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cable d31-mode

To enable the DOCSIS 3.1 mode on a MAC domain, use the **cable d31-mode** command in the interface configuration mode. To disable the DOCSIS 3.1 mode, use the **no** form of the command.

[no] **cable d31-mode**

This command has no keywords or arguments.

Command Default

DOCSIS 3.1 mode is enabled.

Command Modes

Interface configuration—cable interface only (config-if)
MAC domain profile configuration (config-profile-md)

Command History

Release	Modification
IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

Enabling the DOCSIS 3.1 mode has the following effects:

- MDDs advertise the MAC domain as DOCSIS 3.1 capable.
- DOCSIS 3.1 protocol support is enabled for the MAC domain, including:
 - v5 Ranging support
 - D3.1 TLV parsing
 - D3.1 MMMs
- OFDM channels are included in MD-SG calculations assuming that they are a member of an associated fiber node.
- OFDM channels are allowed to become active primary-capable downstream channels within the MAC domain.

The following example shows how to enable DOCSIS 3.1 mode:

```
router#configure terminal
router(config)#interface c3/0/0
router(config-if)#cable d31-mode
```

Related Commands

Command	Description
cable mtc-mode	Enables Multiple Transmit Channel mode for the MAC domain. For d31-mode to be active, mtc-mode must also be configured.
cable mrc-mode	Enables Multiple Receive Channel mode for the MAC domain. For d31-mode to be active, mrc-mode must also be configured.

Command	Description
show interface Cable <i>slot/subslot/port</i> controller	Displays the status of the controller, including the d31-mode enablement state.

cable d40-mode

To enable the DOCSIS 4.0 mode on a MAC domain, use the **cable d40-mode** command in the interface configuration mode. To disable the DOCSIS 4.0 mode, use the **no** form of the command.

cable d40-mode

no cable d40-mode

This command has no keywords or arguments.

Command Default

DOCSIS 4.0 mode is enabled.

Command Modes

Interface configuration—cable interface only (config-if)

MAC domain profile configuration (config-profile-md)

Command History

Release	Modification
Cisco IOS XE Dublin 17.12.1z	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

Enabling the DOCSIS 4.0 mode has the following effects:

- MDDs advertise the MAC domain as DOCSIS 4.0 capable.
- DOCSIS 4.0 protocol support is enabled for the MAC domain, including:
 - D4.0 TLV parsing
 - D4.0 MMMs
- OFDM channels are included in MD-SG calculations assuming that they are a member of an associated fiber node.
- OFDM channels are allowed to become active primary-capable downstream channels within the MAC domain.

The following example shows how to enable DOCSIS 4.0 mode:

```
router#configure terminal
router(config)#interface c4/0/0
router(config-if)#cable d40-mode
```

Related Commands

Command	Description
cable d31-mode	To enable the DOCSIS 3.1 mode on a MAC domain, use the cable d31-mode command in the interface configuration mode.

cable dci-response

To configure how a cable interface responds to DCI-REQ messages for CMs on that interface, use the **cable dci-response** command in cable interface configuration mode.

cable dci-response [**success** | **ignore** | **reject permanent** | **reject temporary**]

Syntax Description		
success	(Optional) Configures the interface so that the Cisco CMTS responds to DCI-REQ messages from CMs on the interface by sending a DCI-RSP response with the confirmation code of Success (0).	
ignore	(Optional) Configures the interface so that the Cisco CMTS ignores DCI-REQ messages from CMs on the interface. It does not send any DCI-RSP responses.	
reject permanent	(Optional) Configures the interface so that the Cisco CMTS responds to DCI-REQ messages from CMs on the interface by sending a DCI-RSP response with the confirmation code of Reject Permanent (4).	
reject temporary	(Optional) Configures the interface so that the Cisco CMTS ignores the first four DCI-REQ messages from a CM on the interface, but on the fifth DCI-REQ message, the CMTS responds with a DCI-RSP response with the confirmation code of Reject Temporary (3). The CMTS then continues to ignore the next seven DCI-REQ messages and then restarts this process when it receives the twelfth DCI-REQ message.	

Command Default The Cisco CMTS router responds to DCI-REQ messages from all CMs by sending a DCI-RSP response with the confirmation code of Success (0).

Command Modes Interface configuration—cable interface only (config-if)

Command History	Release	Description
	12.1(4)CX	This command was introduced for DOCSIS 1.1 operation.
	12.2(4)BC1	This command was integrated into Cisco IOS Release 12.2(4)BC1.
	12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines The Device Class Identification (DCI) messages are part of the Media Access Control Specification section of the DOCSIS 1.1 specification (revision SP-RFiv1.1-I05-000714 and above). A CM can optionally use the DCI-REQ message to inform the CMTS router of certain capabilities, such as whether it is a CPE-controlled cable modem (CCCM).

The CMTS router then responds with one of the following confirmation codes:

- Success—Allows the CM to continue with the registration process.

- **Reject Permanent**—Instructs the CM to cancel its registration process on this downstream channel. The CM must try all other available downstream channels before attempting to register on this downstream channel again.
- **Reject Temporary**—Instructs the CM to reset its DCI-REQ counter, to send another DCI-REQ message, and to wait for the DCI-RSP before proceeding with the registration process.



Note The CMTS router also can respond with an Upstream Transmitter Disable (UP-DIS) message. See the description of the **cable dci-upstream-disable** command for details.

Examples

The following example shows how to configure the CMTS router so that it ignores all DCI-REQ messages from CMs on the cable interface at slot 6:

```
Router# configure terminal
Router(config)# interface c6/0
Router(config-if)# cable dci-response ignore
```

The following example shows how to configure the CMTS router so that it returns to its default behavior for the cable interface on slot 6, which is to respond to all DCI-REQ messages from CMs by sending a DCI-RSP with a Success confirmation code:

```
Router# configure terminal
Router(config)# interface c6/0
Router(config-if)# cable dci-response success
```



Note The **cable dci-response success** command does not appear in a startup or running configuration file, because it is the default configuration for a cable interface.

Related Commands

Command	Description
cable dci-upstream-disable	Configures the cable interface so that it transmits an Upstream Transmitter Disable (UP-DIS) message instead of a DCI-RSP message to a particular CM.
debug cable dci	Enables debugging of DCI-REQ, DCI-RSP, and UP-DIS messages.

cable dci-upstream-disable

To configure a cable interface so that it transmits a DOCSIS 1.1 Upstream Transmitter Disable (UP-DIS) message to a particular CM, use the **cable dci-upstream-disable** command in cable interface configuration mode. To remove that configuration and return to the default configuration, use the **no** form of this command.

cable dci-upstream-disable *mac-address* [**enable** | **disable**]
no cable dci-upstream-disable *mac-address* [**enable** | **disable**]

Syntax Description	
<i>mac-address</i>	Specifies the MAC physical layer address for a particular CM.
enable	(Optional) Enables the UP-DIS message for the particular CM, so that when the CM sends a DCI-REQ message, the CMTS router responds by sending an UP-DIS response.
disable	(Optional) Disables the sending of UP-DIS messages to a particular CM.

Command Default The Cisco CMTS router does not transmit UP-DIS messages to any CMs.

Command Modes Interface configuration—cable interface only (config-if)

Command History	Release	Description
	12.1(4)CX	This command was introduced for DOCSIS 1.1 operation.
	12.2(4)BC1	This command was integrated into Cisco IOS Release 12.2(4)BC1.
	12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines The DOCSIS 1.1 specification (revision SP-RF1v1.1-I05-000714 and above) allows a CMTS router to transmit an Upstream Transmitter Disable (UP-DIS) message to a CM. If the CM supports the UP-DIS message, it responds by immediately disabling its upstream transmitter circuitry. The CM must be power-cycled before it can begin transmitting on the upstream again.

Examples The following example shows the **cable dci-upstream-disable** command being used to enable the UP-DIS message for the CM with the MAC address of 0123.4567.89ab.

```
Router# configure terminal
Router(config)# interface c6/0
Router(config-if)# cable dci-upstream-disable 0123.4567.89ab enable
Router(config-if)# exit
Router(config)# exit
```

Related Commands

Command	Description
cable dci-response	Configures how the cable interface responds to DCI-REQ messages from CMs on that interface.
debug cable dci	Enables debugging of DCI-REQ, DCI-RSP, and UP-DIS messages.

cable def-phy-burst

To specify a value for the upstream Maximum Traffic Burst parameter for CMs that do not specify their own value, use the **cable def-phy-burst** command in controller configuration mode. To reset the maximum burst size to its default, use the **no** form of this command.

```
cable def-phy-burst burst-size
no cable def-phy-burst
```

Syntax Description	<i>burst-size</i> Specifies the maximum number of bytes that are allowed in a burst. The valid range is 0 to 4096 bytes, with a default of 2000 bytes. A value of 0 specifies that CMs cannot register unless they specify a valid burst size.				
Command Default	2000 bytes				
Command Modes	Controller configuration—upstream-cable only (config-controller)				
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>IOS-XE 3.15.0S</td> <td>This command was introduced on the Cisco cBR Series Converged Broadband Routers. This command replaces the cable default-phy-burst command.</td> </tr> </tbody> </table>	Release	Modification	IOS-XE 3.15.0S	This command was introduced on the Cisco cBR Series Converged Broadband Routers. This command replaces the cable default-phy-burst command.
Release	Modification				
IOS-XE 3.15.0S	This command was introduced on the Cisco cBR Series Converged Broadband Routers. This command replaces the cable default-phy-burst command.				

