available to the modem.

Viewing the DTI Client Configuration Details

To view the DTI Client configuration details:


- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > DTI Client**. The DTI Client details are displayed in the content pane.

[Table 27-2](#) describes the DTI Client configuration details.

Table 27-2 DTI Client Configuration Details

Field	Description
DTI Server Details	
Server Status	<p>The status of the server, which can be any one of the following:</p> <ul style="list-style-type: none"> • Free Run • Warm Up • Fast Tracking • Normal • Hold Over • Client Stable • Test
Root Server Clock Type	<p>The clock type of the DTI Server, which can be any one of the following:</p> <ul style="list-style-type: none"> • ITU Type 1 • ITU Type 2 • ITU Type 3 • ITU STRATUM 3

Table 27-2 DTI Client Configuration Details (continued)

Field	Description
Root Server Source	The clock source of the DTI server, which can be any one of the following: <ul style="list-style-type: none"> • Internal • External • GPS • None
Server Type	The type of DTI Server, which can be any one of the following: <ul style="list-style-type: none"> • Root • User Time • NTPV 4 • GPS
Client Performance Stable	Indicates the stability of the performance of the DTI client.
Client Cable Advance Valid	Indicates the cable advance status of the DTI Server Frame.
TOD Setting Mode	The output of the Time of Day Setting mode (User time, NTP, GPS), which can be any one of the following: <ul style="list-style-type: none"> • Short • Verbose <div>  <p>Note The output is based on the TOD message sent by the DTI Server.</p> </div>
Time of Day	The date and time of the clock.
DTI Client Port Status	
DTI Client	The name of the DTI client, which when clicked will take you to the relevant slot under the Physical Inventory node.
DTI Client Status	The status of the DTI client, which can be any of the following: <ul style="list-style-type: none"> • Active • Standby
Connected	Indicates whether the DTI Server is active in the DTI client port.

Viewing the QAM Domain Configuration Details

To view the QAM domain configuration details:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > QAM Domain > QAM Domain name**. The QAM Domain details are displayed north content pane.

Table 27-3 describes the QAM Domain configuration details.

Table 27-3 QAM Domain Configuration Details

Field	Description
QAM Domain ID	The unique identification code of the QAM domain.
QAM Domain	
QAM Domain ID	The unique identification code of the QAM domain.
UDP Start Range	The starting port in the range of UDP ports for the video route.
UDP End Range	The ending port in the range of UDP ports for the video route.
QAM Block	The QAM block ID for the video route.

Viewing the MAC Domain Configuration Details

To view the MAC domain configuration details:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > MAC Domains > MAC Domain name**. The MAC Domain configuration details are displayed in the content pane.

Table 27-4 describes the MAC Domain configuration details.

Table 27-4 MAC Domain Configuration Details

Field	Description
MAC Domain Name	The name of the MAC domain.
Domain Status	The status of the MAC domain, which can be any one of the following: <ul style="list-style-type: none"> Up Down Administrative Up Administrative Down Unknown
Bundle	The bundle address associated with the MAC domain.
Active Remote DS	The downstream channel associated with the MAC domain.
Upstream Channels	
US Channel ID	The unique identification code of the Upstream channel.

Table 27-4 MAC Domain Configuration Details (continued)

Field	Description
Status	The status of the upstream channel, which can be any one of the following: <ul style="list-style-type: none"> • Up • Down • Administrative Up • Administrative Down • Unknown
Port	The port to which the upstream channel is associated with.
Frequency	The frequency of the upstream channel.
Channel width	The width of the upstream channel.
Modulation	The modulation value of the upstream channel.
Backoff End	The backoff end time of the upstream channel.
Backoff Start	The backoff start time of the upstream channel.
Downstream Channels	
DS Channel ID	The unique identification code of the Downstream Channel.
Associated Narrowband	The name of the narrowband channel that is associated to the downstream channel.
Port	The port to which the downstream channel is associated with.
Status	The status of the downstream channel, which can be any one of the following: <ul style="list-style-type: none"> • Up • Down • Administrative Up • Administrative Down • Unknown
Frequency	The frequency of the downstream channel.
Bandwidth	The bandwidth of the downstream channel.
Total Modem	The total number of modem for the downstream channel.
Modem Active	The number of modems active for the downstream channel.
Network Delay	The network delay (in terms of bits per second) in the downstream channel.

