



IGMP-Triggered VDOC Broadcast Support on the Cisco CMTS Routers

First Published: December 17, 2008

Last Updated: May 27, 2013

The Cisco universal broadband router supports the Video over DOCSIS (VDOC) Broadcast feature enabling multiple service operators (MSOs) to broadcast video content on RF-spanned downstream signals.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to <http://tools.cisco.com/ITDIT/CFN/>. An account on <http://www.cisco.com/> is not required.

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Prerequisites for Configuring VDOC Broadcast

The table below shows the hardware compatibility prerequisites for the VDOC broadcast feature.


Note

The hardware components introduced in a given Cisco IOS Release are supported in all subsequent releases unless otherwise specified.

Table 1: Cable Hardware Compatibility Matrix for the VDOC Broadcast Feature

CMTS Platform	Processor Engine	Cable Interface Cards
Cisco uBR10012 Universal Broadband Router	Cisco IOS Release 12.2(33)SCA and later releases <ul style="list-style-type: none"> • PRE2 Cisco IOS Release 12.2(33)SCB and later releases <ul style="list-style-type: none"> • PRE4 Cisco IOS Release 12.2(33)SCH and later releases <ul style="list-style-type: none"> • PRE5 	Cisco IOS Release 12.2(33)SCB and later releases <ul style="list-style-type: none"> • Cisco uBR10-MC5X20U/H Cisco IOS Release 12.2(33)SCC and later releases <ul style="list-style-type: none"> • Cisco UBR-MC20X20V Cisco IOS Release 12.2(33)SCE and later releases <ul style="list-style-type: none"> • Cisco uBR-MC3GX60V ¹
Cisco uBR7246VXR Universal Broadband Router	Cisco IOS Release 12.2(33)SCA and later releases <ul style="list-style-type: none"> • NPE-G1 • NPE-G2 	Cisco IOS Release 12.2(33)SCA and later releases <ul style="list-style-type: none"> • Cisco uBR-MC28U/X Cisco IOS Release 12.2(33)SCD and later releases <ul style="list-style-type: none"> • Cisco uBR-MC88V ²
Cisco uBR7225VXR Universal Broadband Router	Cisco IOS Release 12.2(33)SCA and later releases <ul style="list-style-type: none"> • NPE-G1 Cisco IOS Release 12.2(33)SCB and later releases <ul style="list-style-type: none"> • NPE-G2 	Cisco IOS Release 12.2(33)SCA and later releases <ul style="list-style-type: none"> • Cisco uBR-E-28U • Cisco uBR-E-16U • Cisco uBR-MC28U/X Cisco IOS Release 12.2(33)SCD and later releases <ul style="list-style-type: none"> • Cisco uBR-MC88V

- ¹ Cisco uBR3GX60V cable interface line card is compatible only with PRE4.
- ² Cisco uBR-MC88V cable interface line card is compatible only with NPE-G2.

- The Cisco uBR10012 router must have the M-CMTS setup.
- The Cable Modem Termination System (CMTS) and the cable modem must have the latest DOCSIS 3.0 setup with the Multicast DSID-based Forwarding (MDF) and Dynamic Bonding Change (DBC) capability.
- The cable modem software must support the channel change capability via Receive Channel Configuration (RCC) TLV (49.5) in the DBC message.
- Support for DOCSIS 3.0 channel bonding.

Restrictions for Configuring VDOC Broadcast

- The VDOC Broadcast feature supports:
 - Only one tuner per cable modem.
 - Only one video stream per IP set-top box.
 - Only one IP set-top box for every cable modem.
- Internet Group Management Protocol version 3 (IGMPv3) configuration is required on the bundle interface.
- Secondary bonding groups used for video streams must be created using one or more downstream RF channels.
- The secondary bonding group must not be used for forwarding by other features, such as video on demand (VOD) and service flow attribute-based forwarding interface selection.
- The DPC3010 cable modem (DPC3010 firmware version) might experience 3 seconds delay if receive channel configuration is changed using Dynamic Bonding Change (DBC).

Information About Configuring VDOC Broadcast

The VDOC Broadcast feature facilitates broadcasting video over DOCSIS. Video streams are broadcast to one or more downstream RF channels using static multicast. Depending on the video stream selected for viewing by the IP set-top box, the multituner cable modem is tuned to the appropriate RF channel carrying the specific video stream.

The process to broadcast video over the cable is as follows:

- 1** When a channel is selected, the IP set-top box sends an IGMP join message to a particular bonding group.
- 2** The CMTS locates the secondary bonding group that has the video streaming channel and the RCC template that contains the channel corresponding to the secondary bonding group.
- 3** The CMTS sends a dynamic bonding change request (DBC-REQ) message to the modem. The DBC-REQ message contains the DSID. It also contains a new RCC (that contains frequencies for the primary bonding group and the secondary bonding group that was selected in Step 2), if the modem is not currently tuned to the frequencies selected in Step 2.

- 4 The cable modem retunes to the new channel and receives the video stream.

**Note**

In the case of subsequent channel changes, the IP set-top box sends an IGMP leave message for the old video stream. CMTS responds with the DBC-REQ message to remove the DSID corresponding to this stream.

Inter Line Card RF Spanning

The Inter Line Card RF Spanning feature, introduced in Cisco IOS Release 12.2(33)SCF, supports sharing of downstream channels across line cards installed on the Cisco uBR10012 router. This feature is an extension to the existing downstream channel sharing functionality supported within the bonding groups configured on a single line card. This feature enables you to associate downstream channels of a line card to a service group that is hosted on a different line card.

**Note**

The Inter Line Card RF Spanning feature is supported only on the Cisco uBR10012 router with Cisco UBR-MC20X20V and Cisco uBR-MC3GX60V cable interface line cards.

The Inter Line Card RF Spanning feature supports the following two methods of downstream channel sharing:

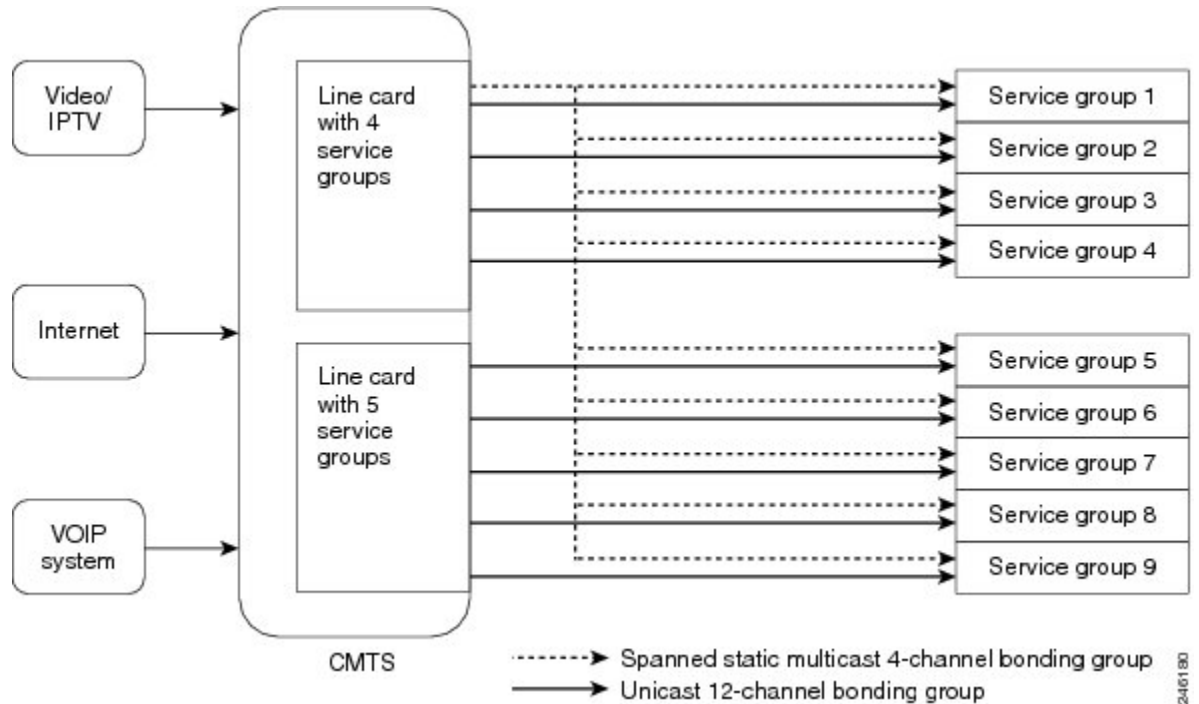
RF Spanning of Bonding Groups Carrying Static Multicast Traffic

