Configuring the Cisco Remote-PHY Solution

This section provides information on how to configure the Cisco Remote-PHY solution.

Restrictions for Configuring the Cisco Remote-PHY Solution

- Adding or removing the upstream or downstream channels in the channel group may trigger the Cisco CMC to reset.
- The Cisco uBR-MC3GX60V-RPHY line card supports only static DEPI configuration.
- The Cisco uBR-MC3GX60V-RPHY line card does not support Spectrum Management, Inter Line Card RF Spanning, and High Availability.

How to Configure the Cisco Remote-PHY Solution

This section provides information on how to configure the Cisco Remote-PHY solution. These procedures provide only the initial and basic configurations for the Cisco Remote-PHY solution.

Note The Cisco CMTS must be operational before beginning the following procedures to configure the Cisco Remote-PHY solution.

Note Cisco CMC enable password change is supported starting from Cisco IOS Release 12.2(33)CY.

Note More than one person can connect to Cisco CMC via telnet at the same time.

Configuring the Gigabit Ethernet Interface on the Cisco uBR-MC3GX60V-RPHY Line Card

The Cisco uBR-MC3GX60V-RPHY line card supports six (3 + 3) Gigabit Ethernet links and the links are arranged in three sets of redundant pairs. The links in the pair are modeled as an active-passive Gigabit Ethernet pair and traffic can be quickly switched from the working Gigabit Ethernet link to the standby Gigabit Ethernet link in the pair. The three active Gigabit Ethernet links are numbered as *slotnumber*/*subslotnumber*/0, 2, 4 and are mapped to the modular controllers *slotnumber*/*subslotnumber*/0, 1, 2 respectively.

The Cisco CMTS creates the following interfaces and controllers during the initialization of the Cisco uBR-MC3GX60V-RPHY line card:

- Three Gigabit Ethernet interfaces
- Three modular cable controllers
- 24x3 modular cable interfaces

Each Gigabit Ethernet pair is assigned as follows:

Gigabit Ethernet pair	Assignment
Gigabit Ethernet {0, 1} - Gigabit Ethernet interface 0	Modular cable controller {0}; 0 to 23 channels; 0 to 31 bonding groups
Gigabit Ethernet {2, 3} - Gigabit Ethernet interface 2	Modular cable controller {1}; 24 to 47 channels; 32 to 63 bonding groups
Gigabit Ethernet {4, 5} - Gigabit Ethernet interface 4	Modular cable controller {2}; 48 to 71 channels; 64 to 95 bonding groups

Before You Begin

Restriction Due to slow link loss detection, we do not recommend using the SFP-GE-T modules for primary interfaces.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**interface gigabitEthernet** *slot /subslot /port* **Example:** `Router(config)# interface gigabitEthernet 8/1/0`	Enters Gigabit Ethernet interface configuration mode. • *slot*—Slot where the Cisco uBR-MC3GX60V-RPHY line card resides. The valid range is from 5 to 8. • *subslot*—Secondary slot number of the Cisco uBR-MC3GX60V-RPHY line card. The valid ranges are 0 or 1. • *port*—Port number. The valid range is from 3 to 6.
Step 4	**ip address** *ip-address IP-subnet-mask* **Example:** `Router(config-if)# ip address 192.71.0.1 255.255.255.0`	Sets the IP address of the Gigabit Ethernet interface. • *ip-address*—IP address of the Gigabit Ethernet interface. • *IP-subnet -mask*—Subnet mask for the network.
Step 5	**cable helper-address** *ip-address* **Example:** `Router(config-if)# cable helper-address 20.1.0.3`	Sets the destination IP address for UDP broadcast DHCP packets. • *ip-address*—IP address of a DHCP server to which the UDP broadcast packets are sent.
Step 6	**ip pim sparse-dense-mode** **Example:** `Router(config-if)# ip pim sparse-dense-mode`	Enables Protocol Independent Multicast (PIM) on the Gigabit Ethernet interface and treats the interface in either sparse mode or dense mode of operation, depending on which mode the multicast group operates in.
Step 7	**negotiation auto** **Example:** `Router(config-if)# negotiation auto`	Selects the auto-negotiation mode.
Step 8	**output-rate** *rate* **Example:** `Router(config-if))# output-rate 100`	Specifies the output link rate for DEPI packets on the Gigabit Ethernet interface. • *rate*—The valid range is from 1 to 1000000 kbps. **Note** The recommended value is 1000 kbps.
Step 9	**end** **Example:** `Router(config-if)# end`	Exits Gigabit Ethernet interface configuration mode. Returns to privileged EXEC mode.

What to Do Next

- To verify the Gigabit Ethernet interface configuration, run the **show interfaces gigabitEthernet** *slot /subslot /port* command.

- To verify the link status of the primary and secondary ports, run the **show controller** command.

Configuring the Modular Cable Controller on the Cisco uBR-MC3GX60V-RPHY Line Card

The downstream modular cable controller configuration defines the Layer 1 and Layer 2 parameters for the downstream RF channels, and the configuration parameters for the Gigabit Ethernet port. The modular cable controllers can be configured only using static DEPI.

Before You Begin

Restriction When you are configuring the parameters for the downstream RF channel in a channel group, the value of a parameter (except the frequency) must be the same for all RF channels in the channel group. If you change the value of any parameter in a downstream RF channels, the value of that parameter changes in all other channels.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**controller modular-cable** *slot* /*subslot* /*controller* **Example:** `Router(config)# controller Modular-Cable 7/1/0`	Enters controller configuration mode to configure the Cisco uBR-MC3GX60V-RPHY line card modular cable controller. • *slot*—Slot where the Cisco uBR-MC3GX60V-RPHY line card resides. The valid range is from 5 to 8. • *subslot*—Secondary slot number of the Cisco uBR-MC3GX60V-RPHY line card. The valid values are 0 or 1. • *controller*—Controller index for the modular cable. The valid range is from 0 to 2.
Step 4	**rf-channel** *rf-channel number* **cable downstream channel-id** *channel-id* **Example:** `Router(config-controller)# rf-channel 0 cable downstream channel-id 73`	**Note** We recommend that you retain the system-generated default channel IDs instead of configuring them. (Optional) Assigns a downstream channel ID to an RF channel.

	Command or Action	Purpose
		• *rf-channel number* —RF channel number on the physical port of the Cisco uBR-MC3GX60V-RPHY line card. The valid range is from 0 to 23. • *channel-id*—Unique channel ID. The valid range is from 1 to 255.
Step 5	**rf-channel** *rf-channel number* **frequency** [*freq*][**annex** {**A** | **B**} **modulation** {**64**|**256**} [**interleave-depth** {**8**|**12**|**16**|**32**|**64**|**128**}]] **Example:** `Router(config-controller)# rf-channel 0 frequency 451000000 annex A modulation 256 interleave-depth 12`	Configures the frequency of an RF channel. • *rf-channel number*—RF channel number on the physical port of the Cisco uBR-MC3GX60V-RPHY line card. The valid range is from 0 to 3. • *freq*—Center frequency of the RF channel. The valid range for each RF channel is different based on the Annex type. • **annex** {**A** | **B**}— Indicates the MPEG framing format for each RF channel. ◦ **A**—Indicates that the downstream is compatible with the European MPEG framing format specified in ITU-TJ.83 Annex A. ◦ **B**—Indicates that the downstream is compatible with the North American MPEG framing format specified in ITU-TJ.83 Annex B. • **modulation** {**64** | **256**}—Indicates the modulation rate (64 or 256 QAM) for each RF channel. • **interleave-depth**—Indicates the downstream interleave depth. For annex A, the value is 12. For annex B, the valid values are 8, 16, 32, 64, and 128. **Important** For the four downstream RF channel in a channel group, all the parameters except the frequency must have the same value. If the value of any parameter is changed in a downstream RF channels, it impacts all other channels.
Step 6	Perform one of the following: • To configure the DEPI in unicast mode, use the following command: **rf-channel** *rf-channel number* **ip-address** *ip-address* **mac-address** *mac-address* **depi-remote-id** *session-id* • To configure the DEPI in multicast mode, use the following command: **rf-channel** *rf-channel number* **group-address** *ip-address*	Configures the DEPI CMTS. **Note** For unicast, choose the **ip-address** option and for multicast choose the **group-address** option. • *rf-channel number*—RF channel number on the physical port of the Cisco uBR-MC3GX60V-RPHY line card. The valid range is from 0 to 3. • **ip-address** *ip-address*—IP address of the Cisco CMC. Use this option for the unicast. **Note** If the number of destination IP addresses, each corresponding to a DEPI tunnel, exceeds the limit of 24, the command with the 25th IP address is rejected.

	Command or Action	Purpose
	Example: `Router(config-controller)# rf-channel 0 ip-address 192.3.2.1 mac-address 0090.f001.930c depi-remote-id 3001`	• *mac-address*—MAC address of the Cisco CMC. • *session-id*—DEPI remote session ID used for encapsulation of frames in D-MPT (DOCSIS MPEG Transport) mode. • **group-address** *ip-address*—DEPI multicast group address.
Step 7	**no rf-channel** *rf-channel number* **rf-shutdown** **Example:** `Router(config-controller)# no rf-channel 0 rf-shutdown`	Enables RF channel on the Cisco CMTS.
Step 8	**end** **Example:** `Router(config-controller)# end`	Exits controller configuration mode and returns to privileged EXEC mode.