Usage Guidelines



Note The **cable def-phy-burst** command applies to cable modems that cannot perform fragmentation. The value specified by the **cable def-phy-burst** command is used to determine the maximum total frame burst size supported for a cable modem request. In contrast, the **cable upstream fragment-force** command may be used to determine the largest single physical burst a cable modem can transmit, when the cable modem supports fragmentation.

The DOCSIS 1.0 specification allows CMs to register without specifying a maximum upstream burst size, or to register with a value of 0, which means an unlimited burst size. This behavior can interfere with DOCSIS 1.1 networks because excessively large bursts on an upstream will generate unpredictable jitter and delay in voice calls. DOCSIS 1.1 CMs can also cause this problem if they register without enabling fragmentation of packets at the DOCSIS MAC layer.

This command allows you to specify a default burst size for CMs that register without specifying a burst size or that register with a burst size of 0. It also specifies the maximum size of long data grants if a CM specifies a size of 0 (unlimited) in the Upstream Channel Descriptor (UCD) packet. If a CM specifies a long data grant that would exceed the maximum burst size, and the CM is not using DOCSIS concatenation, the DOCSIS scheduler drops the bandwidth request.

To prevent CMs from registering without defining a burst profile, use this command with a *burst-size* of zero. CMs that do not define a burst profile will not be allowed to register and come online.



Note Typically, DOCSIS 1.1 CMs set the maximum upstream transmit burst size to the larger value of 1522 bytes and maximum concatenated burst size (which can be a maximum of 4096 bytes).

The default PHY burst parameter interacts with two other parameters that are configured in the DOCSIS configuration file:

- DOCSIS 1.1 configuration files can also specify a value for the maximum concatenation burst, which has a default of 1522 bytes. If this parameter is greater than the default PHY burst size, the CM can override the default PHY burst when it is using concatenation.
- DOCSIS 1.0 and 1.1 configuration files can also specify a maximum transmit burst size. In DOCSIS 1.1 configurations, this parameter defaults to 3044 bytes, with a minimum of 1522 bytes. DOCSIS 1.0 configuration files could set this parameter to a value lower than 1522 bytes, depending on what version of the DOCSIS 1.0 specification they support. The CMTS router will enforce the lower limit between the default phy burst and the maximum transmit burst, so you should ensure that all configuration files in your network specify a minimum of 1522 bytes for the maximum transmit burst size.

Example

The following example shows how to set the default maximum burst size to 1 on a Cisco cBR-8 router:

```
Router(config)# controller upstream-Cable 3/0/1
Router(config-controller)# cable def-phy-burst 1
```

Related Commands

Command	Description
cable upstream fragmentation	Enables fragmentation of DOCSIS frames on a particular upstream.
cable upstream fragment-force	Specifies that a cable interface line card should fragment DOCSIS frames on an upstream when the frame exceeds a particular size.
show cable modem	Displays information for the registered and unregistered CMs, including the QoS configuration for individual CMs.
show controllers cable	Displays the downstream MPEG framing format (Annex A or Annex B) setting.

cable default-phy-burst

To specify a value for the upstream Maximum Traffic Burst parameter for CMs that do not specify their own value, use the **cable default-phy-burst** command in cable interface configuration mode. To reset the maximum burst size to its default, use the **no** form of this command.

cable default-phy-burst *burst-size*
no cable default-phy-burst

Syntax Description	<i>burst-size</i> Specifies the maximum number of bytes that are allowed in a burst. The valid range is 0 to 4096 bytes, with a default of 2000 bytes. A value of 0 specifies that CMs cannot register unless they specify a valid burst size.
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Command Default 2000 bytes

Command Modes Interface configuration—cable interface only (config-if)

Command History	Release	Modification
	12.2(8)BC1	This command was introduced for the Cisco uBR7100 series, Cisco uBR7200 series, and Cisco uBR10012 routers.
	12.2(15)BC2	The cable upstream fragment-force command is introduced, with considerations to the cable default-phy-burst command. The maximum upstream traffic burst may also be influenced by the new cable upstream fragment-force command for cable modems that are able to perform fragmentation.
	12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	IOS-XE 3.15.0S	This command was replaced by the cable def-phy-burst command on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines



Note The **cable default-phy-burst** command applies to cable modems that cannot perform fragmentation. The value specified by the **cable default-phy-burst** command is used to determine the maximum total frame burst size supported for a cable modem request. In contrast, the **cable upstream fragment-force** command may be used to determine the largest single physical burst a cable modem can transmit, when the cable modem supports fragmentation.

The DOCSIS 1.0 specification allows CMs to register without specifying a maximum upstream burst size, or to register with a value of 0, which means an unlimited burst size. This behavior can interfere with DOCSIS 1.1 networks because excessively large bursts on an upstream will generate unpredictable jitter and delay in

voice calls. DOCSIS 1.1 CMs can also cause this problem if they register without enabling fragmentation of packets at the DOCSIS MAC layer.

This command allows you to specify a default burst size for CMs that register without specifying a burst size or that register with a burst size of 0. It also specifies the maximum size of long data grants if a CM specifies a size of 0 (unlimited) in the Upstream Channel Descriptor (UCD) packet. If a CM specifies a long data grant that would exceed the maximum burst size, and the CM is not using DOCSIS concatenation, the DOCSIS scheduler drops the bandwidth request.

To prevent CMs from registering without defining a burst profile, use this command with a *burst-size* of zero. CMs that do not define a burst profile will not be allowed to register and come online.



Note Typically, DOCSIS 1.1 CMs set the maximum upstream transmit burst size to the larger value of 1522 bytes and maximum concatenated burst size (which can be a maximum of 4096 bytes).

The default PHY burst parameter interacts with two other parameters that are configured in the DOCSIS configuration file:

- DOCSIS 1.1 configuration files can also specify a value for the maximum concatenation burst, which has a default of 1522 bytes. If this parameter is greater than the default PHY burst size, the CM can override the default PHY burst when it is using concatenation.
- DOCSIS 1.0 and 1.1 configuration files can also specify a maximum transmit burst size. In DOCSIS 1.1 configurations, this parameter defaults to 3044 bytes, with a minimum of 1522 bytes. DOCSIS 1.0 configuration files could set this parameter to a value lower than 1522 bytes, depending on what version of the DOCSIS 1.0 specification they support. The CMTS router will enforce the lower limit between the default phy burst and the maximum transmit burst, so you should ensure that all configuration files in your network specify a minimum of 1522 bytes for the maximum transmit burst size.

Examples

The following example shows the default maximum burst size to 1522 bytes, which is the minimum size required by the DOCSIS 1.1 specification:

```
Router(config)# interface cable 5/1
Router(config-if)# cable default-phy-burst 1522
```

The following example shows the default maximum burst size to 0, which means that a CM must specify a valid burst profile before the Cisco CMTS allows it to register and come online:

```
Router(config)# interface cable 5/1
Router(config-if)# cable default-phy-burst 0
```

The following example shows the default maximum burst size being reset to its default of 2000 bytes:

```
Router(config)# interface cable 5/1
Router(config-if)# no cable default-phy-burst
```

Related Commands	Command	Description
	cable upstream fragmentation	Enables fragmentation of DOCSIS frames on a particular upstream.
	cable upstream fragment-force	Specifies that a cable interface line card should fragment DOCSIS frames on an upstream when the frame exceeds a particular size.
	show cable modem	Displays information for the registered and unregistered CMs, including the QoS configuration for individual CMs.
	show controllers cable	Displays the downstream MPEG framing format (Annex A or Annex B) setting.

cable depi multicast pool

To configure the DEPI multicast pool for downstream virtual splitting, use the **cable depi multicast pool** command in global configuration mode. To void the DEPI multicast pool configuration, use the **no** form of this command.

cable depi multicast pool *id*

no cable depi multicast pool *id*

Syntax Description	<i>id</i> Specifies the ID of the DEPI multicast pool.
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Command Default	None
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Command Modes	Global configuration (config)
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Command History	Release	Modification
	Cisco IOS XE Everest 16.5.1	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines	Use this command to configure the DEPI multicast pool.
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The following example shows how to configure the DEPI multicast pool:

```
Router# configure terminal
Router(config)# cable depi multicast pool 1
Router(config-multicast-pool)#
```

Related Commands	Command	Description
	ip address	Specifies IP address range for multicast pool.

cable depi multicast pool redundant include-video-controller

To configure the DEPI multicast pool for downstream virtual splitting, use the **cable depi multicast pool *id* [redundant include-video-controller]** command in global configuration mode. To void the DEPI multicast pool configuration, use the **no** form of this command.

cable depi multicast pool *id* [redundant [include-video-controller]]

no cable depi multicast pool *id* [redundant [include-video-controller]]

Syntax Description		
	<i>id</i>	Specifies the ID of the DEPI multicast pool.
	redundant	Redundant multicast pool for secondary Linecard Downstream Controller.
	redundant include-video-controller	IP assignment for redundant(stand-by) controllers including video controllers if supported by CBR-CCAP-LC-G2-R Linecard.