In this RF spanning (unrestricted RF spanning) method, a downstream bonding group is configured on one of the line cards and included in one or more fiber nodes as required. Then, one or more static multicast sessions are configured for the bonding group, and any service group can use this bonding group. When this is configured, a cable modem can send a multicast join request and receive multicast streams using this bonding group. This enables service providers to broadcast a set of popular channels and make them available to customers at any time.

As shown in the figure below, each service group is made of 16 downstream channels. Of these 16 channels, 12 downstream channels are from the local card and can carry unicast traffic. The remaining four channels are from one of the line cards and spanned to all downstream service groups. These four channels can carry multicast traffic so that all service groups can use the same channels without creating any replication.

The figure below illustrates how a bonding group carries static multicast traffic.

Figure 1: RF Spanning of Bonding Groups Carrying Static Multicast Traffic



RF Spanning of Remote Bonding Groups

In the RF spanning of remote bonding groups method, downstream channels physically located on a single line card can be used by MAC domains of a different line card for VDOC services. This method supports both unicast VDOC services and static unencrypted multicast services over RF spanned downstream bonding groups. This is similar to the RF spanning functionality supported on the shared port adapter (SPA) bonding groups together with the Cisco uBR10-MC5X20 line card. With this extended RF spanning functionality, you can directly configure remote bonding groups on the Cisco UBR-MC20X20V and Cisco uBR-MC3GX60V line cards for unicast VDOC services. Bonding groups configured on a remote line card are called remote bonding groups.



Note

We recommend using a remote bonding group and its associated channels on a single line card only to avoid bandwidth fragmentation and non-deterministic bandwidth allocation behavior.

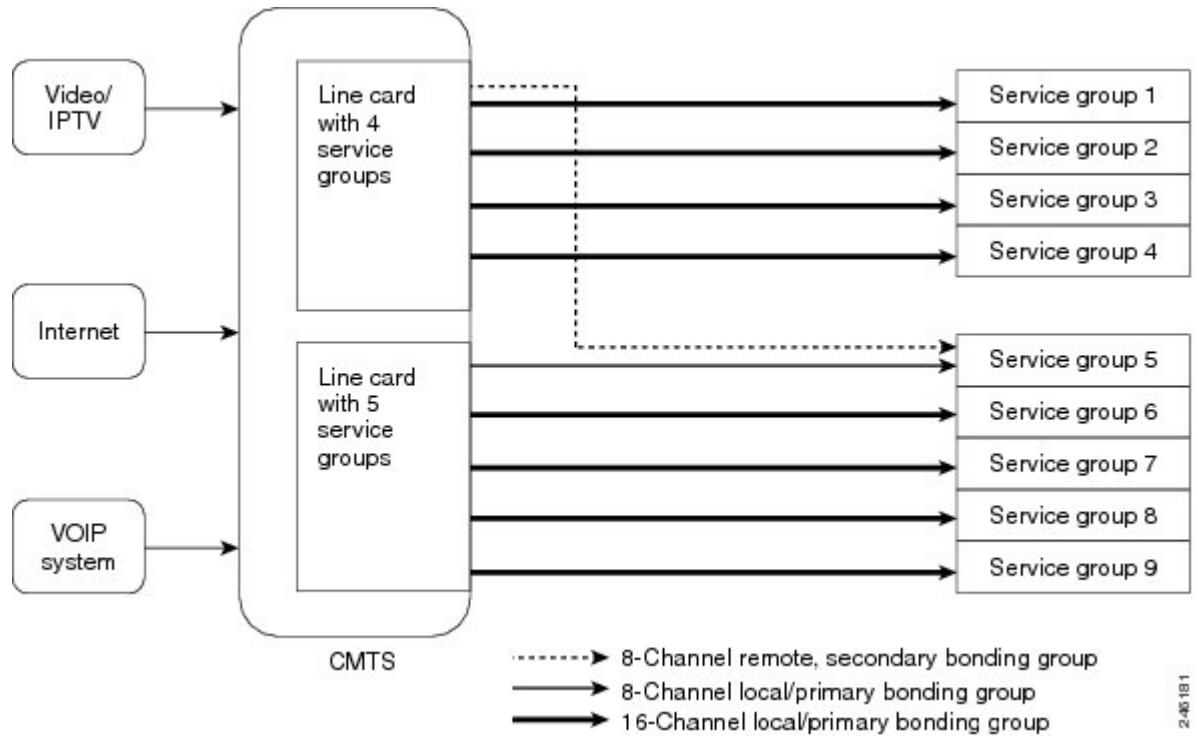
RF spanning of remote bonding groups is configured in the following ways:

Remote Downstream to a Single Host Line Card

As shown in the figure below, each service group is made of 16 downstream channels. Because the Cisco uBR-MC3GX60V line card supports 72 downstream channels, a single line card is not sufficient to make five service groups. Therefore eight downstream channels are taken from another Cisco uBR-MC3GX60V line card to configure five service groups. Also, the service group is made of two or more bonding groups as downstream channels cannot be bonded across line cards.

The figure below illustrates how remote downstream works with a single host line card.

Figure 2: Remote Downstream to a Single Host Line Card



Remote Downstream to Multiple Line Cards

In this configuration, a Cisco uBR-MC3GX60V line card provides all its downstream channels to other Cisco uBR-MC3GX60V line cards installed on the Cisco uBR10012 router. As shown in the figure below, some of the downstream channels are shared with one line card and others are shared with another line card, and none are used locally.