What to Do Next

- To verify the modular cable controller configuration, run the **show controllers modular-cable** *slot* /*subslot* /*controller* command.

Troubleshooting Tips

Use the following troubleshooting tips if you did not get the expected results after performing the task.

When you run the **no rf-channel** *rf-channel number* **rf-shutdown** command, the following error message is displayed:

```
%ERROR: Cannot unshut channel 0, please upgrade linecard license and retry
```

This error message is displayed to indicate that there are insufficient licenses for the Cisco uBR-MC3GX60V-RPHY line card to unshut additional channels.

Upgrade the license or shut down the active channel. To upgrade the license, see Software License Activation on Cisco CMTS Routers.

Configuring the Modular Cable Interface on the Cisco uBR-MC3GX60V-RPHY Line Card

A modular cable interface forwards non-bonded traffic in the downstream direction. By default, this interface is allocated the bandwidth from the RF channel where it is configured.

The modular cable interface for the Cisco uBR-MC3GX60V-RPHY line card is restricted to slots 5 through 8.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface modular-cable** *slot*/*subslot*/*port* :*rf-channel* **Example:** `Router(config)# interface modular-Cable 7/1/0:0`	Enters the configuration mode to configure the cable interface. • *slot*—Slot where the Cisco uBR-MC3GX60V-RPHY line card resides. The valid range is from 5 to 8. • *subslot*—Secondary slot number of the Cisco uBR-MC3GX60V-RPHY line card. The valid values are 0 or 1. • *port*—Port number. The valid range is from 0 to 2. • *rf-channel*—RF channel number. The valid range is from 0 to 23.
Step 4	**cable rf-bandwidth-percent** *percent-value* [**remaining ratio** *excess-value*] **Example:** `Router(config-if)# cable rf-bandwidth-percent 50`	Configures the bandwidth of the RF channel that is allocated to a wideband channel or bonding group. • *percent-value*—Static bandwidth allocation of a downstream RF channel in percent. The valid range is from 1 to 96. • **remaining ratio**—(Optional) Indicates the ratio of the remaining or excess bandwidth that can be allocated to the modular cable channel. **Note** If dynamic bandwidth sharing is disabled to use static bandwidth sharing, the remaining ratio option is not available. • *excess-value*—Value of the excess bandwidth that can be allocated to the modular cable channel. The valid range is from 1 to 100. The default value is 1.
Step 5	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to privileged EXEC mode.

What to Do Next

To verify the modular cable configuration, run the **show interfaces modular-cable** *slot* /*subslot* /*controller* :*rf-channel* command.

Configuring the Wideband Cable Interface on the Cisco uBR-MC3GX60V-RPHY Line Card

A wideband (WB) cable interface forwards bonded traffic in the downstream direction. A set of RF channels is configured under the wideband cable interface. The Cisco uBR-MC3GX60V-RPHY line card has 3 downstream controllers and 32 bonded channels per controller with a maximum of 24 RF channels in a bonding group. The 24 RF channels must be on the same controller.

Before You Begin

Restriction Wideband channels can be configured only for downstream RF channels that belongs to a single controller.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface wideband-cable** *slot* /*subslot* /*controller* :*bonded-channel* **Example:** `Router(config)# interface Wideband-Cable7/1/0:0`	Enters the wideband cable interface configuration mode. • *slot*—Slot where the Cisco uBR-MC3GX60V-RPHY line card resides. The valid range is from 5 to 8. • *subslot*—Secondary slot number of the Cisco uBR-MC3GX60V-RPHY line card. The valid values are 0 or 1. • *controller*—Controller index for the modular cable. The valid range is from 0 to 2. • *bonded-channel*—Bonding Group Channel index for the modular cable. The valid range is from 0 to 31. **Note** An RF channel from a specific controller in a modular and multiple wideband group cannot exceed 96 percent.
Step 4	**cable bundle** *bundle-id* **Example:** `Router(config-if)# cable bundle 1`	Configures the wideband cable interface to belong to an interface bundle. • *bundle-id*—Bundle identifier. The valid range is from 1 to 255.
Step 5	**cable rf-channel** *rf-channel number***bandwidth-percent** *bw-percent*	Configures the bandwidth of the RF channel that is allocated to a specified wideband channel or bonding group.

	Command or Action	Purpose
	Example: `Router(config-if)# cable rf-channel 0 bandwidth-percent 25`	• *rf-channel number*—RF channel number of the physical port on the field-programmable gate array (FPGA). • **bandwidth-percent** *bw-percent* —(Optional) Indicates the percentage of bandwidth from the RF channel that is used for the wideband interface. The valid range is from 0 to 100. The default bandwidth value is 100.
Step 6	**cable bonding-group-secondary** **Example:** `Router(config-if)# cable bonding-group-secondary`	Configures the bonding group for VDOC multicast.
Step 7	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to privileged EXEC mode.

What to Do Next

- To verify the wideband channel configuration, run the **show controllers modular-cable** [**association** | **config** | **mapping**] command.
- To view the entire configuration of the bandwidth allocation between WB channels and RF channels, run the **show interfaces wideband-cable** *slot* /*subslot*/*controller*:*bonded-channel* command.

Configuring the Cable Interface on the Cisco uBR-MC3GX60V-RPHY Line Card

The cable interface is the MAC domain interface that hosts modular cable interfaces and associates upstream channels with the modular cable interfaces.

The Cisco uBR-MC3GX60V-RPHY line card supports 15 cable MAC domains (cable interfaces). The 15 cable MAC domains are divided into following three sets. The downstream channels can be associated with any of these 15 MAC domains.

- Set 1: 0-4
- Set 2: 5-9
- Set 3: 10-14

Following is the association of the upstream channels with the MAC domain:

- Upstream channels 0-19 are associated with the Set 1 (0-4 MAC domain).
- Upstream channels 20-39 are associated with the Set 2 (5-9 MAC domain).
- Upstream channels 40-59 are associated with the Set 3 (10-14 MAC domain).

Before You Begin

Restriction	Wideband channels can be configured only for downstream RF channels that belongs to a single controller.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface cable** *slot* /*subslot* /*cable-interface-index* **Example:** `Router(config)# interface cable 7/0/0`	Enters the cable interface mode. • *slot*—Slot where the Cisco uBR-MC3GX60V-RPHY line card resides. The valid range is from 5 to 8. • *subslot*—Secondary slot number of the Cisco uBR-MC3GX60V-RPHY line card. The valid values are 0 or 1. • *cable-interface-index*—Downstream port number or MAC domain index of the Cisco uBR-MC3GX60V-RPHY line card.
Step 4	**cable bundle** *bundle-number* **Example:** `Router(config-if)# cable bundle 2`	Configures the cable interface to belong to an interface bundle. • *bundle-number*—Bundle identifier. The valid range is from 1 to 255.
Step 5	**downstream modular-cable** *slot* /*subslot* /*port* **rf-channel** *grouplist* **upstream** *grouplist* **Example:** `Router(config-if)# downstream modular-Cable 7/1/0 rf-channel 0-7 upstream 0-3`	Configures the RF channels from the Cisco uBR-MC3GX60V-RPHY line card as primary channels in the MAC domain. • *slot*—Slot where the Cisco uBR-MC3GX60V-RPHY line card resides. • *subslot*—Secondary slot number of the Cisco uBR-MC3GX60V-RPHY line card. • *port*—Port number. The valid range is from 0 to 2. • *grouplist*—List of ranges for downstream RF channels. The valid range is from 0 to 23. • **upstream**—Indicates the logical identifier of upstreams that serve these downstream RF channels. **Note** This keyword not indicate an upstream logical channel that requires both, the upstream port number and the logical channel index (0 or 1). This keyword specifies only the upstream port.

	Command or Action	Purpose
		• *grouplist*—Number of upstream with the modular cable downstream channel. The valid range is from 0 to 7.
Step 6	**cable upstream** *n* **frequency** *up-freq-hz* **Example:** `Router(config-if)# cable upstream 2 frequency 25000000`	Configures a fixed frequency of the upstream RF carrier for an upstream port. • *n*—Specifies the upstream port number on the Cisco uBR-MC3GX60V-RPHY line card. The valid range starts with 0 for the first upstream port on the line card. • *up-freq-hz*—Upstream center frequency in Hz. The valid range is from 5 MHz (5000000 Hz) to 85 MHz (85000000 Hz).
Step 7	**cable upstream max-ports** *n* **Example:** `Router(config-if)# cable upstream max-ports 4`	Configures the maximum number of upstreams on a cable interface (MAC domain) on the Cisco uBR-MC3GX60V-RPHY line card. • *n*—Number of upstream ports. The valid range is from 0 to 8.
Step 8	**cable upstream** *port* **connector** *physical-port* **Example:** `Router(config-if)# cable upstream 2 connector 0`	Maps an upstream port to a physical port on the Cisco uBR-MC3GX60V-RPHY line card for use with a downstream. • *port*—Upstream port number. The valid range is from 0 to 3. • *physical-port*—Upstream port number for the actual physical port to be assigned. The valid range is from 0 to 2.
Step 9	**cable upstream** *n* **docsis-mode** {**atdma** | **tdma** } **Example:** `Router(config-if)# cable upstream 2 docsis-mode tdma`	Configures an upstream channel to use either DOCSIS 1.x or DOCSIS 2.0 modulation profiles. • *n*—Upstream port number. The valid values start with 0 for the first upstream port on the Cisco uBR-MC3GX60V-RPHY line card. • **atdma** —Configures the upstream only for the DOCSIS 2.0 Advanced Time Division Multiple Access (A-TDMA) modulation profiles. • **tdma**—Configures the upstream only for the DOCSIS 1.0 and DOCSIS 1.1 Time Division Multiple Access (TDMA) modulation profiles (default).
Step 10	**cable upstream** *n* **channel-width** *first-choice-width* [*last-choice-width*] **Example:** `Router(config-if)# cable upstream 2 channel-width 1600000 1600000`	Specifies an upstream channel width for an upstream port. • *n*—Upstream port number. The valid values start with 0 for the first upstream port on the Cisco uBR-MC3GX60V-RPHY line card. • *first-choice-width*—Upstream channel width, in Hz. The valid values for all cards are: ◦ 200,000 (160,000 symbols/sec)—Not valid when using Unsolicited Grant Service (UGS) or UGS with Activity Detection (UGS-AD) service flows (such as PacketCable voice calls). ◦ 400,000 (320,000 symbols/sec) ◦ 800,000 (640,000 symbols/sec)