Command Default None

Command Modes Global configuration (config)

Command History	Release	Modification
	Cisco IOS XE Bengaluru 17.6.1z	This command is introduced on the Cisco cBR Series Converged Broadband Routers.

- Usage Guidelines**
- If you configure `cable depi multicast pool 10 redundant`, then multicast IPs is assigned only to downstream-cable controllers.
 - If you configure `cable depi multicast pool 10 redundant include-video-controller`, then multicast IPs are assigned for both downstream-cable and downstream-video controllers CBR-CCAP-LC-G2-R Linecards.

If video controllers are not supported by CBR-CCAP-LC-40G Linecards, then IPs are assigned only to downstream-cable controllers. The total redundant pool is set up by the system and allocates IP addresses for all possible controllers multiplied by the number of interfaces available.

The following example shows how to configure `redundant include-video-controller`:

```
Router# configure terminal
Router(config)# cable depi multicast pool 10
Router(config-multicast-pool)# redundant include-video-controller
Router(config-multicast-pool)#
```

The following example shows the difference between `redundant` and `redundant include-video-controller` configurations:

- If you use the `redundant` config, then the total controllers = 16 DOCSIS(x interfaces) + 20 OOB.

- If you use the `redundant include-video-controller` config, then the total controllers = 16 DOCSIS(x interfaces) + 16 VIDEO(x interfaces) + 20 OOB

For Example, If Linecard '0' is secondary, then IP is allocated to downstream-cable and downstream-video controllers as shown below:

- The following allocations are only applicable to CBR-CCAP-LC-40G and CBR-CCAP-LC-G2-R Linecards prior to Cisco IOS XE Bengaluru 17.6.1z:
 - If Linkha is enabled and `redundant` is configured as $16(x4) + 20 = 84$ IPs, then the IPs are assigned to the following controllers:

Controllers	Interfaces
DS0/0/0 to DS0/0/15	Te0/1/0 and Te0/1/2
DS0/0/16 to DS0/0/31	Te0/1/4 and Te0/1/6

- If Linkha is disabled and `redundant` is configured as $16(x8) + 20 = 148$ IPs, then the IPs are assigned to the following controllers:

Controllers	Interfaces
DS0/0/0 to DS0/0/15	Te0/1/0, Te0/1/1, Te0/1/2, Te0/1/3
DS0/0/16 to DS0/0/31	Te0/1/4, Te0/1/5, Te0/1/6, Te0/1/7

- If Linkha is enabled and `redundant include-video-controller` is configured as $16(x4) + 16(x4) + 20 = 148$ IPs, then the IPs are assigned to the following controllers:

Controllers	Interfaces
DS0/0/0 to DS0/0/15	Te0/1/0 and Te0/1/2
DS0/0/16 to DS0/0/31	Te0/1/4 and Te0/1/6
VID0/0/0 to VID0/0/15	Te0/1/0 and Te0/1/2
VID0/0/16 to VID0/0/31	Te0/1/4 and Te0/1/6

- If Linkha is disabled and `redundant include-video-controller` is configured as $16(x8) + 16(x8) + 20 = 276$ IPs, then the IPs are assigned to the following controllers:

Controllers	Interfaces
DS0/0/0 to DS0/0/15	Te0/1/0, Te0/1/1, Te0/1/2, Te0/1/3
DS0/0/16 to DS0/0/31	Te0/1/4, Te0/1/5, Te0/1/6, Te0/1/7
VID0/0/0 to VID0/0/15	Te0/1/0, Te0/1/1, Te0/1/2, Te0/1/3
VID0/0/16 to VID0/0/31	Te0/1/4, Te0/1/5, Te0/1/6, Te0/1/7

- The following allocations are only applicable to CBR-CCAP-LC-G2-R cards for Cisco IOS XE Bengaluru 17.6.1z and later.

If Linkha is disabled and `redundant include-video-controller` is configured as $16(x8) + 16(x8) + 20 = 276$ IPs, then the IPs are assigned to the following controllers:

Controllers	Interfaces
DS0/0/0 to DS0/0/7	Te0/1/0, Te0/1/1
DS0/0/8 to DS0/0/15	Te0/1/2, Te0/1/3
DS0/0/16 to DS0/0/23	Te0/1/4, Te0/1/5
DS0/0/24 to DS0/0/31	Te0/1/6, Te0/1/7
VID0/0/0 to VID0/0/7	Te0/1/0, Te0/1/1
VID0/0/8 to VID0/0/15	Te0/1/2, Te0/1/3
VID0/0/16 to VID0/0/23	Te0/1/4, Te0/1/5
VID0/0/24 to VID0/0/31	Te0/1/6, Te0/1/7

Related Commands

Command	Description
<code>cable depi multicast pool</code>	Specifies the ID of the DEPI multicast pool.

cable depi multicast statistic monitor

This feature enables you to view statistics for the multicast group assigned by DEPI multicast pool. You can enable this feature using the **cable depi multicast statistic monitor** command. Use this command for docsis, bcast and ncst video configurations. OOB configuration is not supported. To void the configuration, use the **no** form of this command.

cable depi multicast statistic monitor

no cable depi multicast statistic monitor

Syntax Description	monitor Enable monitor multicast DEPI throughput.
---------------------------	--

Command Default	None
------------------------	------

Command Modes	Global configuration (config)
----------------------	-------------------------------

Command History	Release	Modification
	Cisco IOS XE Bengaluru 17.6.1z	This command is introduced for the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines Use this command to view statistics for the multicast group assigned by DEPI multicast pool.

The following example shows how to configure the **cable depi multicast statistic monitor** command:

```
Router# configure terminal
Router(config)# cable depi multicast statistic monitor
Router(config)#
```

After configuring the command, you can verify your configuration using the following command:

```
Router# show cable depi multicast counter
IP                               POOL ID pps          bps          IF
Controller
225.225.225.0                    1           4686         39335848     Te3/1/0
DS3/0/1
```

Related Commands	Command	Description
	cable rphy statistics session update-freq value	Specifies the DEPI statistics synchronization interval in units of 5 seconds

cable device

To configure an access list for a cable modem (CM) device or host on the Cisco CMTS router, use the **cable device** command in privileged EXEC mode. To remove an access group, use the **no access-group** option of this command.

```
cable device { {ip-addressmac-address} [no] access-group {access-listaccess-name} | [vrf vrf-name]}
ip-address [no] access-group [access-listaccess-name]}

```

Syntax Description

<i>ip-address</i>	IP address of the CM device or host.
<i>mac-address</i>	MAC address of the CM device or host.
access-group	Enables access-group options. The no form removes access-group specifications.
{ <i>access-list</i> <i>access-name</i> }	Specifies the IP access list (standard or extended), either by access-list number (1 to 199) or by access-list name.
vrf <i>vrf-name</i>	Specifies a virtual routing and forwarding (VRF) instance that is populated with VPN routes. <ul style="list-style-type: none"> <i>vrf-name</i>—Name of the VRF instance

Command Default

None

Command Modes

Privileged EXEC (#)

Command History

Release	Description
12.1	This command was moved from earlier releases.
12.1(1a)T1	The vrf keyword was added for Multiprotocol Label Switching (MPLS) VPN support.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

For the **vrf** keyword of this command, only the *ip-address* option is supported.

An access list can be configured to deny access to any IP address other than the ones previously configured, using the **access-list** *access-list* **deny any any** command. Starting with Cisco IOS Release 12.2(33)SCD, when a CM is added to such an access list on the Cisco uBR7200 series universal broadband routers, the ping fails. If the CM is reset, removed, or powered off, the ping succeeds after the CM comes online. However, the **show cable modem access-group** command displays that the CM does not belong to the access-group.



Note The **cable device** command is not supported on the Cisco uBR10012 universal broadband router.



Note The **vrf** keyword is not supported in Cisco IOS Releases 12.0 SC, 12.1 EC, and 12.2 BC.