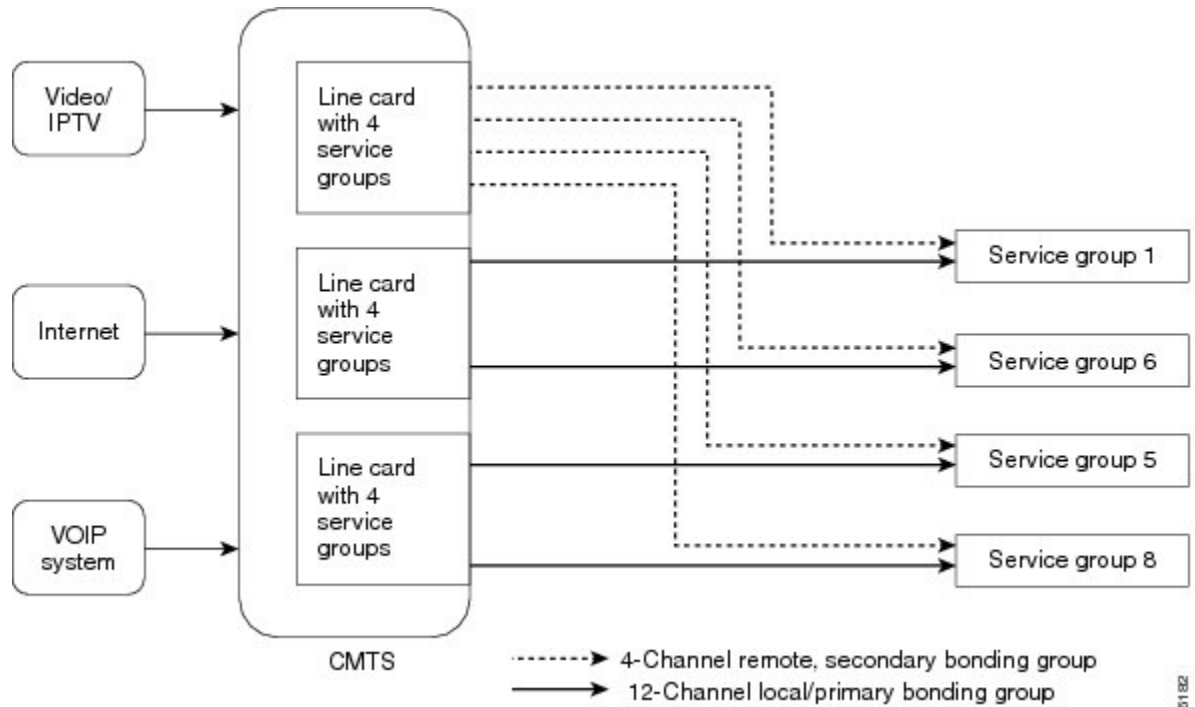


Note

This type of configuration may not be efficient even though it is supported to provide flexibility.

The figure below illustrates how remote downstream works with multiple line cards.

Figure 3: Remote Downstream to Multiple Line Cards



This feature also supports mixing of different types of line cards for downstream channel sharing. That is, a MAC domain configured on a Cisco UBR-MC20X20V line card can use a wideband interface configured on a Cisco uBR-MC3GX60V line card and vice versa. However, this type of configuration is generally not required and is not recommended.

RCC Template

This section describes about the RCC template selection:

Dynamic RCC Selection

The dynamic RCC selection feature facilitates multicast forwarding. The RCC selection occurs after the multicast forwarding selection algorithm identifies that the stream being requested is related to the VDOC Broadcast feature. It will select the RCC, which is superset of the primary bonding group of the cable modem, and the secondary bonding group where the stream is forwarded.



Note

The RCC template is selected only if the number of RF channels in the primary bonding group of the RCC template is same as the number of RF channels in the primary bonding group of the cable modem currently used.

RCC Assignment Across SPAs

The VDOC Broadcast feature requires modems to be tuned to RF spanned channels carrying video streams. The RF spanned channels originate from a SPA other than the SPA hosting the primary bonding group assigned to the cable modem. RCCs are generated from RCC templates that contain Receive Channels (RC) from multiple SPAs.

Limitations while assigning RCCs are:

- For static multicast streams, only SPA downstream channels can be used in RCC templates.
- Encrypted multicast or unicast traffic is not supported on the RC from a secondary SPA.
- For encrypted or unicast downstream VDOC broadcast, traffic will not be forwarded to CPEs even when the cable modem is properly tuned to the downstream.

How to Configure VDOC Broadcast

This section describes the configuration tasks that are performed when using the VDOC broadcast feature on the Cisco CMTS platform.

- 1 [Configuring the Primary and Secondary Bonding Group, on page 8](#) (required)
- 2 [Configuring the RCC Template, on page 9](#) (required)
- 3 [Configuring the Multicast Static Group, on page 11](#) (required)

Configuring the Primary and Secondary Bonding Group

This section describes the tasks required to configure the MAC domain and the bonding group. Follow the summary steps to complete the configuration.

Configure the modular cable controller for four RF channels, two of which will be used for primary bonding group and the other two will be used for broadcasting video specific bonding groups.

Secondary bonding groups may be constructed using multiple RF channels.

Before You Begin

- The modular controller is already configured for RF channels used for the primary and secondary bonding groups. The RF channels used for secondary bonding groups are non-primary capable and can be served by legacy Edge Quadrature Amplitude Modulation (EQAM) applications. The "udp-port" option can be used instead of Downstream External PHY Interface (DEPI) remote ID.
- The MAC domain is configured by specifying the fiber node configuration.

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.

	Command or Action	Purpose
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	interface wideband-cable <i>slot/subslot/port:wideband-channel</i> Example: Router(config)# interface wideband-cable 6/0/1:22	Enters cable interface configuration mode. Variables for this command may vary depending on the Cisco CMTS router and the Cisco IOS software release. For details, see the Cisco IOS CMTS Cable Command Reference . <ul style="list-style-type: none"> • <i>slot</i>—Slot where the Cisco Wideband SIP or a cable line card resides. On the Cisco uBR10012 router, slots 1 and 3 can be used for the Cisco Wideband SIP. The valid range for a cable line card is from 5 to 8. • <i>subslot</i>—Subslot where the Cisco Wideband SIP or a cable line card resides. On the Cisco uBR10012 router, subslot 0 is always specified for the Cisco Wideband SIP. For a cable line card, subslot is 0 or 1. • <i>port</i>—Bay in the SIP where the Cisco Wideband SPA is located. Valid values are 0 (upper bay) and 1 (lower bay). It also refers to the downstream port of the line card. The valid range varies depending on the line card. • <i>wideband-channel</i>—Wideband channel number. The valid range varies depending on the Cisco CMTS router and the line card.
Step 4	cable bonding-group-secondary Example: Router(config-if)# cable bonding-group-secondary	Specifies a secondary bonding group. Note The cable bonding-group-secondary command replaced the cable bonding-group-id command in Cisco IOS Release 12.2(33)SCE.
Step 5	end Example: Router(config-if)# end	Exits interface configuration mode and returns to privileged EXEC mode.

Configuring the RCC Template

This section describes the tasks required to configure the RCC template and associate it to a MAC domain. RCC templates must be configured and then applied to the MAC domain interface. With 3-channel cable modems, the first two channels are part of the primary bonding group, and the third channel is used for video. If two RF channels are used for carrying video streams, then two RCC templates must be configured.

Before You Begin

Modular controller and MAC domain configuration must be complete before you proceed to configuring the RCC template.

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	interface cable { <i>slot/subslot/port</i> <i>slot/subslot/cable-interface-index</i> } Example: Router (config) # interface cable 8/0/0	Associates the RCC template to a MAC domain. Enters interface configuration mode. Variables for this command may vary depending on the Cisco CMTS router and the Cisco IOS software release. For details, see the Cisco IOS CMTS Cable Command Reference . <ul style="list-style-type: none"> • <i>slot</i>—Slot where the line card resides. The valid range is from 5 to 8 on the Cisco uBR10012 router. • <i>subslot</i>—(Cisco uBR10012 only) Secondary slot number of the cable interface line card. The valid subslots are 0 or 1. • <i>port</i>—Downstream port number. The valid range is from 0 to 4 (depending on the cable interface) on the Cisco uBR10012 router. • <i>cable-interface-index</i>—Downstream port of the Cisco uBR10-MC5X20 and Cisco uBR-MC28 line cards, or MAC domain index of the Cisco UBR-MC20X20V and Cisco uBR-MC3GX60V line cards. The valid range for the Cisco UBR-MC20X20V and Cisco uBR-MC5X20 line cards is from 0 to 4. The valid range for the Cisco uBR-MC3GX60V line card is from 0 to 14.
Step 4	cable rcc-template <i>index</i> Example: Router (config) # cable rcc-template 1	Defines the RCC template for a Receive Channel Profile (RCP) outside the MAC domain configuration mode. <ul style="list-style-type: none"> • <i>index</i>—RCC index value. The valid range is from 1 to 255.
Step 5	rcp-id <i>rcp-id</i> Example: Router (config-rcc-template) # rcp-id 0010000004	Configures the RCP ID. <ul style="list-style-type: none"> • <i>rcp-id</i>— RCP ID.
Step 6	receive-module <i>index</i> first-channel-center-frequency <i>Hz</i> Example: Router (config-rcc-template) # receive-module 1 first-channel-center-frequency 45300000	Configures the receive module. <ul style="list-style-type: none"> • <i>Hz</i>—Assigned center frequency of the first channel of the receive module channel block in hertz.