Viewing the Narrowband Channels Configuration Details

To view the Narrowband channels configuration details:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > Narrowband Channels > Narrowband channel cable**. The Narrowband channels configuration details are displayed in the content pane.
- [Table 27-5](#) describes the Narrowband channels configuration details.

Table 27-5 Narrowband Channels Configuration Details

Field	Description
Name	The name of the narrowband channel.
Channel Status	The status of the narrowband channel, which can be any one of the following: <ul style="list-style-type: none"> Up Down Unknown
DS ID	The identification code of the downstream channel associated with the narrowband channel.
RF Channel ID	The identification code of the Radio Frequency (RF) channel associated with the narrowband channel.
Bandwidth	The percentage of bandwidth available for the narrowband channel.
Downstream ID	The link to the downstream channel that is associated to the narrowband channel.
Wideband Associations	
Associated Entity	The wideband channel that is associated to the narrowband channel, which when clicked will take you to the relevant wideband channel configuration under the Wideband Channels node.
Bandwidth	The percentage of bandwidth available for the wideband channel.

Viewing the Wideband Channels Configuration Details

To view the Wideband channels configuration details:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > Wideband Channels > Wideband cable**. The Wideband channels configuration details are displayed in the content pane.
- [Table 27-6](#) describes the Wideband channels configuration details.

Table 27-6 Wideband Channels Configuration Details


Field	Description
Wideband Name	The name of the wideband channel.
Status	The status of the wideband channel, which can be any one of the following: <ul style="list-style-type: none"> • Up • Down • Administrative Up • Administrative Down • Unknown
Bonding Group ID	<p>The unique identification code of the bonding group.</p>  <p>Note A bonding group is a logical grouping of one or more physical radio frequency (RF) channels over which wideband MPEG-TS packets are carried. By aggregating or "channel bonding" multiple RF channels, the wideband channel is capable of greater bandwidth capacity for downstream data traffic than a single narrowband channel.</p>
Bundle	The bundle address associated with the wideband.
NB Channel Interface	The Narrowband (NB) channel interface associated with the wideband channel.
Reserved CIR	The Committed Information Rate (CIR) reserved for the wideband channel.
Total CIR	The total Committed Information Rate (CIR) associated to the Wideband channel available.
Multicasting Reserved CIR	Indicates the Reserved Committed Information Rate associated to the multicasting group of the Wideband channel.
Multicasting Total CIR	Indicates the Total Committed Information Rate associated to the multicasting group of the Wideband channel.
RF Channels	
RF Channel ID	The unique identification code of the RF channel.
Port	The port to which the RF channel is associated with.
Bandwidth	The percentage of bandwidth available for the RF channel.
Channel Type	The type of the RF channel, which can be any one of the following: <ul style="list-style-type: none"> • Primary • Non-Primary
Frequency	The frequency (in terms of Mhz) allocated to the RF channel.
Modulation	The modulation (in terms of QAM) allocated to the RF channel.
Annex	The annexure that is allocated to the RF channel.
IP Address	The IP address that is assigned to the RF channel for downstream data transmission.

Table 27-6 Wideband Channels Configuration Details (continued)

Field	Description
MAC Address	The MAC address that is assigned to the RF channel for downstream data transmission.
DEPI Remote ID	The Downstream External PHY Interface (DEPI) remote session ID that is assigned to the RF channel.

Viewing the Fiber Node Configuration Details

To view the Fiber Node configuration details:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > Fiber NODe**. The Fiber Node configuration details are displayed in the content pane.

[Table 27-7](#) describes the Fiber Node configuration details.

Table 27-7 Fiber Node Configuration Details

Field	Description
Fiber Node Number	The unique number assigned to the Fiber node.
Total DS Channels	The total number of downstream channels associated to the fiber node.
Total US Channels	The total number of upstream channels associated to the fiber node.
Status	The status of the fiber node, which can be any one of the following: <ul style="list-style-type: none"> Valid Invalid

Configure Cable Ports and Interfaces

These commands help in configuring the cable ports and IP interface. The table below lists the navigation of each of these commands. To run these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results.

For details on the supported device list for these configuration commands and the software versions Prime Network supports for the supported network elements, see [Cisco Prime Network 4.0 Supported Cisco VNEs](#).