	Command or Action	Purpose
		◦ 1,600,000 (1,280,000 symbols/sec) ◦ 3,200,000 (2,560,000 symbols/sec) • *last-choice-width*—Upstream channel width, in Hz. The valid values are the same as those for the first-choice-width parameter, but for proper operation, the *last-choice-width* should be equal to or less than the *first-choice-width* value. Use this parameter with supported cards to enable symbol rate management algorithms. The symbol rate automatically steps up from the *first-choice-width* value to the highest value until a stable channel is established.
Step 11	**cable upstream** *n* **minislot-size** *size* **Example:** `Router(config-if)# cable upstream 2 minislot-size 4`	Specifies the mini slot size (in ticks) for a specific upstream interface. • *n*—Upstream port number. The valid values start with 0 for the first upstream port on the Cisco uBR-MC3GX60V-RPHY line card. • *size*—Mini slot size in time ticks. The valid values are 2, 4, 8, 16, 32, 64, and 128.
Step 12	**cable upstream** *n* **range-backoff** {**automatic** | *start end* } **Example:** `Router(config-if)# cable upstream 0 range-backoff 3 6`	Specifies automatic or configured initial ranging backoff calculation. • *n*—Upstream port number. The valid values start with 0 for the first upstream port on the Cisco uBR-MC3GX60V-RPHY line card. • **automatic**—Configures the fixed data backoff start and end values. • *start* —Binary exponential algorithm. Sets the start value for the initial ranging backoff. The valid range is from 0 to 15. • *end* —Binary exponential algorithm. Sets the end value for the initial ranging backoff. The valid range is from *start* to 15.
Step 13	**cable upstream** *n* **modulation-profile** *primary-profile-number* [*secondary-profile-number*] [*tertiary-profile-number*] **Example:** `Router(config-if)# cable upstream 0 modulation-profile 21`	Assigns one or two modulation profiles to an upstream port. • *n*—Upstream port number. The valid values start with 0 for the first upstream port on the Cisco uBR-MC3GX60V-RPHY line card. • *primary-profile-number*—Primary modulation profile number for the upstream port. The valid range is from 21 to 30. • *secondary-profile-number*—Secondary modulation profile number for the upstream port, which is used when noise on the upstream increases to the point that the primary modulation profile can no longer be used. The valid range is same as the range for the *primary-profile-number*. *tertiary-profile-number*—Tertiary modulation profile number for the upstream port.
Step 14	**no cable upstream** *n* **shutdown**	Enables a single upstream port.

	Command or Action	Purpose
	Example: `Router(config-if)# no cable upstream 0 shutdown`	• *n*—Upstream port number. The valid values start with 0 for the first upstream port on the Cisco uBR-MC3GX60V-RPHY line card.
Step 15	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to privileged EXEC mode.

What to Do Next

To verify the cable interface configuration, run the **show interface cable** *slot* / *subslot* / *port* or **show run interface cable** *slot* /*subslot* / *port* command.

Configuring a Channel Group on the Cisco uBR-MC3GX60V-RPHY Line Card

A channel group consists of up to four upstream channels, 16 downstream channels, and four Cisco CMCs, which are mapped to the same Gigabit Ethernet controller. Maximum of five channel groups can be defined for a modular controller with four upstream channels in the channel group (60 Cisco CMCs per Cisco uBR-MC3GX60V-RPHY line card) and maximum of 20 channel groups can be defined for a modular controller with one upstream in the channel group (maximum of 240 Cisco CMCs per Cisco uBR-MC3GX60V-RPHY line card).

A channel group assigns an upstream channel to a MAC domain on the Cisco CMC . In a channel group, each upstream channel can be present in only one MAC domain. Multiple MAC domains can be configured for a channel group.

The Cisco CMC is assigned to a channel group through the Cisco CMC MAC address and maximum of four Cisco CMC can share the downstream capacity of the channel group.

Before You Begin

Restriction

- A channel group must have at least one Cisco CMC and a maximum of four Cisco CMCs.
- A channel group must contain at least one upstream channel and can have a maximum of four upstream channels. All the upstream channels in a channel group must be associated with the same Gigabit Ethernet controller.
- A channel group can have a maximum of 16 downstream channels and all the downstream channels in a channel group must be associated with the same controller.
- The Cisco CMCs, upstream and downstream channels must be mapped to the same Gigabit Ethernet Controller.
- The upstream and downstream channels should be configured as a same fiber node.
- The Cisco CMC must be configured in a channel group before it comes online.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**cable channel-group** *group-id* **Example:** `Router(config)# cable channel-group 100`	Enters channel group configuration mode. • *group-id* —Channel group ID. The valid range is from 1 to 1000.
Step 4	**upstream cable** *slot* /*subslot* /*port* **channel** *grouplist* **Example:** `Router(config-ch-group)# upstream Cable7/1/0 channel 0-1`	Configures the upstream RF channels for the channel group. • *slot*—Slot where the Cisco uBR-MC3GX60V-RPHY line card resides. • *subslot*—Secondary slot number of the Cisco uBR-MC3GX60V-RPHY line card. • *port*—Port number on the Cisco uBR-MC3GX60V-RPHY line card. The valid range is from 0 to 14. • *grouplist*—Range of upstream channel numbers. The valid range is from 0 to 7.
Step 5	**downstream modular-cable** *slot* / *subslot* /*port* **rf-channel** *grouplist*	Specifies the downstream channel ports for a fiber node.

	Command or Action	Purpose
	Example: `Router(config-ch-group)# downstream modular-Cable 7/1/0 rf-channel 0-3`	• *slot* —Slot where the Cisco uBR-MC3GX60V-RPHY line card resides. • *subslot* —Secondary slot number of the Cisco uBR-MC3GX60V-RPHY line card. • *port* —Port number on the Cisco uBR-MC3GX60V-RPHY line card. The valid range is from 0 to 2. • *grouplist* —Range of downstream RF channel numbers. The valid range is from 0 to 23.
Step 6	**cmc** *mac-address* **Example:** `Router(config-ch-group)# cmc 0004.9f01.8120`	Configures the Cisco CMC in the channel group. • *mac-address* —MAC address of the Cisco CMC.
Step 7	**end** **Example:** `Router(config-ch-group)# end`	Exits channel group configuration mode and returns to privileged EXEC mode.

What to Do Next

To verify the channel group configuration, run the **show cable channel-group** *group-id* command.

Configuring the Fiber Node on the Cisco uBR-MC3GX60V-RPHY Line Card

You must configure the service group units called fiber nodes to enable the DOCSIS 3.0 operations.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**cable fiber-node** *fiber-node-id*	Enters the fiber node configuration mode.

	Command or Action	Purpose
	Example: `Router(config)# cable fiber-node 1`	• *fiber-node-id* —Unique numerical ID for the fiber node. The valid range is from 1 to 256.
Step 4	**downstream modular-Cable downstream** *slot* / *subslot* /*port* **rf-channel** *grouplist* **Example:** `Router(config-fiber-node)# downstream modular-Cable 7/1/0 rf-channel 0-3`	Specifies the downstream channel ports for a fiber node. • *slot* —Slot where the Cisco uBR-MC3GX60V-RPHY line card resides. The valid range is from 5 to 8. • *subslot* —Secondary slot number of the Cisco uBR-MC3GX60V-RPHY line card. The valid ranges are 0 or 1. • *port* —upstream port number or MAC domain index of the Cisco uBR-MC3GX60V-RPHY line card. The valid ranges is from 0 to 2. • *rf-channel number* —Specifies the rf-channel group number. • *grouplist* —Group of RF channel number, and number ranges. The valid range is from 0 to 23.
Step 5	**upstream cable** *slot* /*subslot* /*port* **channel** *grouplist* **Example:** `Router(config-fiber-node)# upstream Cable 7/1/0 channel 0-1`	Specifies the upstream channel ports for a fiber node. • *slot* —Slot where the Cisco uBR-MC3GX60V-RPHY line card resides. The valid range is from 5 to 8. • *subslot* —Secondary slot number of the Cisco uBR-MC3GX60V-RPHY line card. The valid ranges are 0 or 1. • *port* —upstream port number or MAC domain index of the Cisco uBR-MC3GX60V-RPHY line card. • *channel number* —List or range of upstream channel numbers. The valid range is from 0 to 3.
Step 6	**end** **Example:** `Router(config-fiber-node)# end`	Exits fiber node configuration mode and returns to privileged EXEC mode.