Examples

The following example shows how to assign an access list to the MAC address of a cable device:

```
Router# configure terminal

Router(config)# cable device 0010.7b6b.77ed acc 1
Router(config)# exit
```

Related Commands

Command	Description
clear cable host	Clears the host from the internal address tables of the Cisco CMTS router.
cable host access-group	Configures the access list for the specified hosts on the Cisco CMTS router.
show cable device access-group	Displays CMs and hosts behind the CMs on the network on the Cisco CMTS router.
show cable host access-group	Displays hosts behind the CMs on the network on the Cisco CMTS router.

cable dfo-retry-count

To configure the Downstream Frequency Override (DFO) retry count, use the **cable dfo-retry-count** command in global configuration mode. To reset the DFO retry count to its default value, use the **no** form of this command.

```
cable dfo-retry-count n
no cable dfo-retry-count n
```

Syntax Description	<i>n</i> Downstream frequency override retry count. The valid range is from 1 to 100.
---------------------------	---

Command Default	The DFO retry count is 20 on the Cisco uBR10012 and Cisco uBR7200 series routers. The DFO retry count is 5 on the Cisco cBR series routers.
------------------------	--

Command Modes	Global configuration (config)
----------------------	-------------------------------

Command History	Release	Modification
	12.2(33)SCD7	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines	The Downstream Frequency Override (DFO) feature enables cable modems to register on a specific primary RF channel. Because of RF failure conditions and some cable modem types, the cable modem takes more time to register on a specific primary RF channel. You can configure the DFO retry count to reduce the cable modem registration time using the cable dfo-retry-count command.
-------------------------	---

Examples	The following example shows how to configure the DFO retry count as 10:
-----------------	---

```
Router# configure terminal
Router(config)# cable dfo-retry-count 10
```

Related Commands	Command	Description
	cable service attribute ds-bonded downstream-type bonding-enabled	Forces a downstream bonding-capable modem to initialize on a bonded primary-capable downstream channel.
	cable service attribute non-ds-bonded downstream-type bonding-disabled	Forces the non-bonding-capable modems to register only on non-bonded RF channels on the CMTS.
	cable service type ds-frequency	Redirects matching service types to the downstream frequency.

cable dhcp ipv4 profile

To enter the IPv4 DHCP profile configuration mode, use the **cable dhcp ipv4 profile** command in global configuration mode. To remove the configured profile, use the **no** form of this command.

cable dhcp ipv4 profile *name*
no cable dhcp ipv4 profile *name*

Syntax Description

<i>name</i>	Specifies the name of the IPv4 DHCP profile.
-------------	--

Command Default

None

Command Modes

Global configuration (config)

Command History

Release	Modification
IOS XE Fuji 16.8.1	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Examples

The following example shows how to enter the IPv4 DHCP profile configuration mode:

```
Router# configure terminal
Router(config)# cable dhcp ipv4 profile DEVICE1
Router(config-dhcpv4-profile)#
```

Related Commands

Command	Description
match	Specifies the matching option for the IPv4 DHCP profile.

cable dhcp-giaddr

To modify the GIADDR field for the DHCPDISCOVER and DHCPREQUEST packets with a relay IP address before they are forwarded to the DHCP server, use the **cable dhcp-giaddr** command in cable interface or subinterface configuration mode. To set the GIADDR field to its default, use the **no** form of this command.

```
cable dhcp-giaddr {policy [strict | host | mta | ps | stb | profile name ] giaddr | primary}
no cable dhcp-giaddr
```

Syntax Description

policy	Selects the control policy, so that the primary address is used for cable modems and the secondary addresses are used for hosts and other customer premises equipment (CPE) devices. This setting is typically used when the CMs on the interface are configured for routing, so that the CMs and hosts can use IP addresses on different subnets.
strict	(Optional, only when the policy keyword is specified) Selects the GIADDR IP address as the source IP address in the forwarded DHCPOFFER packet. By default when using the policy option, the Cisco CMTS changes the source IP address in the DHCPOFFER packet to match that of the primary address on the cable interface. Enable the strict option to prevent this behavior, which could interfere with any access lists applied to the CM when the CM is using a different subnet from the primary address space of the cable interface.
host	Specifies the GIADDR for hosts.
mta	Specifies the GIADDR for media terminal adapters (MTA).
ps	Specifies the GIADDR for portal servers (PS).
stb	Specifies the GIADDR for set-top boxes (STB).
profile name	Specifies DHCP profile as control policy.
<i>giaddr</i>	IP addresses of the secondary interface of the bundle interface.
primary	Selects the primary address always to be used for the GIADDR field for both CMs and CPE devices. This option is typically used for the Cisco uBR-MC16E card and Cisco uBR7100E series routers to support EuroDOCSIS operations.

Command Default

None

Command Modes

Interface configuration (config-if)

Subinterface configuration (config-subif)

Command History

Release	Modification
12.0(4)T	This command was introduced.

Release	Modification
12.0(6)SC	This command was integrated into Cisco IOS Release 12.0(6)SC.
12.1(2)EC1	This command was integrated into Cisco IOS Release 12.1(2)EC1.
12.1(3a)EC	This command was modified to support subinterfaces.
12.2(15)BC2	This command was modified to include the strict option.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. This command was modified to support the Cisco uBR7225VXR router.
12.2(33)SCD5	This command was modified to support the host , mta , ps , and stb keywords.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.
IOS XE Fuji 16.8.1	This command was modified to add the profile keyword.

Usage Guidelines

You can use this command to modify the GIADDR field of DHCPDISCOVER and DHCPREQUEST packets to provide a relay IP address before packets are forwarded to the DHCP servers. Use this command to set a policy option such that primary addresses are used for CMs and secondary addresses are used for hosts (such as PCs) behind the CMs.

When using multiple secondary subnets, the Cisco CMTS router uses the first secondary IP address as the GIADDR field when forwarding a DHCPDISCOVER request to the DHCP server. If no DHCP server responds with a DHCPOFFER message after three attempts, the Cisco CMTS router uses the next secondary IP address, up to a maximum of 16 secondary addresses.



Note If you have configured a Cisco CM for routing mode and are also using the **cable-modem dhcp-prox nat** command on the CM, you must configure the corresponding cable interface on the Cisco CMTS using the **cable dhcp-giaddr policy strict]** command.



Caution You cannot use the **strict** option with the internal DHCP server that is onboard the Cisco CMTS router, because the **strict** option requires the use of DHCP relay operation, which is not performed by DHCP termination points such as the internal DHCP server.



Note For cBR Series Converged Broadband Routers, internal DHCP server is not supported.

Examples

The following example shows how to set the primary address to be used always for GIADDR:

```
Router# configure terminal
```

```
Router(config)# interface cable 3/0
```

```
Router(config-if)# cable dhcp-giaddr primary
```

The following example shows how to set the primary address to be used always for GIADDR in the cable subinterface mode:

```
Router# configure terminal
```

```
Router(config)# interface cable 6/0.1
```

```
Router(config-subif)# cable dhcp-giaddr primary
```

The following example shows how to configure the router so that the primary address is used for CMs and the secondary addresses are used for hosts. In addition, the GIADDR is used as the source IP address in forwarded DHCP OFFER packets.

```
Router# configure terminal
```

```
Router(config)# interface cable 5/1/0
```

```
Router(config-if)# cable dhcp-giaddr policy strict
```

The following example shows how to configure the router so that the CPE device (in this case, the MTA) uses a specific secondary interface:

```
Router# configure terminal
```

```
Router(config)# interface bundle 25
```

```
Router(config-if)# cable dhcp-giaddr mta 172.10.10.1
```

The following example shows how to specify DHCP profile as control policy:

```
Router# configure terminal
```

```
Router(config)# interface bundle 2
```

```
Router(config-if)# cable dhcp-giaddr policy profile DEVICE1 2.2.1.1
```

Related Commands

Command	Description
cable helper-address	Specifies a destination IP address for the User Datagram Protocol (UDP) broadcast (DHCP) packets.
cable relay-agent-option	Enables the system to insert the CM MAC address into a DHCP packet received from a CM or host, and forward the packet to a DHCP server.
cable source-verify	Enables CM upstream verification.
cable telco-return spd dhcp-authenticate	Enforces the telco-return CM to use a specific DHCP server.
cable telco-return spd dhcp-server	Identifies the IP address of the Dynamic Host Configuration Protocol (DHCP) server that the telco-return CM must access.
debug cable dhcp	Enables debugging of the DHCP when it is used on the cable interface.