Note

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Configure Cable Ports

Command	Navigation	Description
Modify Port	Physical Inventory > <i>Ethernet Slot</i> > <i>navigate to Ethernet port</i> > Commands > Configuration > Port	Controls a variety of RFGW port characteristics (status of port, IP address type and so forth).
Modify Cable Port	Physical Inventory > Chassis > <i>Slot</i> > <i>Subslot</i> > <i>Cable</i> > Commands > Configuration > Port	Controls a variety of uBR10000 port characteristics (status of port, bundle ID and so forth).
Configure Downstream Port	Physical Inventory > Chassis > <i>Slot</i> > <i>Subslot</i> > <i>Cable</i> > Commands > Configuration > Downstream	Configure and enable the downstream ports on the Cisco uBR10K card. Configure parameters like modulation rate, downstream interleave depth in number of rows of code words, and so on.
Create Upstream Port Modify Upstream Port	Physical Inventory > Chassis > <i>Slot</i> > <i>Subslot</i> > <i>Cable or Ethernet port</i> > Commands > Configuration > Upstream	Create or modify an upstream port.

Configure Cable Interfaces

Command	Navigation	Description
Create IP Interface	Logical Inventory > Routing Entities > Routing Entity > Commands > Configuration	Configure IP interface as part of the routing entity for the selected device.
Modify IP Interface Delete IP Interface	Logical Inventory > Routing Entities > Routing Entity > <i>select an interface</i> > Commands > Configuration	Changes or removes descriptive information that is displayed in GUI clients when the interface is selected.

View Upstream and Downstream Configuration for Cable

Command	Navigation	Description
Show > Upstream Show > Downstream	Physical Inventory > <i>Ethernet Slot > navigate to Ethernet port</i> > Commands > Configuration > Port	View the configured upstream and downstream rate for the selected cable.

Configure QAM

These commands help in configuring the Quadrature Amplitude Modulation (QAM) domain for the RF channel. The table below lists the navigation of each of these commands. To run these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results.

For details on the supported device list for these configuration commands and the software versions Prime Network supports for the supported network elements, see [Cisco Prime Network 4.0 Supported Cisco VNEs](#).



Note

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Configure RF and Frequency Profiles

Command	Navigation	Description
Create RF Profile Modify RF Profile Delete RF Profile	<i>NE</i> > Commands > Configuration > RF Profile	Configures a combination of RF attributes to be used across all line cards in the chassis.
Delete Frequency Profile Create Lane Create Block	<i>NE</i> > Commands > Configuration > Frequency Profile	Configure the frequency profile at the port level. These user-defined frequency scheme provides flexibility to define each lane and block start frequencies. These frequency profiles can then be applied to the port in this scheme.

Configure QAM Port and Channel

Command	Navigation	Description
Modify QAM Port Modify QAM Channel	Physical Inventory > Chassis > Slot > QAM > Commands > Configuration	Modify the QAM port and channel.

View QAM Configurations

Command	Navigation	Description
Show > RF Profile Show > Frequency Profile	<i>NE</i> > Commands	Display RF and Frequency profiles created on the device.
Show > QAM Port Show > QAM Channel	Physical Inventory > Chassis > Slot > QAM > Commands	Displays cable information configured on the QAM channel and port.

Configure DEPI and L2TP

These commands help in configuring the Downstream External PHY Interface (DEPI) and Layer 2 Tunnel Protocol (L2TP). The table below lists the navigation of each of these commands. To run these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results.

For details on the supported device list for these configuration commands and the software versions Prime Network supports for the supported network elements, see [Cisco Prime Network 4.0 Supported Cisco VNEs](#).



Note

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Configure DEPI Class and Tunnel

Command	Navigation	Description
Create DEPI Class	<i>NE</i> > Commands > Configuration > DEPI	Configures template of DEPI control plane and tunnel configuration settings.
Delete DEPI Class		
Create DEPI Tunnel		
Modify DEPI Tunnel		
Delete DEPI Tunnel		

Configure L2TP Class

Command	Navigation	Description
Create L2TP Class	<i>NE</i> > Commands > Configuration > L2TP	Configures a template of Layer 2 Tunnel Protocol (L2TP) control plane configuration settings.
Modify L2TP Class		
Delete L2TP Class		

View DEPI Tunnel, DEPI Session, and L2TP Class

Command	Navigation	Description
Show > L2TP Class	<i>NE</i> > Commands > Configuration	Displays Layer 2 Tunnel Protocol control plane configuration settings.
Show > DEPI Tunnel		Displays DEPI tunnel configuration settings.
Show > DEPI Session		Displays DEPI session information and DEPI sessions configured on the line card.
Show > Cable DEPI Session		