What to Do Next

To verify the fiber node configuration details, run the **show cable fiber-node** *fiber-node-id* command.

Configuring the Layer 3 CIN Network support

In Layer 3 CIN network, the connection between CMTS and CMC goes through the routers.

Note Only for the first router that established connection to CMC, the DHCP relay must be set to CMTS using **ip helper-address** command.

Currently we only support static routing to connect traffic between CMTS and CMC.

To establish Layer 3 CIN connection, only the internal DHCP server on the CMTS is supported.

Follow the steps below to configure the DHCP server and static routing using the illustration above as an example:

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip dhcp pool** *pool name* **Example:** `Router(config)# ip dhcp pool cmc-50`	Specify the DHCP pool.
Step 4	**network** *IP-address subnet-mask* **Example:** `Router(dhcp-config)# network 50.2.0.0 255.255.255.0`	Specify the IP address and subnet mask used by the DHCP pool.
Step 5	**boofile** *path* **Example:** `Router(dhcp-config)# bootfile tftp://20.1.0.3/cmc-16x4-os-20141127.bin`	Specify the CMC upgrade image path.
Step 6	**default-router** *IP-address* **Example:** `Router(dhcp-config)# default-router 50.2.0.1`	Specify the IP address of the default router.
Step 7	**lease** *days hours minutes* **Example:** `Router(dhcp-config)# lease 7 0 10`	Specify the lease time of the IP address given to the DHCP pool.

	Command or Action	Purpose
Step 8	**ip route** *IP-address subnet-maskinterface-IP* **Example:** `Router(config)# ip route 50.2.0.0 255.255.255.0 50.1.0.2`	Add static routing to the adjacent router which connects to CMTS. After the example step in the left column is performed, all the traffic targets to 50.2.0.0 (the subnet which is used for CMC) will be forwarded to this adjacent router. **Note** Roll back to **config** mode to perform this step.
Step 9	**end** **Example:** `Router(config)# end`	Exits fiber node configuration mode and returns to privileged EXEC mode.

Configuring the Downstream RF Power on the Cisco CMC

This configuration is optional. This procedure configures the resource sharing between the Cisco CMCs in a channel group based on the MAC address.

The valid downstream RF power value is based on the number of active downstream RF channels on the Cisco CMC. If the configured downstream RF power value for a specific number of downstream RF channels is out of the valid range, the downstream RF power is adjusted according to the number of active downstream RF channels on the Cisco CMC and a warning message is displayed.

We recommend that you use the following downstream RF power values based on the number of active downstream RF channels:

Table 1: Recommended Downstream RF Power Values

Number of Downstream RF Channels	Recommended RF Power Values
1	50 dBmV to 6 2dBmV
2	46 dBmV to 58 dBmV
3	44 dBmV to 56 dBmV
4	42 dBmV to 54 dBmV
5	41 dBmV to 53 dBmV
6	40 dBmV to 52 dBmV
7	39 dBmV to 51 dBmV
8	39 dBmV to 51 dBmV

Number of Downstream RF Channels	Recommended RF Power Values
9	38 dBmV to 50 dBmV
10	38 dBmV to 50 dBmV
11	37 dBmV to 49 dBmV
12	37 dBmV to 49 dBmV
13	36 dBmV to 48 dBmV
14	36 dBmV to 48 dBmV
15	35 dBmV to 47 dBmV
16	35 dBmV to 47 dBmV

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**cable cmc** *mac-address* **ds-rf-power** *power* [**tilt** *tilt-value*] **Example:** `Router(config)# cable cmc 0200.0000.0001 ds-rf-power 35.0 tilt 0dB`	Configures the downstream RF power for the downstream channel on the Cisco CMC. • *mac-address*—MAC address of the Cisco CMC. • *power*—RF power, in dBmV. The range is from 35 to 62. RF power is specified in the format *xy.z*, where *z* is 0. • **tilt** *tilt-value*—(Optional) Specifies the tile equalization value, in dB. The valid values are **-15dB**, **-12dB**, **-9dB**, **-6dB**, **-3dB**, and **0dB**. The default value is 9 dB.
Step 4	**end** **Example:** `Router(config)# end`	Exits global configuration mode and returns to privileged EXEC mode.

Configuring the FRx on the Cisco CMC

This configuration is optional. This procedure configures the attenuation and equalization values for the Forward Optical Receiver Module (FRx) on the Cisco CMC.

Before You Begin

Ensure that FRx is installed on the Cisco CMC.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**cable cmc** *mac-address* **frx** {**att** *att-value* | **eq** *eq-value*} **Example:** `Router(config)# cable cmc 0200.0000.0001 frx att 1`	Configures the FRx on the Cisco CMC. • *mac-address*—MAC address of the Cisco CMC. • **att** *att-value*—Sets the attenuation value, in dB. The valid range is from 0 to 10. • **eq** *eq-value*—Sets the equalization value, in dB. The valid range is from 3 to 15.
Step 4	**end** **Example:** `Router(config)# end`	Exits global configuration mode and returns to privileged EXEC mode.