Command	Description
debug cable mac-address	Enables debugging of the MAC address on the cable interface.
ip dhcp relay information option	Enables the system to insert the CM MAC address into a DHCP packet received from a CM or host and forward the packet to a DHCP server.
ip dhcp smart-relay	Monitors client retransmissions when address pool depletion occurs.

cable dhcp-insert

To configure the Cisco CMTS router to insert descriptors into DHCP packets using option 82, use the **cable dhcp-insert** command in global configuration mode. To remove this configuration, use the **no** form of this command.

cable dhcp-insert {**downstream-description** | **hostname** | **service-class** | **upstream-description**}

Syntax Description	Parameter	Description
	downstream-description	Appends received DHCP packets with downstream port descriptors.
	hostname	Appends received DHCP packets with router host names.
	service-class	Appends received DHCP packets with router service class.
	upstream-description	Appends received DHCP packets with upstream port descriptors.

Command Default This configuration is disabled by default.

Command Modes Interface configuration (config-if) and bundle interface configuration.

Command History	Release	Modification
	12.3(21)BC	This command was introduced.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	12.2(33)SCF2	This command was modified. The service-class keyword was added.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines The **cable dhcp-insert** command is used to configure the following feature:

[DHCP, ToD, and TFTP Services for the CMTS Routers](#)

This feature enhances the DHCP security potential and the Cable Duplicate MAC Address Feature on the Cisco CMTS router.

The **cable dhcp-insert** command specifies which descriptors to append to DHCP packets. The DHCP servers can then detect cable modem clones and extract geographical information.



Note Multiple types of descriptor strings can be configured as long as the maximum relay information option size is not exceeded.

The Cisco CMTS router can use the DHCP Relay Agent Information option (DHCP option 82) to send particular information about a cable modem, such as its MAC address and the cable interface to which it is connected. If the DHCP server cannot match the information with that belonging to a cable modem in its

database, the Cisco CMTS router identifies that the device is a CPE device. This allows the Cisco CMTS router and DHCP server to retain accurate information about which CPE devices are using which cable modems and whether the devices should be allowed network access.

The DHCP Relay Agent can also be used to identify cloned modems or gather geographical information for E911 and other applications. Using the **cable dhcp-insert** command, configure the Cisco CMTS router to insert downstream, upstream, hostname, or service class descriptors into DHCP packets. A DHCP server can utilize such information to determine service levels available to the host specific to the provisioned subscriber.



Note To use the **service-class** option, the service class name specified in the CM configuration file must be configured on the Cisco CMTS. The **ip dhcp relay information option-insert** command should be configured on the bundle interface to insert the **service-class** option into the DHCP DISCOVER messages.

Examples

The following example shows how to insert descriptors into DHCP packets. The DHCP server can then use these descriptors to identify cable modem clones and extract geographical information.

```
Router (dhcp-config) # cable dhcp-insert service-class
```

Related Commands

Command	Description
ip dhcp relay information option-insert	Enables the system to insert a DHCP Relay Agent option in forwarded BOOTREQUEST messages to a DHCP server.
cable ipv6 dhcp-insert	Enables the system to insert descriptors into DHCPv6 packets.

cable dhcp-parse option

To enable parsing of Dynamic Host Configuration Protocol (DHCP) options, use the **cable dhcp-parse option** command in cable interface configuration mode. To disable parsing, use the **no** form of this command.

cable dhcp-parse option *-optnum*
no cable dhcp-parse option *-optnum*

Syntax Description	<i>-optnum</i> Specifies the DHCP option. Valid values are 43 and 60.
---------------------------	---

Command Default The CMTS does not parse the specified DHCP options.

Command Modes Cable interface configuration (config-if)

Command History	Release	Modification
	12.3(21)BC	This command was introduced.
	IOS-XE 3.15.OS	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines To determine specific device and system information, configure cable **dhcp-parse option-43** command on the CMTS. The CMTS parses option-43 of the CPE DHCP message to determine the device and system information of the CPE.

To determine the CPE device type, configure **cable dhcp-parse option-60** command on the CMTS. The CMTS parses option-60 of the CPE DHCP message to determine the device type of the CPE.

Examples

The following example shows DHCP option 43 enabled on the CMTS:

```
Router(config-if)# cable dhcp-parse option-43

Router(config-if)#
```

Related Commands	Command	Description
	cable helper address	Specifies a destination IP address for User Datagram Protocol (UDP) broadcast Dynamic Host Configuration Protocol (DHCP) packets.

cable diaglog

To enable the DOCSIS 3.1 mode on a MAC domain, use the **cable d31-mode** command in the interface configuration mode. To disable the DOCSIS 3.1 mode, use the **no** form of the command.

[no] cable d31-mode

This command has no keywords or arguments.

Command Default DOCSIS 3.1 mode is enabled.

Command Modes Interface configuration (config-if)

Command History	Release	Modification
	Cisco IOS XE Fuji 16.6.1	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

Enabling the DOCSIS 3.1 mode has the following effects:

- MDDs advertise the MAC domain as DOCSIS 3.1 capable.
- DOCSIS 3.1 protocol support is enabled for the MAC domain, including:
 - v5 Ranging support
 - D3.1 TLV parsing
 - D3.1 MMMs
- OFDM channels are included in MD-SG calculations assuming that they are a member of an associated fiber node.
- OFDM channels are allowed to become active primary-capable downstream channels within the MAC domain.

The following example shows how to enable DOCSIS 3.1 mode:

```
router#configure terminal
router(config)#interface c3/0/0
router(config-if)#cable d31-mode
```

Related Commands

Command	Description
cable mtc-mode	Enables Multiple Transmit Channel mode for the MAC domain. For d31-mode to be active, mtc-mode must also be configured.
cable mrc-mode	Enables Multiple Receive Channel mode for the MAC domain. For d31-mode to be active, mrc-mode must also be configured.
show interface Cable slot/subslot/port controller	Displays the status of the controller, including the d31-mode enablement state.

cable diplexer-band-edge

To enable transmitting diplexer band edges in MAC Domain Descriptor (MDD) messages use the **cable diplexer-band-edge** command. To disable transmitting diplexer band edges in MAC Domain Descriptor (MDD) messages use the **no cable diplexer-band-edge** command.

cable diplexer-band-edge
no cable diplexer-band-edge

This command has no keywords or arguments.

Command Default

Transmitting diplexer band edges in MAC Domain Descriptor (MDD) messages is enabled by default.

Command Modes

Interface configuration—cable interface only (config-if)
 MAC domain profile configuration (config-profile-md)

Command History

Release	Modification
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Example

The following sample shows an example of the **cable diplexer-band-edge** command.

```
Router# conf t
Router(config)# cable profile mac-domain MD1
Router(config-profile-md) #cable diplexer-band-edge
Router(config-profile-md) #end
```

The following sample shows an example of the **no cable diplexer-band-edge** command.

```
Router# conf t
Router(config)# cable profile mac-domain MD1
Router(config-profile-md) #no cable diplexer-band-edge
Router(config-profile-md) #end
```

cable diplexer-mdd-override-band-edge

To override diplexer band edge settings in MAC Domain Descriptor (MDD) messages, use the **cable diplexer-band-edge** command. You can manually set the values used in MDD TLV 21.

To disable override diplexer band edge settings in MAC Domain Descriptor (MDD) messages, use the **no cable diplexer-band-edge** command.

cable diplexer-mdd-override-band-edge { **ds_lower** *frequency-value* | **ds_upper** *frequency-value* | **us_upper** *frequency-value* }

no cable diplexer-mdd-override-band-edge

Syntax Description		
	ds_lower <i>frequency-value</i>	Configure DS Lower Band Edge. You can configure 108MHz or 258MHz.
	ds_upper <i>frequency-value</i>	Configure DS Upper Band Edge. You can configure 1002MHz or 1218MHz.
	us_upper <i>frequency-value</i>	Configure DS Upper Band Edge. You can configure 42MHz, 65MHz, 85MHz, 117MHz, 204MHz.

Command Default override diplexer band edge settings in MAC Domain Descriptor (MDD) messages is disabled by default.

Command Modes Interface configuration—cable interface only (config-if)
MAC domain profile configuration (config-profile-md)

Command History	Release	Modification
	Cisco IOS XE Dublin 17.12.1w	This command is introduced on the Cisco cBR Series Converged Broadband Routers.

The following sample shows an example of the **cable diplexer-mdd-override-band-edge** command.

```
Router#configure terminal
Router#(config)#interface Cable1/0/0
Router(config-if)#cable diplexer-mdd-override-band-edge us_upper 204MHz
Router(config-if)#cable diplexer-mdd-override-band-edge ds_lower 258MHz
Router(config-if)#cable diplexer-mdd-override-band-edge ds_upper 1218MHz
Router(config-if)#end
```

Use the following command to verify the configuration.

```
Router#show cable mac-domain Cable1/0/0 mdd Integrated-Cable 1/0/0 0 | be Diplexer
Diplexer Band Edge
    US Upper Band Edge: 4
    DS Lower Band Edge: 1
    DS Upper Band Edge: 0
```

cable divert-rate-limit

To set Cable-side DRL rate and limit, use the **cable divert-rate-limit** command in interface configuration mode. To reset the rate and limit to the default values, use the **no** form of this command.

cable divert-rate-limit *rate* **limit** *limit*
no cable divert-rate-limit

Syntax Description

<i>rate</i>	Specifies the divert rate in packets per second. Minimum rate is 1 packet per second. Maximum rate is 65535 packets per second. The default rate is 2000 packets per second.
<i>limit</i>	Specifies the number of packets to be diverted in an initial burst of packets. Minimum limit is 4 packets. Maximum limit is 4194 packets. The default limit is 2000 packets.