	Command or Action	Purpose
Step 7	<p><code>receive-channel <i>index</i> center-frequency <i>Hz</i></code> <code>connected-receive-module <i>index</i> [<i>primary</i>]</code></p> <p>Example: Router(config-rcc-template)# receive-channel 1 center-frequency 453000000 connected-receive-module 1 primary</p>	<p>Configures the receive channel.</p> <ul style="list-style-type: none"> • <i>Hz</i>—Center frequency of a receive channel in Hz. • connected-receive-module <i>index</i>—Specifies the index value for the connected receive module. The valid range is from 1 to 10. The configuration will be rejected if the connected receive module has not been previously configured. • primary— (Optional) Indicates an RCC can be derived with this channel designated as the primary channel of the cable modem.
Step 8	<p><code>end</code></p> <p>Example: Router(config-rcc-template)# end</p>	<p>Exits RCC template configuration mode and returns to privileged EXEC mode.</p>

What to Do Next



Note

Run the `show cable mac-domain cable interface rcc` command to verify that RCC templates are applied to the MAC domain.

Configuring the Multicast Static Group

Multicast static group configuration is used to statically forward (broadcast) video streams on secondary bonding groups. This configuration specifies certain video streams should be broadcast on particular bonding groups.

This section describes the tasks required to configure the multicast static group.

One or more IGMP static groups corresponding to the broadcast video channels are configured on the specified secondary bonding group. The same groups should be specified under the cable bundle interface as part of the `ip igmp static-group` command.

Before You Begin

- Multicast routing must be configured on the Cisco CMTS.
- PIM sparse-mode must be configured on the bundle interface.
- IGMPv3 must be configured on the bundle interface.

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	interface bundle <i>bundle-number</i> Example: Router# interface bundle 1	Indicates the bundle interface.
Step 4	interface wideband-cable <i>slot/subslot/port:wideband-channel</i> Example: Router(config)# interface wideband-cable 6/0/1:22	Enters cable interface configuration mode. Variables for this command may vary depending on the Cisco CMTS router and the Cisco IOS software release. For details, see the Cisco IOS CMTS Cable Command Reference . <ul style="list-style-type: none"> • <i>slot</i>—Slot where the Cisco Wideband SIP or a cable line card resides. On the Cisco uBR10012 router, slots 1 and 3 can be used for the Cisco Wideband SIP. The valid range for a cable line card is from 5 to 8. • <i>subslot</i>—Subslot where the Cisco Wideband SIP or a cable line card resides. On the Cisco uBR10012 router, subslot 0 is always specified for the Cisco Wideband SIP. For a cable line card, subslot is 0 or 1. • <i>port</i>—Bay in the SIP where the Cisco Wideband SPA is located. Valid values are 0 (upper bay) and 1 (lower bay). It also refers to the downstream port of the line card. The valid range varies depending on the line card. • <i>wideband-channel</i>—Wideband channel number. The valid range varies depending on the Cisco CMTS router and the line card.
Step 5	cable igmp static-group [<i>multicast group</i>] source [<i>source IP</i>] [<i>subinterface number</i>] Example: Router(config-if)# cable igmp static-group 224.0.0.0	Configures the cable per physical downstream static multicast support on the Cisco CMTS. <ul style="list-style-type: none"> • <i>multicast group</i>—Multicast IP address of the group. • source [<i>source IP</i>]— (Optional) Source IP address for SSM. • <i>subinterface number</i>—Subinterface number. The default is 0 for the main interface. <p>Note If the subinterface is configured at the virtual bundle interface, the subinterface number option must be configured to match up with the desired subinterface devices.</p>

	Command or Action	Purpose
Step 6	end Example: Router (config-if) # end	Exits interface configuration mode and returns to privileged EXEC mode.

How to Configure Inter Line Card RF Spanning

The following tasks describe how to configure RF spanning of bonding groups carrying static multicast traffic and RF spanning of remote bonding groups to enable RF spanning on the line cards on the Cisco uBR10012 router:

Configuring RF Spanning of Bonding Groups Carrying Static Multicast Traffic

To configure RF spanning of bonding groups carrying static multicast traffic, you need to associate downstream channels to one or more fiber nodes after configuring VDOC features on the Cisco UBR-MC20X20V and Cisco uBR-MC3GX60V line cards.

Before You Begin

- An RCC template must be created and associated to a MAC domain. For details, see [Configuring the RCC Template, on page 9](#)
- A multicast static group must be created. For details, see [Configuring the Multicast Static Group, on page 11](#).



Restriction RF spanning of bonding groups carrying static multicast traffic is supported only with static, unencrypted multicast.

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	cable fiber-node <i>fiber-node-id</i>	Enters fiber node configuration mode.

	Command or Action	Purpose
	<p>Example: Router (config)# cable fiber-node 70</p>	<ul style="list-style-type: none"> • <i>fiber-node-id</i>—Unique numerical ID of the fiber node. The valid range is from 1 to 256.
Step 4	<p>downstream modular-cable slot/subslot/controller rf-channel grouplist</p> <p>Example: Router(config-fiber-node)# downstream modular-cable 6/1/0 rf-channel 7</p>	<p>Associates the downstream channels to the fiber node of the cable interface line card.</p> <ul style="list-style-type: none"> • <i>slot</i>—Cable interface line card slot. The valid values range from 5 to 8. • <i>subslot</i>—Cable interface line card subslot. The valid values are 0 and 1. • <i>controller</i>—Cable interface number. The valid range is from 0 to 2. • <i>grouplist</i>—Group of RF channels. The valid range is from 0 to 23.
Step 5	<p>upstream cable slot/subslot connector grouplist</p> <p>Example: Router(config-fiber-node)# upstream Cable 6/1 connector 3</p>	<p>Specifies the upstream channel ports for the fiber node.</p> <ul style="list-style-type: none"> • <i>slot</i>—Cable interface line card slot. The valid values range from 5 to 8. • <i>subslot</i>—Cable interface line card subslot. The valid values are 0 and 1. • <i>connector</i>—Specifies the physical upstream port connector on the cable interface line card. • <i>grouplist</i>—Range of physical port numbers on the cable interface line card. The grouplist can be one or more port numbers, or a range of port numbers separated by a hyphen or combinations of both. The valid range for port numbers is from 0 to 19.
Step 6	<p>end</p> <p>Example: Router(config-fiber-node)# end</p>	<p>Exits fiber node configuration mode and returns to privileged EXEC mode.</p>

Configuring RF Spanning of Remote Bonding Groups

To configure RF spanning of remote bonding groups, you need to configure a wideband interface on the Cisco uBR10012 router.

Before You Begin

- An RCC template must be created and associated to a MAC domain. For details, see [Configuring the RCC Template, on page 9](#)
- RF channels must be associated to a fiber node. For details, see [Configuring RF Spanning of Bonding Groups Carrying Static Multicast Traffic, on page 13](#).