Configuration Example for the Cisco Remote-PHY Solution

Example: Configuring the Cisco Remote-PHY Solution

The following example shows how to configure the Cisco uBR-MC3GX60V-RPHY line card.

```
version 12.2
no service pad
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone
no service password-encryption
service internal
service debug-tracking ip-address 192.2.1.2
```

```
!
hostname App-10k-10
!
logging buffered 5000000
no logging rate-limit
no logging console
!
no aaa new-model
clock timezone CST 8
facility-alarm outlet-temperature major 58
facility-alarm outlet-temperature minor 48
facility-alarm outlet-temperature critical 85
facility-alarm intake-temperature major 51
facility-alarm intake-temperature minor 41
facility-alarm intake-temperature critical 73
!
card 1 4jacket-1
card 1/0 SPA-1XTENGE-XFP-V2
card 1/1 SPA-1XTENGE-XFP-V2
card 1/1 2cable-dtcc
card 7/1 ubr10k-clc-3g60-rphy license 72X60
!
!
cable logging badipsource
cable logging layer2events
cable logging overlapip
cable logging ironbus
cable logging downstream-index
cable clock dti
!
ip subnet-zero
no ip domain lookup
ip host rfsw-1 192.4.0.36
ip host rfsw-2 192.4.0.36
ip name-server 192.1.0.2
ip multicast-routing
!
ip dhcp pool cmc
network 192.71.0.0 255.255.255.0
next-server 192.71.0.1
default-router 192.71.0.1
lease 7 0 10
!

controller Modular-Cable 7/1/0
rf-channel 0 cable downstream channel-id 73
rf-channel 0 frequency 451000000 annex A modulation 256qam interleave 12
rf-channel 0 group-address 192.1.2.1
no rf-channel 0 rf-shutdown
rf-channel 1 cable downstream channel-id 74
rf-channel 2 cable downstream channel-id 75
rf-channel 3 cable downstream channel-id 76
rf-channel 4 cable downstream channel-id 77
rf-channel 5 cable downstream channel-id 78
rf-channel 6 cable downstream channel-id 79
rf-channel 7 cable downstream channel-id 80
rf-channel 8 cable downstream channel-id 81
rf-channel 9 cable downstream channel-id 82
rf-channel 10 cable downstream channel-id 83
rf-channel 11 cable downstream channel-id 84
rf-channel 12 cable downstream channel-id 85
rf-channel 13 cable downstream channel-id 86
rf-channel 14 cable downstream channel-id 87
rf-channel 15 cable downstream channel-id 88
rf-channel 16 cable downstream channel-id 89
rf-channel 17 cable downstream channel-id 90
rf-channel 18 cable downstream channel-id 91
rf-channel 19 cable downstream channel-id 92
rf-channel 20 cable downstream channel-id 93
rf-channel 21 cable downstream channel-id 94
rf-channel 22 cable downstream channel-id 95
rf-channel 23 cable downstream channel-id 96
!
```

```
controller Modular-Cable 7/1/1
rf-channel 0 cable downstream channel-id 97
rf-channel 1 cable downstream channel-id 98
rf-channel 2 cable downstream channel-id 99
rf-channel 3 cable downstream channel-id 100
rf-channel 4 cable downstream channel-id 101
rf-channel 5 cable downstream channel-id 102
rf-channel 6 cable downstream channel-id 103
rf-channel 7 cable downstream channel-id 104
rf-channel 8 cable downstream channel-id 105
rf-channel 9 cable downstream channel-id 106
rf-channel 10 cable downstream channel-id 107
rf-channel 11 cable downstream channel-id 108
rf-channel 12 cable downstream channel-id 109
rf-channel 13 cable downstream channel-id 110
rf-channel 14 cable downstream channel-id 111
rf-channel 15 cable downstream channel-id 112
rf-channel 16 cable downstream channel-id 113
rf-channel 17 cable downstream channel-id 114
rf-channel 18 cable downstream channel-id 115
rf-channel 19 cable downstream channel-id 116
rf-channel 20 cable downstream channel-id 117
rf-channel 21 cable downstream channel-id 118
rf-channel 22 cable downstream channel-id 119
rf-channel 23 cable downstream channel-id 120
!
controller Modular-Cable 7/1/2
rf-channel 0 cable downstream channel-id 121
rf-channel 1 cable downstream channel-id 122
rf-channel 2 cable downstream channel-id 123
rf-channel 3 cable downstream channel-id 124
rf-channel 4 cable downstream channel-id 125
rf-channel 5 cable downstream channel-id 126
rf-channel 6 cable downstream channel-id 127
rf-channel 7 cable downstream channel-id 128
rf-channel 8 cable downstream channel-id 129
rf-channel 9 cable downstream channel-id 130
rf-channel 10 cable downstream channel-id 131
rf-channel 11 cable downstream channel-id 132
rf-channel 12 cable downstream channel-id 133
rf-channel 13 cable downstream channel-id 134
rf-channel 14 cable downstream channel-id 135
rf-channel 15 cable downstream channel-id 136
rf-channel 16 cable downstream channel-id 137
rf-channel 17 cable downstream channel-id 138
rf-channel 18 cable downstream channel-id 139
rf-channel 19 cable downstream channel-id 140
rf-channel 20 cable downstream channel-id 141
rf-channel 21 cable downstream channel-id 142
rf-channel 22 cable downstream channel-id 143
rf-channel 23 cable downstream channel-id 144
!
!
interface Loopback1
no ip address
no ip route-cache cef
no ip route-cache
ip rsvp bandwidth 10000
ip rsvp listener outbound reply
!
interface FastEthernet0/0/0
ip address 192.4.0.37 255.255.255.0
no ip route-cache cef
no ip route-cache
media-type rj45
speed auto
duplex auto
ipv6 address 2001:DB:4:1::37/64
ipv6 enable
!
interface TenGigabitEthernet1/0/0
no ip address
!
```

```
interface TenGigabitEthernet1/1/0
no ip address
!
!
interface Cable7/1/0
downstream Modular-Cable 7/1/0 rf-channel 0
no cable mtc-mode
no cable packet-cache
cable bundle 1
cable upstream max-ports 4
cable upstream 0 connector 0
cable upstream 0 frequency 20000000
cable upstream 0 channel-width 6400000
cable upstream 0 docsis-mode atdma
cable upstream 0 minislot-size 4
cable upstream 0 range-backoff 3 6
cable upstream 0 modulation-profile 221
no cable upstream 0 shutdown
cable upstream 1 connector 0
cable upstream 1 channel-width 1600000
cable upstream 1 docsis-mode atdma
cable upstream 1 minislot-size 4
cable upstream 1 range-backoff 3 6
cable upstream 1 modulation-profile 221
cable upstream 1 shutdown
cable upstream 2 connector 0
cable upstream 2 channel-width 1600000
cable upstream 2 docsis-mode atdma
cable upstream 2 minislot-size 4
cable upstream 2 range-backoff 3 6
cable upstream 2 modulation-profile 221
cable upstream 2 shutdown
cable upstream 3 connector 0
cable upstream 3 channel-width 1600000
cable upstream 3 docsis-mode atdma
cable upstream 3 minislot-size 4
cable upstream 3 range-backoff 3 6
cable upstream 3 modulation-profile 221
cable upstream 3 shutdown
!
interface Cable7/1/1
no cable packet-cache
cable upstream max-ports 4
cable upstream 0 connector 0
cable upstream 0 channel-width 1600000
cable upstream 0 docsis-mode atdma
cable upstream 0 minislot-size 4
cable upstream 0 range-backoff 3 6
cable upstream 0 modulation-profile 221
cable upstream 0 shutdown
cable upstream 1 connector 0
cable upstream 1 channel-width 1600000
cable upstream 1 docsis-mode atdma
cable upstream 1 minislot-size 4
cable upstream 1 range-backoff 3 6
cable upstream 1 modulation-profile 221
cable upstream 1 shutdown
cable upstream 2 connector 0
cable upstream 2 channel-width 1600000
cable upstream 2 docsis-mode atdma
cable upstream 2 minislot-size 4
cable upstream 2 range-backoff 3 6
cable upstream 2 modulation-profile 221
cable upstream 2 shutdown
cable upstream 3 connector 0
cable upstream 3 channel-width 1600000
cable upstream 3 docsis-mode atdma
cable upstream 3 minislot-size 4
cable upstream 3 range-backoff 3 6
cable upstream 3 modulation-profile 221
cable upstream 3 shutdown
!
```

```
interface GigabitEthernet7/1/0
ip address 192.71.0.1 255.255.255.0
ip pim sparse-dense-mode
negotiation auto
!
interface GigabitEthernet7/1/2
no ip address
negotiation auto
!

interface Bundle1
ip address 192.2.1.1 255.255.255.0
ip pim sparse-mode
ip igmp version 3
cable multicast-qos group 20
cable arp filter request-send 3 2
cable arp filter reply-accept 3 2
cable dhcp-giaddr policy
cable helper-address 192.1.0.3
ip rsvp bandwidth 10000
ip rsvp listener outbound reply
!
ip default-gateway 192.4.0.1
ip classless
!
no ip http server
no ip http secure-server
!
!
logging cmts ipc-cable log-level errors
logging cmts sea syslog-level errors
cpd cr-id 1
nls resp-timeout 1
cdp run
!
tftp-server disk0:basic.cm alias golden.cm
!
control-plane
!
alias exec ccmad clear cable modem all delete
alias exec scm show cable modem
alias exec ccm clear cable modem
alias exec scc show cable cmc
!
line con 0
exec-timeout 0 0
privilege level 15
stopbits 1
line aux 0
stopbits 1
line vty 0 4
exec-timeout 0 0
privilege level 15
no login
line vty 5 15
privilege level 15
no login
line vty 16 50
no login
!
scheduler isr-watchdog
!
cable channel-group 71
upstream Cable7/1/0 channel 0-3
downstream Modular-Cable 7/1/0 rf-channel 0-7
cmc 0200.0000.0001
!
ntp clock-period 17179828
ntp update-calendar
ntp server 20.1.0.2
end
```