Command Default

The default DRL configuration for every physical cable interface is 2000 packets per second and the default limit is 2000 packets.

Command Modes

Interface configuration—cable interface only (config-if)

Command History

Release	Modification
12.2(33)SCB	This command was introduced.
IOS-XE 3.15.0S	This command was replaced by the platform punt-sbrl subscriber rate command on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

Cable-side DRL is configured on the physical cable interface. It cannot be configured on a cable bundle interface.

Examples

The following example shows how to configure the rate and limit values for a cable interface.:

```
Router(config-if)# cable divert-rate-limit rate 1 limit 4
```

Related Commands

Command	Description
service divert-rate-limit ip	This command configures DRL rate and limit for WAN-side IP packet streams.
service divert-rate-limit non-ip	This command configures DRL for WAN-side non-IP packet streams.

cable docsis30-voice downstream req-attr-mask

To configure downstream DOCSIS 3.0 QoS parameters of the required attribute-mask and forbidden attribute-mask number for all DS voice flows, use the **cable docsis30-voice downstream req-attr-mask** command in global configuration mode. To disable the required attribute-mask and forbidden attribute-mask number, use the **no** form of this command.

cable docsis30-voice downstream req-attr-mask *req-attr-mask* **forb-attr-mask** *forb-attr-mask*
no cable docsis30-voice

Syntax Description

<i>req-attr-mask</i>	Specifies the required attribute-mask value. Example: 0 It can also include HEX format. Example: cable docsis30-voice downstream req-attr-mask FF forb-attr-mask 8000AAbb
<i>forb-attr-mask</i>	Specifies the forbidden attribute-mask value. Example: 80000000

Command Default

The value of required attribute-mask and forbidden attribute-mask number is 0. Use the **no** form of this command to return to default. It will set the values for required attribute-mask and forbidden attribute-mask number to 0.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(33)SCB	This command was introduced.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

This command is used to configure DOCSIS 3.0 voice-related downstream service-flow attribute-mask number.

Examples

The following example shows how to configure the downstream attribute mask for the interface cable:

```
Router# configure terminal

Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# cable docsis30-voice downstream req-attr-mask ?

<0-FFFFFFFF> The attribute bitmap in hex
Router(config)# cable docsis30-voice downstream req-attr-mask aa00 ?
forb-attr-mask SF Forbidden Attribute Mask
Router(config)# cable docsis30-voice downstream req-attr-mask aa00 forb-attr-mask ?
```

```

<0-FFFFFFF> The attribute bitmap in hex
Router(config)# cable docsis30-voice downstream req-attr-mask aa00 forb-attr-mask bbcc

Router(config)# do show run | include docsis30
cable docsis30-voice downstream req-attr-mask AA00 forb-attr-mask Bbcc

Router(config)# no cable docsis30-voice down

Router(config)# no cable docsis30-voice

Router(config)# do show run | include docsis30

```

Related Commands

Command	Description
cable downstream attribute-mask	This command enables attribute-based forwarding which allows CMTS to choose bonding group or individual channel for unicast and multicast forwarding.

cable docsis-ver

To report the CMTS-supported DOCSIS version to the DHCP server, use the **cable docsis-ver** command in global configuration mode. To report the default DOCSIS version to the DHCP server, use the **no** form of the command.

cable docsis-ver [*major version* | *minor version*]

no cable docsis-ver [*major version* | *minor version*]

Syntax Description

<i>major version</i>	Specifies the major DOCSIS version.
<i>minor version</i>	Specifies the minor DOCSIS version.

Command Default

The default value of the command is **cable docsis-ver 3 1**

Command Modes

Global configuration (config)

Command History

Release	Modification
IOS-XE 16.7.1	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

cable dot1q-vc-map

To map a cable modem to a particular Virtual Local Area Network (VLAN) on a local outbound Ethernet interface, use the **cable dot1q-vc-map** command in global configuration mode. To remove this mapping, or to remove a particular customer's name from the internal tables, use the **no** form of this command.

cable dot1q-vc-map *mac-address ethernet-interface vlan-id* {*cust-name*}

cable dot1q-vc-map *mac-address ethernet-interface backup-interface ethernet-interface vlan-id* {*cust-name*}

no cable dot1q-vc-map *mac-address ethernet-interface backup-interface ethernet-interface vlan-id* {*cust-name*}

no cable dot1q-vc-map *mac-address*

no cable dot1q-vc-map customer *cust-name*

Syntax Description		
<i>mac-address</i>		Hardware (MAC) address for the cable modem whose traffic is to be mapped.
<i>ethernet-interface</i>		Outbound interface to which this cable modem should be mapped. On the Cisco uBR7100 series and Cisco uBR7246VXR routers, you can specify an Ethernet, Fast Ethernet, or Gigabit Ethernet interface, depending on what interfaces are actually installed in the chassis. On the Cisco cBR series routers, you can specify the Gigabit Ethernet 0 interface or a Ten Gigabit Ethernet interface.
<i>vlan-id</i>		ID for the IEEE 802.1Q Virtual Local Area Network (VLAN) that should be used to tag the frames for this cable modem. The range is 1 to 4095, with no default on the Cisco uBR7100 series and Cisco uBR7246VXR routers. The range is 2 to 4095 on the Cisco cBR series routers. Note The switches acting as the bridge aggregators might support a lower number of VLAN IDs. If so, the Cisco CMTS router should be configured within the limits of the switches' maximum number of VLANs.
<i>cust-name</i>		(Optional) Identifies the customer using this VLAN. The <i>cust-name</i> can be any arbitrary alphanumeric string, up to 127 characters long.
customer <i>cust-name</i>		(Optional) Deletes all VCs belong to this customer. The <i>cust-name</i> can be any arbitrary alphanumeric string, up to 127 characters long.
backup-interface <i>ethernet-interface</i>		Specifies the backup WAN interface.

Command Default None

Command Modes Global configuration (config)

Command History	Release	Modification
	12.2(15)BC2	This command was introduced for Cisco uBR7246VXR universal broadband routers.

Release	Modification
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.
12.2(33)SCJ	This command was modified. The backup-interface keyword was added.
IOS-XE 3.18.0S	This command was modified. The backup-interface keyword was added.

Usage Guidelines

This command maps a cable modem, on the basis of its hardware (MAC) address, to a particular IEEE 802.1Q VLAN on a particular outbound Ethernet interface. This enables the cable modem's traffic to be part of a virtual LAN at the Layer-2 level.



Note To use this command, you must first enable the use of IEEE 802.1Q Layer 2 tunnels, using the **cable l2-vpn-service dot1q** command. Then use this command to map individual cable modems to specific VLANs.

Examples

The following example shows how to enable the use of Layer 2 tunnels and then map specific CMs to VLANs on a specific interface on a Cisco uBR7246VXR router:

```
Router# configure terminal
Router(config)# cable l2-vpn-service dot1q
Router(config)# cable dot1q-vc-map 000C.0e03.69f9 GigabitEthernet 1/0 4
Router(config)# cable dot1q-vc-map 0010.7bed.9c95 GigabitEthernet 1/0 5
Router(config)# exit
```

The following example shows the same command as above on a Cisco uBR7246VXR router, but this time each VLAN is identified by the customer that is using it:

```
Router# configure terminal
Router(config)# cable l2-vpn-service dot1q
Router(config)# cable dot1q-vc-map 000C.0e03.69f9 GigabitEthernet 1/0 4 ENTERPRISE-CO1
Router(config)# cable dot1q-vc-map 0010.7bed.9c95 GigabitEthernet 1/0 5 ENTERPRISE-CO2
Router(config)# exit
```

The following example shows how to remove the Layer 2 mapping for a specific cable modem on a Cisco uBR7246VXR router. This particular cable modem's traffic is then routed using the normal Layer 3 routing processes.

```
Router# config terminal
Router(config)# no cable dot1q-vc-map 000C.0e03.69f9 GigabitEthernet 1/0 4
Router(config)# exit
```

The following example shows how to enable the use of Layer 2 tunnels and then map specific CMs to VLANs on a specific interface on a Cisco cBR-8 router:

```
Router# configure terminal
```

```

Router(config)# cable l2-vpn-service dot1q
Router(config)# cable dot1q-vc-map 000C.0e03.69f9 GigabitEthernet 0 2
Router(config)# cable dot1q-vc-map 0010.7bed.9c95 TenGigabitEthernet 4/1/0 5
Router(config)# exit