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	interface wideband-cable <i>slot/subslot/port:wideband-channel</i> Example: Router(config)# interface wideband-cable 6/0/1:22	Enters cable interface configuration mode. Variables for this command may vary depending on the Cisco CMTS router and the Cisco IOS software release. For details, see the Cisco IOS CMTS Cable Command Reference . <ul style="list-style-type: none"> • <i>slot</i>—Slot where the Cisco Wideband SIP or a cable line card resides. On the Cisco uBR10012 router, slots 1 and 3 can be used for the Cisco Wideband SIP. The valid range for a cable line card is from 5 to 8. • <i>subslot</i>—Subslot where the Cisco Wideband SIP or a cable line card resides. On the Cisco uBR10012 router, subslot 0 is always specified for the Cisco Wideband SIP. For a cable line card, subslot is 0 or 1. • <i>port</i>—Bay in the SIP where the Cisco Wideband SPA is located. Valid values are 0 (upper bay) and 1 (lower bay). It also refers to the downstream port of the line card. The valid range varies depending on the line card. • <i>wideband-channel</i>—Wideband channel number. The valid range varies depending on the Cisco CMTS router and the line card.
Step 4	cable bundle <i>bundle-id</i> Example: Router(config-if)# cable bundle 1	Configures the wideband cable interface to belong to an interface bundle. <ul style="list-style-type: none"> • <i>bundle-id</i>—Bundle identifier. The valid range is from 1 to 255.
Step 5	cable rf-channel <i>rf-channel</i> bandwidth-percent <i>bw-percent</i> Example: Router(config-if)# cable rf-channel 0 bandwidth-percent 25	Configures the bandwidth of the RF channel that would be allocated to a specified wideband channel or bonding group. <ul style="list-style-type: none"> • <i>rf-channel</i>—RF channel on the physical port of the field-programmable gate array (FPGA). • bandwidth-percent <i>bw-percent</i>—(Optional) Indicates the percentage of bandwidth from this RF channel that is used for the wideband interface. The valid range is from 0 to 100 percent. The default bandwidth value is 100.
Step 6	end Example: Router(config-if)# end	Exits interface configuration mode and returns to privileged EXEC mode.

Configuration Examples for VDOC Broadcast

This section describes a sample configuration example for configuring the VDOC broadcast feature.

This configuration supports four video channels (IGMP groups) over two bonding groups, with two channels over one bonding group each. Depending on the video channel selected by the set-top box, the cable modem tunes to frequencies in either RCC template 1 or 2.

Example: Configuring the Primary and Secondary Bonding Groups

The following example shows how to configure the primary and secondary bonding groups. This example is valid for Cisco IOS Release 12.2(33)SCD and earlier.



Note

Secondary bonding group configuration is required only for the VDOC Broadcast feature. This configuration is not required for Inter Line Card RF Spanning.

```

controller modular-cable 1/0/0
 ip-address 192.0.2.0
 modular-host subslot 6/0
 rf-channel 0 cable downstream channel-id 24
 rf-channel 0 frequency 453000000 annex B modulation 256qam interleave 32
 rf-channel 0 ip-address 192.0.2.0 mac-address 0090.f001.930c depi-remote-id 20000
 rf-channel 1 cable downstream channel-id 25
 rf-channel 1 frequency 459000000 annex B modulation 256qam interleave 32
 rf-channel 1 ip-address 192.0.2.0 mac-address 0090.f001.930c depi-remote-id 21000
 rf-channel 2 cable downstream channel-id 26
 rf-channel 2 frequency 465000000 annex B modulation 256qam interleave 32
 rf-channel 2 ip-address 192.0.2.0 mac-address 0090.f001.930c depi-remote-id 21001
 rf-channel 3 cable downstream channel-id 27
 rf-channel 3 frequency 471000000 annex B modulation 256qam interleave 32
 rf-channel 3 ip-address 192.0.2.0 mac-address 0090.f001.930c depi-remote-id 21002
!
Router(config)# interface Wideband-Cable1/0/0:0
 cable bundle 1
 cable bonding-group-id 1

0 bandwidth-percent 80
 cable rf-channel 1
!
Router(config)# interface Wideband-Cable1/0/0:1
 cable bundle 1
 cable bonding-group-id 2 secondary
 cable rf-channel 2
!
Router(config)# interface Wideband-Cable1/0/0:2
 cable bundle 1
 cable bonding-group-id 3 secondary
 cable rf-channel 3
!
Router(config)# interface Modular-Cable1/0/0:0
 cable bundle 1
 cable rf-bandwidth-percent 10
!
 cable fiber-node 1
 downstream Modular-Cable 1/0/0 rf-channel 0-3
!
```


The following example shows how to configure secondary bonding groups in Cisco IOS Release 12.2(33)SCE and later.

```

controller modular-cable 1/0/0
 ip-address 192.0.2.0
 modular-host subslot 6/0
 rf-channel 0 cable downstream channel-id 24
 rf-channel 0 frequency 453000000 annex B modulation 256qam interleave 32
 rf-channel 0 ip-address 192.0.2.0 mac-address 0090.f001.930c depi-remote-id 20000
 rf-channel 1 cable downstream channel-id 25
 rf-channel 1 frequency 459000000 annex B modulation 256qam interleave 32
 rf-channel 1 ip-address 192.0.2.0 mac-address 0090.f001.930c depi-remote-id 21000
 rf-channel 2 cable downstream channel-id 26
 rf-channel 2 frequency 465000000 annex B modulation 256qam interleave 32
 rf-channel 2 ip-address 192.0.2.0 mac-address 0090.f001.930c depi-remote-id 21001
 rf-channel 3 cable downstream channel-id 27
 rf-channel 3 frequency 471000000 annex B modulation 256qam interleave 32
 rf-channel 3 ip-address 192.0.2.0 mac-address 0090.f001.930c depi-remote-id 21002
 !
Router(config)# interface Wideband-Cable1/0/0:0
cable bundle 1
cable bonding-group-secondary
cable rf-channel 0 bandwidth-percent 80 cable rf-channel 1
!
Router(config)# interface Wideband-Cable1/0/0:1
cable bundle 1
cable bonding-group-secondary
cable rf-channel 2
!
Router(config)# interface Wideband-Cable1/0/0:2
cable bundle 1
cable bonding-group-secondary
cable rf-channel 3
!
Router(config)# interface Modular-Cable1/0/0:0
cable bundle 1
cable rf-bandwidth-percent 10
!
cable fiber-node 1
downstream Modular-Cable 1/0/0 rf-channel 0-3
!
```

Example: Configuring the RCC Template

The following example shows how to apply RCC templates to the MAC domain host interface. The frequencies used to configure the MAC domain and bonding group are also used here.

```

cable rcc-template 1
 rcp-id 00 10 18 33 81
 receive-module 1 first-center-frequency 453000000
 receive-channel 1 center-frequency 453000000 connected-receive-module 1 primary
 receive-channel 2 center-frequency 459000000 connected-receive-module 1
 receive-channel 3 center-frequency 465000000 connected-receive-module 1
 !
cable rcc-template 2
 rcp-id 00 10 18 80 61
 receive-module 1 first-center-frequency 465000000
 receive-module 2 first-center-frequency 489000000
 receive-channel 1 center-frequency 465000000 connected-receive-module 1 primary
 receive-channel 2 center-frequency 471000000 connected-receive-module 1
 receive-channel 3 center-frequency 477000000 connected-receive-module 1
 receive-channel 4 center-frequency 483000000 connected-receive-module 1
 receive-channel 5 center-frequency 489000000 connected-receive-module 2
 receive-channel 6 center-frequency 495000000 connected-receive-module 2
 receive-channel 7 center-frequency 501000000 connected-receive-module 2
 receive-channel 8 center-frequency 507000000 connected-receive-module 2
 !
```

Example: Configuring the Multicast Static Group

```

interface Cable 6/0/0
  downstream Modular-Cable 1/0/0 rf-channel 0 upstream 0-3
  cable rcc-template 1
  cable rcc-template 2
  no cable packet-cache
  cable bundle 1
  cable downstream channel-id 119
  cable downstream annex B
  cable downstream modulation 256qam
  cable downstream interleave-depth 32
  cable downstream frequency 615000000
  cable downstream rf-shutdown
  cable upstream max-ports 4
  cable upstream 0 connector 0
  cable upstream 0 frequency 10000000
  cable upstream 0 docsis-mode tdma
  cable upstream 0 channel-width 1600000 1600000
  cable upstream 0 minislots-size 4
  cable upstream 0 range-backoff 3 6
  cable upstream 0 modulation-profile 21
  no cable upstream 0 shutdown
  cable upstream 1 connector 1
  cable upstream 1 docsis-mode tdma
  cable upstream 1 channel-width 1600000 1600000
  cable upstream 1 minislots-size 4
  cable upstream 1 range-backoff 3 6
  cable upstream 1 modulation-profile 21
  cable upstream 1 shutdown
  cable upstream 2 connector 2
  cable upstream 2 docsis-mode tdma
  cable upstream 2 channel-width 1600000 1600000
  cable upstream 2 minislots-size 4
  cable upstream 2 range-backoff 3 6
  cable upstream 2 modulation-profile 21
  cable upstream 2 shutdown
  cable upstream 3 connector 3
  cable upstream 3 docsis-mode tdma
  cable upstream 3 channel-width 1600000 1600000
  cable upstream 3 minislots-size 4
  cable upstream 3 range-backoff 3 6
  cable upstream 3 modulation-profile 21
  cable upstream 3 shutdown
!
```