Example: Configuring CMTS and Router in Layer 3 CIN Network

The following example shows how to configure CMTS in Layer 3 CIN network shown in the illustration of Configuring the Layer 3 CIN Network support, on page 16.

```
issu-ubr10k-5#show run
Building configuration...

Current configuration : 143626 bytes
!
! Last configuration change at 16:28:30 CST Tue Mar 24 2015
!
version 12.2
no service pad
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone
no service password-encryption
service internal
service udp-small-servers max-servers 25
service debug-tracking ip-address 50.1.0.1
service debug-tracking context-copy
!
hostname issu-ubr10k-5
!
boot-start-marker
boot system disk0:ubr10k4-k9p6u2-mz.cd102.dbg
boot-end-marker
!
logging buffered 20000000
logging rate-limit console 10
no logging console
enable password lab
!
no aaa new-model
clock timezone CST 8
facility-alarm outlet-temperature major 58
facility-alarm outlet-temperature minor 48
facility-alarm outlet-temperature critical 85
no facility-alarm intake-temperature major
no facility-alarm intake-temperature minor
facility-alarm intake-temperature critical 72
!
!
!
!
card 1 4jacket-1
card 3 4jacket-1
card 5/0 ubr10k-clc-3g60-rphy license 72X60
card 6/0 ubr10k-clc-3g60 license 16X60
card 7/1 ubr10k-clc-3g60-rphy license 72X60!
cable admission-control preempt priority-voice
!
cable source-verify group ngspa-perf
!
!
!
cable modem v6-max-cpe-prefix 16
cable service class 1 name mcast1
cable service class 1 downstream
cable service class 11 name ugs_test
cable service class 11 upstream
cable service class 11 sched-type 6
cable service class 11 req-trans-policy 3FF
cable service class 11 grant-size 232
cable service class 11 grant-interval 20000
cable service class 11 grant-jitter 10000
cable service class 11 grants-per-interval 1
cable service class 11 max-buff-size 200000000
no cable qos permission create
no cable qos permission update
```

```
cable qos permission modems
!
cable logging badipsource
cable logging layer2events
cable logging overlapip
cable logging ironbus
cable logging downstream-index
cable time-server
cable clock dti
cable cmc 9078.5634.1200 ds-rf-power 52.0 tilt -12dB
cable privacy hotlist cm 7cb2.1b10.32d2
cable privacy hotlist cm 7cb2.1b10.2248
cable load-balance docsis-enable
!
cable load-balance docsis-group 1
!
cable load-balance docsis-group 2
!
cable load-balance group 1 method utilization
cable load-balance group 1 threshold load minimum 1
cable load-balance group 79
cable load-balance group 80
!
ip subnet-zero
no ip domain lookup
ip host rfsw-1 20.5.0.50
ip host rfsw-2 20.5.0.50
ip multicast-routing
ip dhcp smart-relay
no ip dhcp use vrf connected
ip dhcp excluded-address 50.2.0.1
!
ip dhcp pool CMC-50
   network 50.2.0.0 255.255.255.0
   bootfile tftp://50.1.0.1/cmc-16x4-os-20141127.bin
   default-router 50.2.0.1
   lease 7 0 10
!
!
!
!
ipv6 multicast rpf use-bgp
l2tp-class l2tp-class_6_0
 hello 5
 hostname lchc6_0
 retransmit retries 5
 retransmit timeout max 1
!
packetcable multimedia
depi-class depi-class_6_0
 mode mpt
!
depi-tunnel 3g60_6_0_0
 dest-ip 192.60.0.2
 l2tp-class l2tp-class_6_0
 depi-class depi-class_6_0
 protect-tunnel 3g60_6_1_0_p
!
depi-tunnel 3g60_6_1_0_p
 dest-ip 192.61.0.2
!
!
diagnostic bootup level minimal
!
redundancy
  mode sso
!
controller Modular-Cable 5/0/0
 rf-channel 0 cable downstream channel-id 1
 rf-channel 0 frequency 453000000 annex B modulation 256qam interleave 32
 rf-channel 0 group-address 225.1.1.2
 no rf-channel 0 rf-shutdown
 rf-channel 1 cable downstream channel-id 2
```

```
 rf-channel 1 frequency 459000000 annex B modulation 256qam interleave 32
 rf-channel 1 group-address 225.1.1.2
 no rf-channel 1 rf-shutdown
 rf-channel 2 cable downstream channel-id 3
 rf-channel 2 frequency 465000000 annex B modulation 256qam interleave 32
 rf-channel 2 group-address 225.1.1.2
 no rf-channel 2 rf-shutdown
 rf-channel 3 cable downstream channel-id 4
 rf-channel 3 frequency 471000000 annex B modulation 256qam interleave 32
 rf-channel 3 group-address 225.1.1.2
 no rf-channel 3 rf-shutdown
 rf-channel 4 cable downstream channel-id 5
 rf-channel 4 frequency 477000000 annex B modulation 256qam interleave 32
 rf-channel 4 group-address 225.1.1.2
 no rf-channel 4 rf-shutdown
 rf-channel 5 cable downstream channel-id 6
 rf-channel 5 frequency 483000000 annex B modulation 256qam interleave 32
 rf-channel 5 group-address 225.1.1.2
 no rf-channel 5 rf-shutdown
 rf-channel 6 cable downstream channel-id 7
 rf-channel 6 frequency 489000000 annex B modulation 256qam interleave 32
 rf-channel 6 group-address 225.1.1.2
 no rf-channel 6 rf-shutdown
 rf-channel 7 cable downstream channel-id 8
 rf-channel 7 frequency 495000000 annex B modulation 256qam interleave 32
 rf-channel 7 group-address 225.1.1.2
 no rf-channel 7 rf-shutdown
 rf-channel 8 cable downstream channel-id 9
 rf-channel 9 cable downstream channel-id 10
 rf-channel 10 cable downstream channel-id 11
 rf-channel 11 cable downstream channel-id 12
 rf-channel 12 cable downstream channel-id 13
 rf-channel 13 cable downstream channel-id 14
 rf-channel 14 cable downstream channel-id 15
 rf-channel 15 cable downstream channel-id 16
 rf-channel 16 cable downstream channel-id 17
 rf-channel 17 cable downstream channel-id 18
 rf-channel 18 cable downstream channel-id 19
 rf-channel 19 cable downstream channel-id 20
 rf-channel 20 cable downstream channel-id 21
 rf-channel 21 cable downstream channel-id 22
 rf-channel 22 cable downstream channel-id 23
 rf-channel 23 cable downstream channel-id 24
!
controller Modular-Cable 5/0/1
 rf-channel 0 cable downstream channel-id 25
 rf-channel 1 cable downstream channel-id 26
 rf-channel 2 cable downstream channel-id 27
 rf-channel 3 cable downstream channel-id 28
 rf-channel 4 cable downstream channel-id 29
 rf-channel 5 cable downstream channel-id 30
 rf-channel 6 cable downstream channel-id 31
 rf-channel 7 cable downstream channel-id 32
 rf-channel 8 cable downstream channel-id 33
 rf-channel 9 cable downstream channel-id 34
 rf-channel 10 cable downstream channel-id 35
 rf-channel 11 cable downstream channel-id 36
 rf-channel 12 cable downstream channel-id 37
 rf-channel 13 cable downstream channel-id 38
 rf-channel 14 cable downstream channel-id 39
 rf-channel 15 cable downstream channel-id 40
 rf-channel 16 cable downstream channel-id 41
 rf-channel 17 cable downstream channel-id 42
 rf-channel 18 cable downstream channel-id 43
 rf-channel 19 cable downstream channel-id 44
 rf-channel 20 cable downstream channel-id 45
 rf-channel 21 cable downstream channel-id 46
 rf-channel 22 cable downstream channel-id 47
 rf-channel 23 cable downstream channel-id 48
!
controller Modular-Cable 5/0/2
 rf-channel 0 cable downstream channel-id 1
 rf-channel 0 frequency 453000000 annex B modulation 256qam interleave 32
```

```
 rf-channel 0 group-address 225.1.1.2
 no rf-channel 0 rf-shutdown
 rf-channel 1 cable downstream channel-id 2
 rf-channel 1 frequency 459000000 annex B modulation 256qam interleave 32
 rf-channel 1 group-address 225.1.1.2
 no rf-channel 1 rf-shutdown
 rf-channel 2 cable downstream channel-id 3
 rf-channel 2 frequency 465000000 annex B modulation 256qam interleave 32
 rf-channel 2 group-address 225.1.1.2
 no rf-channel 2 rf-shutdown
 rf-channel 3 cable downstream channel-id 4
 rf-channel 3 frequency 471000000 annex B modulation 256qam interleave 32
 rf-channel 3 group-address 225.1.1.2
 no rf-channel 3 rf-shutdown
 rf-channel 4 cable downstream channel-id 5
 rf-channel 4 frequency 477000000 annex B modulation 256qam interleave 32
 rf-channel 4 group-address 225.1.1.2
 no rf-channel 4 rf-shutdown
 rf-channel 5 cable downstream channel-id 6
 rf-channel 5 frequency 483000000 annex B modulation 256qam interleave 32
 rf-channel 5 group-address 225.1.1.2
 no rf-channel 5 rf-shutdown
 rf-channel 6 cable downstream channel-id 7
 rf-channel 6 frequency 489000000 annex B modulation 256qam interleave 32
 rf-channel 6 group-address 225.1.1.2
 no rf-channel 6 rf-shutdown
 rf-channel 7 cable downstream channel-id 8
 rf-channel 7 frequency 495000000 annex B modulation 256qam interleave 32
 rf-channel 7 group-address 225.1.1.2
 no rf-channel 7 rf-shutdown
 rf-channel 8 cable downstream channel-id 57
 rf-channel 9 cable downstream channel-id 58
 rf-channel 10 cable downstream channel-id 59
 rf-channel 11 cable downstream channel-id 60
 rf-channel 12 cable downstream channel-id 61
 rf-channel 13 cable downstream channel-id 62
 rf-channel 14 cable downstream channel-id 63
 rf-channel 15 cable downstream channel-id 64
 rf-channel 16 cable downstream channel-id 65
 rf-channel 17 cable downstream channel-id 66
 rf-channel 18 cable downstream channel-id 67
 rf-channel 19 cable downstream channel-id 68
 rf-channel 20 cable downstream channel-id 69
 rf-channel 21 cable downstream channel-id 70
 rf-channel 22 cable downstream channel-id 71
 rf-channel 23 cable downstream channel-id 72
!
controller Modular-Cable 6/0/0
 rf-channel 0 cable downstream channel-id 1
 rf-channel 0 frequency 483000000 annex B modulation 256qam interleave 128
 rf-channel 0 depi-tunnel 3g60_6_0_0 tsid 5091
 no rf-channel 0 rf-shutdown
 rf-channel 1 cable downstream channel-id 2
 rf-channel 1 frequency 489000000 annex B modulation 256qam interleave 128
 rf-channel 1 depi-tunnel 3g60_6_0_0 tsid 5092
 no rf-channel 1 rf-shutdown
 rf-channel 2 cable downstream channel-id 3
 rf-channel 2 frequency 495000000 annex B modulation 256qam interleave 128
 rf-channel 2 depi-tunnel 3g60_6_0_0 tsid 5093
 no rf-channel 2 rf-shutdown
 rf-channel 3 cable downstream channel-id 4
 rf-channel 3 frequency 501000000 annex B modulation 256qam interleave 128
 rf-channel 3 depi-tunnel 3g60_6_0_0 tsid 5094
 rf-channel 3 rf-shutdown
 rf-channel 4 cable downstream channel-id 5
 rf-channel 4 frequency 507000000 annex B modulation 256qam interleave 128
 rf-channel 4 depi-tunnel 3g60_6_0_0 tsid 5095
 no rf-channel 4 rf-shutdown
 rf-channel 5 cable downstream channel-id 6
 rf-channel 5 frequency 146000000 annex B modulation 256qam interleave 128
 rf-channel 5 depi-tunnel 3g60_6_0_0 tsid 5096
 no rf-channel 5 rf-shutdown
 rf-channel 6 cable downstream channel-id 7
```

```
 rf-channel 6 frequency 152000000 annex B modulation 256qam interleave 128
 rf-channel 6 depi-tunnel 3g60_6_0_0 tsid 5097
 no rf-channel 6 rf-shutdown
 rf-channel 7 cable downstream channel-id 8
 rf-channel 8 cable downstream channel-id 9
 rf-channel 9 cable downstream channel-id 10
 rf-channel 10 cable downstream channel-id 11
 rf-channel 11 cable downstream channel-id 11
 rf-channel 12 cable downstream channel-id 13
 rf-channel 13 cable downstream channel-id 14
 rf-channel 14 cable downstream channel-id 15
 rf-channel 15 cable downstream channel-id 16
 rf-channel 16 cable downstream channel-id 17
 rf-channel 17 cable downstream channel-id 18
 rf-channel 18 cable downstream channel-id 19
 rf-channel 19 cable downstream channel-id 20
 rf-channel 20 cable downstream channel-id 21
 rf-channel 21 cable downstream channel-id 22
 rf-channel 22 cable downstream channel-id 23
 rf-channel 23 cable downstream channel-id 24
!
controller Modular-Cable 6/0/1
 ip-address 192.60.0.1
 rf-channel 0 cable downstream channel-id 25
 rf-channel 1 cable downstream channel-id 26
 rf-channel 2 cable downstream channel-id 27
 rf-channel 3 cable downstream channel-id 28
 rf-channel 4 cable downstream channel-id 29
 rf-channel 5 cable downstream channel-id 30
 rf-channel 6 cable downstream channel-id 31
 rf-channel 7 cable downstream channel-id 32
 rf-channel 8 cable downstream channel-id 33
 rf-channel 9 cable downstream channel-id 34
 rf-channel 10 cable downstream channel-id 35
 rf-channel 11 cable downstream channel-id 36
 rf-channel 12 cable downstream channel-id 37
 rf-channel 13 cable downstream channel-id 38
 rf-channel 14 cable downstream channel-id 39
 rf-channel 15 cable downstream channel-id 40
 rf-channel 16 cable downstream channel-id 41
 rf-channel 17 cable downstream channel-id 42
 rf-channel 18 cable downstream channel-id 43
 rf-channel 19 cable downstream channel-id 44
 rf-channel 20 cable downstream channel-id 45
 rf-channel 21 cable downstream channel-id 46
 rf-channel 22 cable downstream channel-id 47
 rf-channel 23 cable downstream channel-id 48
!
controller Modular-Cable 6/0/2
 ip-address 192.60.0.1
 rf-channel 0 cable downstream channel-id 49
 rf-channel 1 cable downstream channel-id 50
 rf-channel 2 cable downstream channel-id 51
 rf-channel 3 cable downstream channel-id 52
 rf-channel 4 cable downstream channel-id 53
 rf-channel 5 cable downstream channel-id 54
 rf-channel 6 cable downstream channel-id 55
 rf-channel 7 cable downstream channel-id 56
 rf-channel 8 cable downstream channel-id 57
 rf-channel 9 cable downstream channel-id 58
 rf-channel 10 cable downstream channel-id 59
 rf-channel 11 cable downstream channel-id 60
 rf-channel 12 cable downstream channel-id 61
 rf-channel 13 cable downstream channel-id 62
 rf-channel 14 cable downstream channel-id 63
 rf-channel 15 cable downstream channel-id 64
 rf-channel 16 cable downstream channel-id 65
 rf-channel 17 cable downstream channel-id 66
 rf-channel 18 cable downstream channel-id 67
 rf-channel 19 cable downstream channel-id 68
 rf-channel 20 cable downstream channel-id 69
 rf-channel 21 cable downstream channel-id 70
 rf-channel 22 cable downstream channel-id 71
```

```
 rf-channel 23 cable downstream channel-id 72
!
!
!
!
!
!
interface FastEthernet0/0/0
 ip address 80.1.1.51 255.255.255.0
 no ip proxy-arp
 no ip route-cache cef
 no ip route-cache
 media-type rj45
 speed 100
 duplex auto
!
interface Cable5/0/0
 downstream Modular-Cable 5/0/0 rf-channel 0-7 upstream 0-3
 cable mtc-mode
 no cable packet-cache
 cable default-phy-burst 0
 cable bundle 4
 cable upstream max-ports 4
 cable upstream bonding-group 1
  upstream 0
  upstream 1
  upstream 2
  upstream 3
  attributes 80000000
 cable upstream 0 connector 0
 cable upstream 0 frequency 20000000
 cable upstream 0 channel-width 6400000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 no cable upstream 0 rate-limit
 cable upstream 0 rate-adapt
 no cable upstream 0 shutdown
 cable upstream 1 connector 0
 cable upstream 1 frequency 28000000
 cable upstream 1 channel-width 6400000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 no cable upstream 1 rate-limit
 cable upstream 1 rate-adapt
 no cable upstream 1 shutdown
 cable upstream 2 connector 0
 cable upstream 2 frequency 36000000
 cable upstream 2 channel-width 6400000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 no cable upstream 2 rate-limit
 cable upstream 2 rate-adapt
 no cable upstream 2 shutdown
 cable upstream 3 connector 0
 cable upstream 3 frequency 44000000