```

The following example shows how to configure a backup WAN interface on DOT1Q L2VPN on a Cisco cBR-8 router:

```

Router# configure terminal
Router(config)# cable l2-vpn-service dot1q
Router(config)# cable dot1q-vc-map 0025.2eab.8482 Te4/0/1 backup-interface Te4/0/7 207
Topgun

```

Related Commands

Command	Description
cable l2-vpn-service dot1q	Enables the use of Layer 2 tunnels so that traffic for individual cable modems can be routed over a particular Virtual Local Area Network (VLAN) on an Ethernet interface.
debug cable l2-vpn	Displays debugging messages for the Layer 2 mapping of cable modems to particular PVCs or VLANs.
show cable l2-vpn dot1q-vc-map	Displays the mapping of one or all cable modems to VLANs on the router's Ethernet interfaces.

cable dot1q-vc-map port-channel

To configure the port-channel uplink port for TLS L2VPN, use the **cable dot1q-vc-map port-channel** command in global configuration mode.

cable dot1q-vc-map *mac address* **port-channel** *number* *vlan id* *custom name*

Syntax Description

<i>mac address</i>	MAC address of the cable modem.
<i>number</i>	Port-channel interface number.
<i>vlan id</i>	IEEE 802.1Q VLAN ID.
<i>custom name</i>	Name of the customer.

Command Default

None

Command Modes

Global configuration (config)

Command History

Release	Modification
IOS-XE 3.18.0S	This command was introduced on Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

The **cable dot1q-vc-map port-channel** command configures the port-channel uplink port for TLS L2VPN.

The following example shows how to configure the port-channel uplink port for TLS L2VPN:

```
router# configure terminal
router(config)#cable l2-vpn-service xconnect nsi dot1q
router(config)#cable dot1q-vc-map c8fb.26a5.551c port-channel 64 1200 topgun
```

cable downstream annex

To set the Moving Picture Experts Group (MPEG) framing format for a downstream port on a cable interface line card to either Annex A (Europe) or Annex B (North America), use the **cable downstream annex** command in cable interface configuration mode.

cable downstream annex {A | B}

Syntax Description

A	Annex A. The downstream uses the EuroDOCSIS J.112 standard.
B	Annex B. The DOCSIS-compliant cable plants that support North American channel plans use ITU J.83 Annex B downstream radio frequency.

Command Default

Annex B for all Cisco cable interface cards other than the Cisco uBR-MC16E. Annex A, if using the Cisco uBR-MC16E cable interface line card and the Cisco uBR7111E and Cisco uBR7114E universal broadband routers.

Command Modes

Interface configuration—cable interface only (config-if)

Command History

Release	Modification
12.1(1a)T1	This command was introduced.
12.0(7)T, 12.1(1a)T1, 12.1 mainline, 12.0(8)SC, 12.1(2)EC1	Support for Annex A was introduced for the Cisco uBR-MC16E cable interface line card.
12.1(7)EC	Support for Annex A was added for the Cisco uBR7111E and Cisco uBR7114E universal broadband routers.
12.2(15)CX	Support was added for both Annex A and Annex B on the Cisco uBR-MC16U/X and Cisco uBR-MC28U/X cable interface line cards.
12.2(15)BC2	Support was added for both Annex A and Annex B on the Cisco uBR-MC5X20U/S cable interface line cards.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

The MPEG framing format must be compatible with the downstream symbol rate you set. Annex B is the North America (DOCSIS) standard and Annex A is the European (EuroDOCSIS) standard. You should review your local standards and specifications for downstream MPEG framing to determine which format you should use.

The Cisco uBR-MC16U/X, Cisco uBR-MC28U/X, and Cisco uBR-MC5X20U cable interface line cards support both Annex A and Annex B operation. However, on the Cisco uBR-MC28U/X, both downstreams must be configured for the same mode (either both Annex A or both Annex B).

On the Cisco uBR-MC16U and Cisco uBR-MC28U (with integrated upconverter), the IF frequency is fixed at 44 MHz for both Annex A and Annex B modes of operation. On the Cisco uBR-MC16X and Cisco uBR-MC28X (without integrated upconverter), the IF frequency is set to 36.125 MHz in Annex A mode and 44 MHz in Annex B mode.



Note This command can be used to change the symbol rate, alpha, and other parameters for compliance with EuroDOCSIS (annex A), or DOCSIS (annex B). Annex A is not supported on the Cisco uBR-MC1xC, Cisco uBR-MC16B, Cisco uBR-MC16S, and Cisco uBR-MC28C cable interface line cards. Annex B is not supported on the Cisco uBR-MC16E card and on the Cisco uBR7111E and Cisco uBR7114E universal broadband routers.



Note The cable interface line card downstream ports and the CMs on the HFC network connected through these ports must be set to the same MPEG framing format.



Caution In Cisco IOS Release 12.1, only Annex B MPEG framing format is supported.



Tip Changing the MPEG framing format affects the PHY layer on the downstream and disconnects all online CMs. For this reason, if you are using N+1 HCCP redundancy, you should configure this command on both the Protect and Working interfaces, so that the PHY layer is properly configured before a switchover occurs. Otherwise, online CMs could be disconnected when a switchover occurs. (This also applies to the **cable downstream modulation** and **cable downstream interleave-depth** commands.)

Examples

The following example shows how to set the MPEG framing format to Annex A:

```
Router# configure terminal
Router(config)# interface cable 1/0
Router(config-if)# cable downstream annex A
```

The following example shows how to set the MPEG framing format to Annex B:

```
Router# configure terminal
Router(config)# interface cable 4/0
Router(config-if)# cable downstream annex B
```

Related Commands

Command	Description
show controllers cable	Displays the downstream MPEG framing format (Annex A or Annex B) setting.

cable downstream attribute-mask

To configure an attribute for a cable interface or a wideband cable interface, use the **cable downstream attribute-mask** command in interface configuration mode or MAC domain profile configuration mode. To disable this configuration, use the **no** form of this command.

cable downstream attribute-mask *mask*
no cable downstream attribute-mask *mask*

Syntax Description

<i>mask</i>	Specifies the mask value for the interface.
-------------	---

Command Default

If this command is not used, the default attribute is used for the cable interface and the wideband cable interface. The default attribute is 0x80000000 (31-bit) for the wideband cable interface and zero for the cable interface. For a wideband cable interface, 31-bit mask is always set to 1.

Command Modes

Interface configuration (config-if)

MAC domain profile configuration (config-profile-md)

Command History

Release	Modification
12.2(33)SCB	This command was introduced.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.
IOS XE Fuji 16.7.1	This command was modified to support MAC domain profile configuration on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

The attribute-mask comprises 32 attributes and each attribute represents a single bit in the mask. You can configure a provisioned attribute mask for each channel and provisioned bonding group to assign values to the operator-defined binary attributes, or to override the default values of the specification-defined attributes. The operator may configure, in the CM configuration file, a required attribute mask and a forbidden attribute mask for a service flow. Additionally, in a CM-initiated dynamic service request, the CM can include a required attribute mask and a forbidden attribute mask for a service flow.

Examples

The following example shows how to configure an attribute for a wideband cable interface:

```
Router# configure terminal
Router(config)# interface wideband-cable 1/0/0:0
Router(config-if)# cable downstream attribute-mask 800000ff
```

Related Commands

Command	Description
interface wideband-cable	Specifies a wideband cable interface.
interface cable	Specifies a cable interface.

cable downstream channel-id

To configure the downstream channel ID, use the **cable downstream channel-id** command in cable interface configuration mode. To set the downstream channel ID to its default value, use the **no** form of this command.

cable downstream channel-id *id*
no cable downstream channel-id

Syntax Description

<i>id</i>	Specifies a downstream channel ID. Valid values for releases prior to Cisco IOS Release 12.2(33)SCB are from 0 to 255 and the valid values for Cisco IOS Release 12.2(33)SCB and later are from 1 to 255 as 0 is reserved for network management.
-----------	---

Command Default

The unit number of the downstream device, starting with a value of 1.

Command Modes

Interface configuration—cable interface only (config-if)

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
12.2(33)SCB1	The downstream channel ID scheme was changed.
IOS-XE 3.15.0S	This command was replaced by the docsis-channel-id command on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

Use this command to ensure that each downstream channel has a unique ID when there are multiple Cisco CMTS routers at a headend facility.

Cisco IOS assigns the default ID number of each downstream channel in the order in which devices connected to the downstream channels appear to the CMTS router. The downstream channel connected to the first device that appears to the CMTS router is configured with a default ID of 1, the downstream channel connected to the second device that appears is configured with an ID of 2, and so on.