Example: Configuring the Multicast Static Group

The following example shows how to configure multicast static groups on the bundle interface and on bonding groups in Cisco IOS Release 12.2(33)SCD and earlier:

```

interface Bundle 1
  ip address 192.0.2.8 255.255.255.0
  ip pim sparse-mode
  ip helper-address 2.39.16.1
  ip igmp static-group 224.0.2.1
  ip igmp static-group 224.0.2.2
  ip igmp static-group 224.0.2.3
  ip igmp static-group 224.0.2.4
  cable arp filter request-send 3 2
  cable arp filter reply-accept 3 2
!
Router(config)# interface Wideband-Cable1/0/0:1
  cable bundle 1
Router(config)#cable igmp static-group 224.0.2.3
Router(config)#cable igmp static-group 224.0.2.4
  cable bonding-group-id 2 secondary
  cable rf-channel 2
!
Router(config)#interface Wideband-Cable1/0/0:2
  cable bundle 1
```

```
Router(config)#cable igmp static-group 224.0.2.1
Router(config)#cable igmp static-group 224.0.2.2
cable bonding-group-id 3 secondary
cable rf-channel 3
```

The following example shows how to configure multicast static groups on the bundle interface and on bonding groups in Cisco IOS Release 12.2(33)SCE and later:

```
interface Bundle 1
 ip address 192.0.2.8 255.255.255.0
 ip pim sparse-mode
 ip helper-address 2.39.16.1
 ip igmp static-group 224.0.2.1
 ip igmp static-group 224.0.2.2
 ip igmp static-group 224.0.2.3
 ip igmp static-group 224.0.2.4
 cable arp filter request-send 3 2
 cable arp filter reply-accept 3 2
!
Router(config)# interface Wideband-Cable1/0/0:1
 cable bundle 1
Router(config)#cable igmp static-group 224.0.2.3
Router(config)#cable igmp static-group 224.0.2.4
 cable bonding-group-secondary
 cable rf-channel 2
!
Router(config)#interface Wideband-Cable1/0/0:2
 cable bundle 1
Router(config)#cable igmp static-group 224.0.2.1
Router(config)#cable igmp static-group 224.0.2.2
 cable bonding-group-secondary 3
 cable rf-channel 3
```

Configuration Examples for Inter Line Card RF Spanning

This section provides configuration examples for the Inter Line Card RF Spanning feature.

Example: RF Spanning of Bonding Groups Carrying Static Multicast Traffic

The following example shows how to configure RF spanning of bonding groups carrying static multicast traffic on the Cisco uBR100 router:

```
controller Modular-Cable 1/2/0
 modular-host subslot 7/0
 rf-channel 0 cable downstream channel-id 193
 rf-channel 0 frequency 549000000 annex B modulation 256qam interleave 32
 rf-channel 0 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500025
 rf-channel 1 cable downstream channel-id 194
 rf-channel 1 frequency 555000000 annex B modulation 256qam interleave 32
 rf-channel 1 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500026
 rf-channel 2 cable downstream channel-id 195
 rf-channel 2 frequency 561000000 annex B modulation 256qam interleave 32
 rf-channel 2 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500027
 rf-channel 3 cable downstream channel-id 196
 rf-channel 3 frequency 567000000 annex B modulation 256qam interleave 32
 rf-channel 3 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500028

interface Wideband-Cable1/2/0:0
 cable bundle 11
 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
controller Modular-Cable 5/0/0
```

Example: RF Spanning of Remote Bonding Groups

```

ip-address 60.3.2.4
rf-channel 0 cable downstream channel-id 5
rf-channel 0 frequency 501000000 annex B modulation 256qam interleave 32
rf-channel 0 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500017
rf-channel 1 cable downstream channel-id 1
rf-channel 1 frequency 507000000 annex B modulation 256qam interleave 32
rf-channel 1 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500018
rf-channel 2 cable downstream channel-id 2
rf-channel 2 frequency 513000000 annex B modulation 256qam interleave 32
rf-channel 2 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500019
rf-channel 3 cable downstream channel-id 3
rf-channel 3 frequency 519000000 annex B modulation 256qam interleave 32
rf-channel 3 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500020

interface Wideband-Cable5/0/0:0
cable bundle 11
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

controller Modular-Cable 6/0/0
ip-address 60.3.2.3
rf-channel 0 cable downstream channel-id 4
rf-channel 0 frequency 405000000 annex B modulation 256qam interleave 32
rf-channel 0 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500001
rf-channel 1 cable downstream channel-id 22
rf-channel 1 frequency 411000000 annex B modulation 256qam interleave 32
rf-channel 1 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500002
rf-channel 2 cable downstream channel-id 23
rf-channel 2 frequency 417000000 annex B modulation 256qam interleave 32
rf-channel 2 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500003
rf-channel 3 cable downstream channel-id 24
rf-channel 3 frequency 423000000 annex B modulation 256qam interleave 32
rf-channel 3 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500004
interface Wideband-Cable6/0/0:0
cable bundle 11
cable igmp static-group 230.1.1.1 1
cable igmp static-group 230.5.5.5 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 fiber-node 50
downstream Modular-Cable 5/0/0 rf-channel 0-3
downstream Modular-Cable 6/0/0 rf-channel 0-3
upstream Cable 5/0 connector 0-3
cable fiber-node 70
downstream Modular-Cable 1/2/0 rf-channel 0-3
downstream Modular-Cable 6/0/0 rf-channel 0-3
upstream Cable 7/0 connector 0-3

```

Example: RF Spanning of Remote Bonding Groups

The following example shows how to configure RF spanning of remote bonding groups on the Cisco uBR100 router:

```

controller Modular-Cable 5/0/0
ip-address 60.3.2.4
rf-channel 0 cable downstream channel-id 5
rf-channel 0 frequency 501000000 annex B modulation 256qam interleave 32
rf-channel 0 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500017
rf-channel 1 cable downstream channel-id 1
rf-channel 1 frequency 507000000 annex B modulation 256qam interleave 32
rf-channel 1 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500018
rf-channel 2 cable downstream channel-id 2
rf-channel 2 frequency 513000000 annex B modulation 256qam interleave 32
rf-channel 2 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500019
rf-channel 3 cable downstream channel-id 3

```

```

rf-channel 3 frequency 519000000 annex B modulation 256qam interleave 32
rf-channel 3 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500020

interface Wideband-Cable5/0/0:0
 cable bundle 11
 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

controller Modular-Cable 6/0/0
 ip-address 60.3.2.3
 rf-channel 0 cable downstream channel-id 4
 rf-channel 0 frequency 405000000 annex B modulation 256qam interleave 32
 rf-channel 0 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500001
 rf-channel 1 cable downstream channel-id 22
 rf-channel 1 frequency 411000000 annex B modulation 256qam interleave 32
 rf-channel 1 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500002
 rf-channel 2 cable downstream channel-id 23
 rf-channel 2 frequency 417000000 annex B modulation 256qam interleave 32
 rf-channel 2 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500003
 rf-channel 3 cable downstream channel-id 24
 rf-channel 3 frequency 423000000 annex B modulation 256qam interleave 32
 rf-channel 3 ip-address 60.3.2.1 mac-address 0022.9084.8d7f depi-remote-id 500004
interface Wideband-Cable6/0/0:0
 cable bundle 11
 cable igmp static-group 230.1.1.1 1
 cable igmp static-group 230.5.5.5 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 fiber-node 50
 downstream Modular-Cable 5/0/0 rf-channel 0-3
 downstream Modular-Cable 6/0/0 rf-channel 0-3
 upstream Cable 5/0 connector 0-3