 cable upstream 3 channel-width 6400000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 no cable upstream 3 rate-limit
 cable upstream 3 rate-adapt
 no cable upstream 3 shutdown
!
interface Cable5/0/1
 no cable packet-cache
 cable upstream max-ports 4
```

```
 cable upstream 0 connector 0
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 0
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 1
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 0
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/2
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 0
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 0
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 0
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 0
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/3
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 0
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 0
 cable upstream 1 channel-width 1600000
```

```
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 0
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 0
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/4
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 0
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 0
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 0
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 0
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/5
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 1
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
```

```
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 1
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/6
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 1
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 1
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 1
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 1
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/7
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 1
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 1
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 1
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 1
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
```

```
 cable upstream 3 shutdown
!
interface Cable5/0/8
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 1
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 1
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 1
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 1
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/9
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 1
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 1
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 1
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 1
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/10
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 2
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
```

```
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 2
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 2
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 2
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/11
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 2
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 2
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 2
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 2
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/12
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 2
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 2
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
```

```
 cable upstream 1 shutdown
 cable upstream 2 connector 2
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 2
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/13
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 2
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 2
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 2
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 2
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface Cable5/0/14
 no cable packet-cache
 cable upstream max-ports 4
 cable upstream 0 connector 2
 cable upstream 0 channel-width 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 shutdown
 cable upstream 1 connector 2
 cable upstream 1 channel-width 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 shutdown
 cable upstream 2 connector 2
 cable upstream 2 channel-width 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 shutdown
 cable upstream 3 connector 2
```

```
 cable upstream 3 channel-width 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 shutdown
!
interface GigabitEthernet5/0/0
 mac-address 7081.052d.2438
 ip address 50.1.0.1 255.255.255.0
 ip access-group cmc-l3connect out
 ip helper-address 20.1.0.33
 ip pim sparse-dense-mode
 ip igmp version 3
 load-interval 30
 negotiation auto
!
interface GigabitEthernet5/0/2
 no ip address
 negotiation auto
!
interface GigabitEthernet5/0/4
 no ip address
 negotiation auto
!
interface Modular-Cable5/0/0:0
 cable bundle 4
 cable rf-bandwidth-percent 50
!
interface Modular-Cable5/0/0:1
 cable bundle 4
 cable rf-bandwidth-percent 50
!
interface Modular-Cable5/0/0:2
 cable bundle 4
 cable rf-bandwidth-percent 50
!
interface Modular-Cable5/0/0:3
 cable bundle 4
 cable rf-bandwidth-percent 50
!
interface Modular-Cable5/0/0:4
 cable bundle 4
 cable rf-bandwidth-percent 50
!
interface Modular-Cable5/0/0:5
 cable bundle 4
 cable rf-bandwidth-percent 50
!
interface Modular-Cable5/0/0:6
 cable bundle 4
 cable rf-bandwidth-percent 50
!
interface Modular-Cable5/0/0:7
 cable bundle 4
 cable rf-bandwidth-percent 50
!
interface Wideband-Cable5/0/0:0
 cable bundle 4
 cable rf-channel 0 bandwidth-percent 20
 cable rf-channel 1 bandwidth-percent 20
 cable rf-channel 2 bandwidth-percent 20
 cable rf-channel 3 bandwidth-percent 20
 cable rf-channel 4 bandwidth-percent 20
 cable rf-channel 5 bandwidth-percent 20
 cable rf-channel 6 bandwidth-percent 20
 cable rf-channel 7 bandwidth-percent 20
!
interface Cable6/0/0
 downstream Modular-Cable 6/0/0 rf-channel 0-6 upstream 0-3
 cable mtc-mode
 no cable packet-cache
 cable bundle 1
```

```
 cable upstream max-ports 4
 cable upstream bonding-group 1
  upstream 0
  upstream 1
  upstream 2
  upstream 3
  attributes A0000000
 cable upstream 0 connector 0
 cable upstream 0 frequency 20000000
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 no cable upstream 0 shutdown
 cable upstream 1 connector 1
 cable upstream 1 frequency 28000000
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 no cable upstream 1 shutdown
 cable upstream 2 connector 2
 cable upstream 2 frequency 36000000
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 no cable upstream 2 shutdown
 cable upstream 3 connector 3
 cable upstream 3 frequency 44000000
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 no cable upstream 3 shutdown
!
interface Cable6/0/1
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
```

```
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/2
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/3
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
```

```
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/4
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/5
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
```

```
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/6
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/7
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
```

```
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/8
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/9
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
```

```
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/10
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/11
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
```

```
 cable upstream 3 shutdown
!
interface Cable6/0/12
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface Cable6/0/13
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
```

```
!
interface Cable6/0/14
 no cable packet-cache
 cable upstream max-ports 4
 no cable upstream 0 connector
 cable upstream 0 channel-width 1600000 1600000
 cable upstream 0 docsis-mode atdma
 cable upstream 0 minislot-size 4
 cable upstream 0 range-backoff 3 6
 cable upstream 0 modulation-profile 221
 cable upstream 0 attribute-mask 20000000
 cable upstream 0 shutdown
 no cable upstream 1 connector
 cable upstream 1 channel-width 1600000 1600000
 cable upstream 1 docsis-mode atdma
 cable upstream 1 minislot-size 4
 cable upstream 1 range-backoff 3 6
 cable upstream 1 modulation-profile 221
 cable upstream 1 attribute-mask 20000000
 cable upstream 1 shutdown
 no cable upstream 2 connector
 cable upstream 2 channel-width 1600000 1600000
 cable upstream 2 docsis-mode atdma
 cable upstream 2 minislot-size 4
 cable upstream 2 range-backoff 3 6
 cable upstream 2 modulation-profile 221
 cable upstream 2 attribute-mask 20000000
 cable upstream 2 shutdown
 no cable upstream 3 connector
 cable upstream 3 channel-width 1600000 1600000
 cable upstream 3 docsis-mode atdma
 cable upstream 3 minislot-size 4
 cable upstream 3 range-backoff 3 6
 cable upstream 3 modulation-profile 221
 cable upstream 3 attribute-mask 20000000
 cable upstream 3 shutdown
!
interface GigabitEthernet6/0/0
 ip address 192.60.0.1 255.255.255.0
 negotiation auto
!
interface GigabitEthernet6/0/2
 no ip address
 negotiation auto
!
interface GigabitEthernet6/0/4
 no ip address
 negotiation auto
!
interface Modular-Cable6/0/0:0
 cable bundle 1
 cable rf-bandwidth-percent 20
!
interface Modular-Cable6/0/0:1
 cable bundle 1
 cable rf-bandwidth-percent 10
!
interface Modular-Cable6/0/0:2
 cable bundle 1
 cable rf-bandwidth-percent 10
!
interface Modular-Cable6/0/0:3
 cable bundle 1
 cable rf-bandwidth-percent 50
!
interface Modular-Cable6/0/0:4
 cable bundle 1
 cable rf-bandwidth-percent 50
!
interface Modular-Cable6/0/0:5
 cable bundle 1
 cable rf-bandwidth-percent 50
!
```

```
interface Modular-Cable6/0/0:6
 cable bundle 1
 cable rf-bandwidth-percent 50
!
interface Wideband-Cable6/0/0:0
 cable bundle 1
 cable rf-channel 0 bandwidth-percent 10
 cable rf-channel 1 bandwidth-percent 10
 cable rf-channel 2 bandwidth-percent 10
 cable rf-channel 3 bandwidth-percent 10
 cable rf-channel 4 bandwidth-percent 10
 cable rf-channel 5 bandwidth-percent 10
 cable rf-channel 6 bandwidth-percent 10
!
interface Bundle1
 ip address 70.2.0.1 255.255.0.0
 cable arp filter request-send 3 2
 cable arp filter reply-accept 3 2
 cable dhcp-giaddr policy
!
interface Bundle4
 ip address 80.2.0.1 255.255.255.0 secondary
 ip address 80.1.0.1 255.255.255.0
 cable arp filter request-send 3 2
 cable arp filter reply-accept 3 2
 cable dhcp-giaddr policy
!
ip default-gateway 80.1.1.1
ip classless
ip route 0.0.0.0 0.0.0.0 80.1.1.1
ip route 50.2.0.0 255.255.255.0 50.1.0.2
!
!
no ip http server
no ip http secure-server
!
!
logging cmts ipc-cable log-level errors
logging cmts sea syslog-level errors
cpd cr-id 1
nls resp-timeout 1
cdp run
!
tftp-server disk0:hayu2_cdoc.cm alias golden.cm
tftp-server disk0:basic_cm.cm alias config.cm
tftp-server disk0:cmc-16x4-os-20140731_QDR.bin alias cmc-16x4-os-20140731_QDR.bin
tftp-server disk0:cmc-16x4-os-20141127.bin alias cmc-16x4-os-20141127.bin
snmp-server engineID local A00A00A00AA00A00A00A
snmp-server view hccp_chansw_snmp_view enterprises.6804.2.1.1.3 included
snmp-server view hccp_chansw_snmp_view enterprises.6804.2.1.1.4 included
snmp-server view hccp_chansw_snmp_view enterprises.6804.2.1.1.6 included
snmp-server view hccp_chansw_snmp_view enterprises.6804.2.1.1.7 included
snmp-server view hccp_chansw_snmp_view enterprises.2750.3.1.4.2.2 included
snmp-server view hccp_chansw_snmp_view enterprises.2750.3.2.3.1.0 included
snmp-server view hccp_chansw_snmp_view enterprises.2750.3.2.4.2.1.5 included
snmp-server view hccp_chansw_snmp_view enterprises.2750.3.2.4.2.1.20 included
snmp-server view hccp_chansw_snmp_view enterprises.6804.2.1.1.1.1.4 included
snmp-server view hccp_chansw_snmp_view enterprises.6804.2.1.1.2.1.4 included
snmp-server view hccp_chansw_snmp_view enterprises.2750.3.1.4.2.1.1.1.2 included
snmp-server view hccp_chansw_snmp_view enterprises.2750.3.1.4.2.1.1.1.14 included
snmp-server view hccp_chansw_snmp_trap_view ciscoCableAvailabilityMIBNotifications included
snmp-server community private RW
snmp-server community public RW
snmp-server enable traps cable cmc-onoff
snmp-server host 20.1.0.2 version 2c public udp-port 9988
snmp-server manager
!
!
control-plane
!
alias exec scm show cable modem
alias exec ccm clear cable modem
alias exec spgs show packetcable gate sum
```

```
alias exec scc show cable cmc
!
line con 0
 exec-timeout 0 0
 privilege level 15
 transport output all
 stopbits 1
line aux 0
 transport output all
 stopbits 1
line vty 0 4
 password cisco
 login
 transport input all
 transport output all
!
exception-slave core-file /guyin/ubr10kg4clc-lc-mz.test
exception-slave dump 20.1.0.2
exception crashinfo dump command show chassis eeprom
exception crashinfo dump command show chassis fpga
exception crashinfo dump command show htdp
exception crashinfo dump command show pxf dma register rp
exception crashinfo dump command show pxf dma config rp
exception crashinfo dump command show pxf backplane-bus glob register
exception crashinfo dump command show pxf backplane-bus fbb register
exception crashinfo dump command show pxf backplane-bus tbb register
exception crashinfo dump command show pxf backplane-bus fts register
exception crashinfo dump command show pxf backplane-bus stt register
exception crashinfo dump command show pxf backplane-bus ib register
exception crashinfo dump command show pxf backplane-bus all error
scheduler isr-watchdog
!
cable channel-group 1
 upstream Cable5/0/0 channel 0-3
 downstream Modular-Cable 5/0/0 rf-channel 0-7
 cmc badb.ad02.1cb2
 cmc badb.ad02.3cc2
 cmc badb.ad02.1cd6
 cmc 0004.9f01.8121
!
!
cable fiber-node 2
 downstream Modular-Cable 5/0/0 rf-channel 0-7
 upstream Cable5/0/0 channel 0-3
!
cable fiber-node 60
 downstream Modular-Cable 6/0/0 rf-channel 0-6
 upstream Cable 6/0 connector 0-3
!
ntp clock-period 17179669
ntp update-calendar
ntp server 172.16.0.1
ntp server 20.1.0.2
ntp peer 20.1.0.7
event manager environment _load Line protocol on Interface GigabitEthernet.*changed state
to up
event manager directory user policy "disk0:/"
event manager directory user library "disk0:/"
event manager policy test.tcl type user
!
end

issu-ubr10k-5#scc
MAC Address    IP Address      State      Group Offset CMCID Conn ID    IF
badb.ad02.1cb2 50.2.0.2        online     1     0      2     0          Gi5/0/0

Total 1 CMC.
```