```

Verifying VDOC Broadcast and Inter Line Card RF Spanning

To verify configuration of VDOC broadcast and inter line card RF spanning, use the following commands:

- **show controller integrated-cable**
- **show controller modular-cable**
- **show cable multicast db**
- **show cable mac-domain rcc**
- **show cable modem service-flow**
- **show cable active-reman**

To verify that the bonding group being shared by service groups is associated with all relevant MAC domains of the Cisco UBR-MC20X20V line card, use the **show controller integrated-cable** command with the association keyword as shown in the following example:

```

Router# show controller integrated-cable 8/0/1 association
WB Association Info for 8/0 No of WB 30
WB          BG  Bundle  NB  NB chan  Reserved  Total
channel    ID  num    channel  ID      CIR      CIR
Wideband-Cable8/0/0:0 1217 11    Cable7/0/0 0       0        6000000
                               Multicast 0        6000000
Wideband-Cable8/0/0:1 1218 11    Cable7/0/0 0       0        1500000
                               Multicast 0        1500000
Wideband-Cable8/0/0:2 1219 11    Cable7/0/0 0       0        1500000

```

```

Wideband-Cable8/0/1:0  1249 11      Multicast          0          1500000
                        Cable7/0/0  0          0          6000000
                        Multicast          0          6000000

```

To verify that the bonding group being shared by service groups is associated with all relevant MAC domains of the Cisco uBR-MC3GX60V line card, use the **show controller modular-cable** command with the association keyword as shown in the following example:

```

Router# show controller modular-cable 5/0/0 association
WB Association Info for 5/0 No of WB 96
WB      Bundle  NB      NB chan  Reserved  Total
channel ID  num  channel  ID        CIR        CIR
Wideband-Cable5/0/0:0  257  11  Cable5/0/0  0          0          6000000
                        Multicast          0          6000000
Wideband-Cable5/0/0:1  258  11  Cable5/0/0  0          0          4500000
                        Multicast          0          4500000
Wideband-Cable5/0/0:2  259  11  Cable5/0/1  0          0          6000000
                        Multicast          0          6000000
Wideband-Cable5/0/0:3  260  11  Cable5/0/1  0          0          4500000
                        Multicast          0          4500000

```

To verify the multicast bundle interface, use the **show cable multicast db** command with the bundle keyword as shown in the following example:

```

Router# show cable multicast db bundle 11
Interface : Bundle11.1
Session (S,G) : (*,230.40.40.40)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Mo5/0/0:4  Bundle11.1             Ca5/0/1    ff05.0000.0024  1
Interface : Bundle11.1
Session (S,G) : (*,230.40.40.40)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Mo5/0/0:0  Bundle11.1             Ca5/0/0    ff05.0000.0020  1
Interface : Bundle11.1
Session (S,G) : (*,230.40.40.40)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Mo1/2/0:1  Bundle11.1             Ca7/0/0    ff01.0002.0021  1
Interface : Bundle11.1
Session (S,G) : (*,230.40.40.40)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Mo1/2/0:0  Bundle11.1             Ca7/0/0    ff01.0002.0020  1
Interface : Bundle11.1
Session (S,G) : (*,230.50.50.50)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Mo5/0/0:4  Bundle11.1             Ca5/0/1    ff05.0000.0024  1
Interface : Bundle11.1
Session (S,G) : (*,230.50.50.50)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Mo5/0/0:0  Bundle11.1             Ca5/0/0    ff05.0000.0020  1
Interface : Bundle11.1
Session (S,G) : (*,230.50.50.50)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Mo1/2/0:1  Bundle11.1             Ca7/0/0    ff01.0002.0021  1
Interface : Bundle11.1
Session (S,G) : (*,230.50.50.50)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Mo1/2/0:0  Bundle11.1             Ca7/0/0    ff01.0002.0020  1
Interface : Bundle11.1
Session (S,G) : (*,230.7.7.7)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Wi6/0/0:1  Bundle11.1             Ca6/0/0    ff06.0000.0001  1
Interface : Bundle11.1
Session (S,G) : (*,230.5.5.5)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Wi6/0/0:0  Bundle11.1             Ca6/0/0    ff06.0000.0000  1
Interface : Bundle11.1
Session (S,G) : (*,230.2.2.2)
Fwd Intfc  Sub Intfc      Host Intfc  CM Mac      Hosts
Wi6/0/0:1  Bundle11.1             Ca6/0/0    ff06.0000.0001  1

```

```

Interface : Bundle11.1
Session (S,G) : (*,230.1.1.1)
Fwd Intfc Sub Intfc Host Intfc CM Mac Hosts
Wi6/0/0:0 Bundle11.1 Ca6/0/0 ff06.0000.0000 1
Interface : Bundle11.1
Session (S,G) : (*,230.30.30.30)
Fwd Intfc Sub Intfc Host Intfc CM Mac Hosts
Mo5/0/0:4 Bundle11.1 Ca5/0/1 ff05.0000.0024 1
Interface : Bundle11.1
Session (S,G) : (*,230.30.30.30)
Fwd Intfc Sub Intfc Host Intfc CM Mac Hosts
Mo5/0/0:0 Bundle11.1 Ca5/0/0 ff05.0000.0020 1
Interface : Bundle11.1
Session (S,G) : (*,230.30.30.30)
Fwd Intfc Sub Intfc Host Intfc CM Mac Hosts
Mo1/2/0:1 Bundle11.1 Ca7/0/0 ff01.0002.0021 1
Interface : Bundle11.1
Session (S,G) : (*,230.30.30.30)
Fwd Intfc Sub Intfc Host Intfc CM Mac Hosts
Mo1/2/0:0 Bundle11.1 Ca7/0/0 ff01.0002.0020 1

```

To verify that the right RCC templates are available for the remote MAC domain, use the **show cable mac-domain rcc** command as shown in the following example:

```

Router# show cable mac-domain cable 5/0/0 rcc
RCC-ID RCP RCs MD-DS-SG CMs WB/RCC-TMPL
1 00 10 00 00 04 4 1 0 RCC-TMPL (1)
2 00 10 00 00 04 4 1 8 RCC-TMPL (2)
3 00 10 00 00 04 8 1 2 RCC-TMPL (5)
4 00 10 00 00 04 8 1 2 RCC-TMPL (6)
5 00 00 00 00 00 4 0 0 WB (Wi5/0/0:0)
6 00 00 00 00 00 3 0 0 WB (Wi5/0/0:1)
7 00 00 00 00 00 2 0 0 WB (Wi5/0/0:4)
8 00 00 00 00 00 1 0 0 WB (Wi5/0/0:5)
9 00 00 00 00 00 1 0 0 WB (Wi5/0/0:6)
10 00 00 00 00 00 1 0 0 WB (Wi5/0/0:7)
11 00 00 00 00 00 1 0 0 WB (Wi5/0/0:8)
12 00 00 00 00 00 2 0 0 WB (Wi5/0/0:9)
13 00 00 00 00 00 4 0 0 WB (Wi6/0/0:1)
14 00 00 00 00 00 1 0 0 WB (Wi6/0/0:2)
15 00 00 00 00 00 1 0 0 WB (Wi6/0/0:3)
16 00 00 00 00 00 3 0 0 WB (Wi6/0/0:6)
17 00 00 00 00 00 3 0 0 WB (Wi6/0/0:7)
18 00 00 00 00 00 2 0 0 WB (Wi6/0/0:8)