The following example shows how to configure the router next to the CMC in Layer 3 CIN network shown in the illustration of Configuring the Layer 3 CIN Network support, on page 16.

```
NS7-PGN-DOWN#show run
Building configuration...
```

```
Current configuration : 1593 bytes
!
version 12.4
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone
no service password-encryption
!
hostname NS7-PGN-DOWN
!
boot-start-marker
boot-end-marker
!
no logging console
!
aaa new-model
!
!
aaa authentication login default none
aaa authentication enable default none
!
!
aaa session-id common
!
monitor session 1 source interface Fa0/1/0
clock timezone CST 8
!
!
ip cef
!
!
ip multicast-routing
!
multilink bundle-name authenticated
!
!
voice-card 0
 no dspfarm
!
!
!
!
!
!
!
!
interface FastEthernet0/0
 description CONNECT TO CMC
 ip address 50.2.0.1 255.255.255.0
 ip helper-address 50.1.0.1
 ip pim sparse-dense-mode
 load-interval 30
 duplex auto
 speed auto
!
interface FastEthernet0/1
 description CONNECT TO CMTS Gige5/0/0
 ip address 50.1.0.2 255.255.255.0
 ip pim sparse-dense-mode
 load-interval 30
 duplex auto
 speed auto
!
interface FastEthernet0/1/0
!
interface FastEthernet0/1/1
!
interface FastEthernet0/1/2
!
interface FastEthernet0/1/3
!
interface FastEthernet0/1/4
!
```

```
interface FastEthernet0/1/5
!
interface FastEthernet0/1/6
!
interface FastEthernet0/1/7
!
interface FastEthernet0/1/8
!
interface Vlan1
 no ip address
!
!
!
no ip http server
no ip http secure-server
!
!
!
!
!
!
!
control-plane
!
!
!
!
!
!
line con 0
 exec-timeout 0 0
line aux 0
line vty 0 4
!
scheduler allocate 20000 1000
!
!
end
```