```

To verify that the service flows are established correctly on local and remote bonding groups, use the **show cable modem service-flow** command as shown in the following example:

```

Router# show cable modem 0022.ce89.9664 service-flow
SUMMARY:
MAC Address IP Address Host MAC Prim Num Primary
DS Interface State Sid CPE Downstream
RfId
0022.ce89.9664 30.13.2.74 C5/0/0/UB w-online(pt) 1 0 Mo5/0/0:0
240
Sfid Dir Curr Sid Sched Prio MaxSusRate MaxBrst MinRsvRate Throughput
State Type
15 US act 1 BE 0 0 3044 0 0
16 DS act N/A BE 0 1000012 6000000 0 0
33 DS act N/A BE 0 1000012 6000000 0 0
UPSTREAM SERVICE FLOW DETAIL:
SFID SID Requests Polls Grants Delayed Dropped Packets
Grants Grants
15 1 0 0 401 0 0 416
DOWNSTREAM SERVICE FLOW DETAIL:
SFID RP_SFID QID Flg Policer Scheduler Xmits Drops FrwdIF
16 33559 132579 51 0 51 0 Wi5/0/0:1
33 33560 132580 0 0 0 0 Wi6/0/0:2

```

Flags Legend:
 \$: Low Latency Queue (aggregated)
 ~: CIR Queue

To verify the line card high availability information for all interfaces, use the **show cable active-reman** command as shown in the following example:

```
Router# show cable active-reman all
-----
Active Reman info on LC 5/0:
[slot_index 0]: work_slot:1/0, active_slot:1/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 1]: work_slot:3/0, active_slot:3/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 2]: work_slot:5/0, active_slot:5/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 3]: work_slot:5/1, active_slot:5/1, is_protect:TRUE , is_standby
:TRUE
[slot_index 4]: work_slot:6/0, active_slot:6/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 5]: work_slot:6/1, active_slot:6/1, is_protect:FALSE, is_standby
:FALSE
[slot_index 6]: work_slot:7/0, active_slot:7/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 7]: work_slot:7/1, active_slot:7/1, is_protect:FALSE, is_standby
:FALSE
[slot_index 8]: work_slot:8/0, active_slot:8/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 9]: work_slot:8/1, active_slot:8/1, is_protect:FALSE, is_standby
:FALSE
-----
Active Reman info on LC 5/1:
[slot_index 0]: work_slot:1/0, active_slot:1/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 1]: work_slot:3/0, active_slot:3/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 2]: work_slot:5/0, active_slot:5/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 3]: work_slot:5/1, active_slot:5/1, is_protect:TRUE , is_standby
:TRUE
[slot_index 4]: work_slot:6/0, active_slot:6/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 5]: work_slot:6/1, active_slot:6/1, is_protect:FALSE, is_standby
:FALSE
[slot_index 6]: work_slot:7/0, active_slot:7/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 7]: work_slot:7/1, active_slot:7/1, is_protect:FALSE, is_standby
:FALSE
[slot_index 8]: work_slot:8/0, active_slot:8/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 9]: work_slot:8/1, active_slot:8/1, is_protect:FALSE, is_standby
:FALSE
-----
Active Reman info on LC 6/0:
[slot_index 0]: work_slot:1/0, active_slot:1/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 1]: work_slot:3/0, active_slot:3/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 2]: work_slot:5/0, active_slot:5/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 3]: work_slot:5/1, active_slot:5/1, is_protect:TRUE , is_standby
:TRUE
[slot_index 4]: work_slot:6/0, active_slot:6/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 5]: work_slot:6/1, active_slot:6/1, is_protect:FALSE, is_standby
:FALSE
[slot_index 6]: work_slot:7/0, active_slot:7/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 7]: work_slot:7/1, active_slot:7/1, is_protect:FALSE, is_standby
:FALSE
[slot_index 8]: work_slot:8/0, active_slot:8/0, is_protect:FALSE, is_standby
```



```

:FALSE
[slot_index 9]: work_slot:8/1, active_slot:8/1, is_protect:FALSE, is_standby
:FALSE
-----
Active Reman info on LC 7/0:
[slot_index 0]: work_slot:1/0, active_slot:1/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 1]: work_slot:3/0, active_slot:3/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 2]: work_slot:5/0, active_slot:5/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 3]: work_slot:5/1, active_slot:5/1, is_protect:TRUE , is_standby
:TRUE
[slot_index 4]: work_slot:6/0, active_slot:6/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 5]: work_slot:6/1, active_slot:6/1, is_protect:FALSE, is_standby
:FALSE
[slot_index 6]: work_slot:7/0, active_slot:7/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 7]: work_slot:7/1, active_slot:7/1, is_protect:FALSE, is_standby
:FALSE
[slot_index 8]: work_slot:8/0, active_slot:8/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 9]: work_slot:8/1, active_slot:8/1, is_protect:FALSE, is_standby
:FALSE
-----
Active Reman info on LC 8/0:
[slot_index 0]: work_slot:1/0, active_slot:1/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 1]: work_slot:3/0, active_slot:3/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 2]: work_slot:5/0, active_slot:5/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 3]: work_slot:5/1, active_slot:5/1, is_protect:TRUE , is_standby
:TRUE
[slot_index 4]: work_slot:6/0, active_slot:6/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 5]: work_slot:6/1, active_slot:6/1, is_protect:FALSE, is_standby
:FALSE
[slot_index 6]: work_slot:7/0, active_slot:7/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 7]: work_slot:7/1, active_slot:7/1, is_protect:FALSE, is_standby
:FALSE
[slot_index 8]: work_slot:8/0, active_slot:8/0, is_protect:FALSE, is_standby
:FALSE
[slot_index 9]: work_slot:8/1, active_slot:8/1, is_protect:FALSE, is_standby

```

Additional References

The following sections provide references related to configuring the VDOC Broadcast feature.

Related Documents

Related Topic	Document Title
CMTS Command Reference	<i>Cisco IOS CMTS Cable Command Reference</i> http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

Related Topic	Document Title
PacketCable and PacketCable Multimedia	<i>PacketCable and PacketCable Multimedia for the Cisco CMTS Routers</i> http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_pktcable_mm.html
DOCSIS 3.0 multicast	DOCSIS 3.0 Multicast Support on the CMTS Routers http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_d30_mcast_support.html

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Configuring VDOC Broadcast

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://tools.cisco.com/ITDIT/CFN/>. An account on <http://www.cisco.com/> is not required.



Note

The below table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 2: Feature Information for Configuring VDOC Broadcast

Feature Name	Releases	Feature Information
IGMP-Triggered VDOC Broadcast Support	12.2(33)SCB	<p>The Cisco universal broadband router supports VDOC feature enabling MSOs to broadcast video content on RF spanned downstream signals.</p> <p>The following sections provide information about this feature:</p> <ul style="list-style-type: none"> • Information About Configuring VDOC Broadcast, on page 3 • How to Configure VDOC Broadcast, on page 8 • Configuration Examples for VDOC Broadcast, on page 16 • Verifying VDOC Broadcast and Inter Line Card RF Spanning, on page 21
Inter Line Card RF Spanning	12.2(33)SCF	<p>The Inter Line Card RF Spanning feature supports sharing of downstream channels among the line cards installed on the Cisco uBR10012 router.</p> <p>The following sections provide information about this feature:</p> <ul style="list-style-type: none"> • Inter Line Card RF Spanning, on page 4 • How to Configure Inter Line Card RF Spanning, on page 13 • Configuration Examples for Inter Line Card RF Spanning, on page 19 <p>The following commands were introduced or modified:</p> <ul style="list-style-type: none"> • show cable active-reman • show cable multicast db