The local downstream channel channel ID is unique across all SPA channels. When you add a channel to the MAC domain using the **downstream modular-cable rf-channel** command, the channel IDs in the MAC domain are unique. This also facilitates channel ID uniqueness when the channels are added to a fiber node.

The following applies to **rf-channel rf-port cable downstream channel-id channel-id** command also.

Table 1: Downstream Channel ID Scheme for 12.2(33)SCB1

	8/1	8/0	7/1	7/0	6/1	6/0	5/1	5/0	slot 3	slot 1
SPA Bay 0									217-240	193-216

	8/1	8/0	7/1	7/0	6/1	6/0	5/1	5/0	slot 3	slot 1
SPA Bay 1									217-240	193-216
SPA Bay 2									217-240	193-216
SPA Bay 3									217-240	193-216
5x20 DS /0	169	145	121	97	73	49	25	1		
5x20 DS /1	173	149	125	101	77	53	29	5		
5x20 DS /2	177	153	129	105	81	57	33	9		
5x20 DS /3	181	157	133	109	85	61	37	13		
5x20 DS /4	185	161	137	113	89	65	41	17		

Table 2: Downstream Channel ID Scheme for 12.3(23)BCx

	8/1	8/0	7/1	7/0	6/1	6/0	5/1	5/0	slot 3	slot 1
SPA Bay 0									24-47	24-47
SPA Bay 1									48-71	48-71
5x20	188-192	180-184	168-172	160-164	148-152	140-144	128-132	120-124		



Caution Changing the downstream channel ID of an active channel automatically disconnects all connected CMs and forces them to go offline and reregister with the CMTS router, as required by the DOCSIS specifications.

Examples

The following example shows how to configure the downstream channel on the cable interface line card in slot 6 of a Cisco CMTS router with a channel ID of 44:

```
Router(config-if)# cable downstream channel-id 44
```

The following example shows how to restore the downstream channel ID configuration to the default configuration:

```
Router(config-if)# cable downstream channel-id
```

cable downstream-channel-id automatic

To automatically configure the downstream channel IDs, use the **cable downstream-channel-id automatic** command in global configuration mode. To set the downstream channel ID (DCID) to its default value, use the **no** form of this command.

cable downstream-channel-id automatic
no cable downstream-channel-id automatic

Syntax Description	automatic Specifies an automatic assignment of the DCIDs by the Cisco CMTS.
---------------------------	--

Command Default	None
------------------------	------

Command Modes	Global configuration (config)
----------------------	-------------------------------

Command History	Release	Modification
	12.2(33)SCE	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines	Use this command to automatically assign unique channel IDs for all downstream channels in a fiber node. Automatic DCIDs are not assigned to downstreams that are not in any fiber node.
-------------------------	--

Examples	This example shows how to automatically configure the downstream channel IDs:
-----------------	---

```
Router(config)# cable downstream-channel-id automatic
```

Related Commands	Command	Description
	show cable fibernode	Displays channel ID information for downstreams in a fiber node.

cable downstream controller-profile

To configure the downstream controller profile, use the **cable downstream controller-profile** command in global configuration mode. To void the downstream controller profile configuration, use the **no** form of this command.

cable downstream controller-profile *id* [**RPHY** | **I-CMITS**]

no cable downstream controller-profile *id*

Syntax Description

Syntax Description *id* Specifies the downstream controller profile ID.

Command Default

None

Command Modes

Global configuration (config)

Command History

Command History	Release	Modification
	Cisco IOS XE Everest 16.5.1	This command was introduced on the Cisco cBR Series Converged Broadband Routers.
	Cisco IOS XE Fuji 16.7.1	This command was modified on the Cisco cBR Series Converged Broadband Routers. Keywords RPHY and I-CMITS were added.

Usage Guidelines

Use this command to configure the downstream controller profile.

When configuring a new i-CMITS controller profile, keyword **I-CMITS** is needed. If user input **RPHY** or do not input any keyword, the system will consider it as a RPHY controller profile.

Examples

The following example shows how to enter the downstream controller profile configuration mode:

```
Router# configure terminal
Router(config)# cable downstream controller-profile 1 I-CMITS
Router(config-controller-profile)#
```

Related Commands

Command	Description
multicast-pool	Specifies the multicast pool for the downstream controller profile.

cable downstream description

To specify a description for a downstream port, use the **cable downstream description** *description* command.

cable downstream description *description*

Syntax Description	<i>description</i> Specifies a description that is up to 80 characters describing the downstream port.
---------------------------	--

Command Default	By default, no description is configured.
------------------------	---

Command Modes	cable interface (config-if) MAC domain profile configuration (config-profile-md)
----------------------	---

Command History	<table> <thead> <tr> <th style="text-align: left;">Release</th> <th style="text-align: left;">Modification</th> </tr> </thead> <tbody> <tr> <td>IOS-XE 3.15.0S</td> <td>This command was implemented on the Cisco cBR Series Converged Broadband Router.</td> </tr> </tbody> </table>	Release	Modification	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.
Release	Modification				
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.				

Example

The following sample shows an example of the **cable downstream description** command.

```
Router# conf t
Router(config)# cable profile mac-domain MD1
Router(config-profile-md) # cable downstream description DS
Router(config-profile-md) # no cable downstream description
Router(config-profile-md)#end
```

cable downstream dsg

Supports Advanced-Mode DOCSIS Set-Top Gateway (A-DSG) configuration under MAC domain interface on a Cisco CMTS router with an OPS MD-profile. The method of configuring A-DSG by OPS MD-profile now is in addition to the existing method of using legacy CLI to configure DSG TG.

cable downstream dsg [**channel list** *DSG Channel List Setting* | **dcd-enable** *Enable DSG DCD messages when no enabled rules/tunnels* | **tg** *DSG Tunnel group* | **timer** *DSG Timer Setting* | **vendor-param** *DSG vendor specific parameters*]

chan-list	(Optional) Specifies the downstream Channel List Setting. The valid range is from 1 to 65535.
dcd-enable	(Optional) Enables the DSG DCD messages when no enabled rules/tunnels are enabled.
tg	(Optional) Specifies the DSG Tunnel group.
timer	(Optional) Specifies the DSG Timer Setting.
vendor-param	(Optional) Specifies the DSG vendor-specific parameters group ID.

The following example shows how the **show cable downstream dsg** command is used:

```
router# show cable downstream dsg tg
TG      Chan  TG      Rule  Vendor  UCID  Service-group  Profile
id      id    state  I/F   pri   Param  list           Profile  chan state
-----
2000    1     en     C1/0/0  0           SG1           en
4500    1     en     C1/0/0  2     2       1 2           SG1           dis
4500    2     en           0           --           --
```

cable downstream dsg chan-list

To associate an Advanced-mode DOCSIS Set-Top Gateway (A-DSG) channel list entry to a downstream channel and include it in the Downstream Channel Descriptor (DCD) message on a Cisco CMTS router, use the **cable downstream dsg chan-list** command in interface configuration mode. To remove the configuration, use the **no** form of this command.

cable downstream dsg chan-list *list-index*
no cable downstream dsg chan-list *list-index*

Syntax Description

<i>list-index</i>	Alphanumeric list index identifier.
-------------------	-------------------------------------

Command Default

Channel lists are not defined by default.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(13a)BC	This command was introduced to support A-DSG 1.1 on the Cisco uBR10012 and Cisco uBR7200 series routers.
12.2SB	This command was integrated into Cisco IOS Release 12.2SB. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

Global configuration for A-DSG must be complete before configuring interface definitions.

Examples

The following example shows configuration of inclusion of DSG channel list entries in DCD messages on a downstream cable interface on a Cisco CMTS router:

```
interface Cable6/0
 cable downstream dsg chan-list 2
```

Examples for Cisco cBR Series Converged Broadband Router

```
Router# configure terminal
Router(config)#interface cable 1/0/0
Router(config-if)#cable downstream dsg chan-list 1
```

Related Commands

Command	Description
cable downstream dsg dcd-enable	Enables DCD messages to be sent on a downstream channel on a Cisco CMTS router.

Command	Description
cable downstream dsg rule	Defines and associates an A-DSG rule to a downstream channel on a Cisco CMTS router.
cable downstream dsg timer	Associates an A-DSG timer entry to a downstream channel and includes the DCD message on a Cisco CMTS router.
cable downstream dsg vendor-param	Associates A-DSG vendor parameters to a downstream and includes them in the DCD message on a Cisco CMTS router.
cable dsg chan-list	Configures the A-DSG downstream channel list on a CMTS router.

cable downstream dsg dcd-enable

To enable Downstream Channel Descriptor (DCD) messages to be sent on a downstream channel on a Cisco CMTS router, use the **cable downstream dsg dcd-enable** command in interface configuration mode. To disable DCD messages, use the **no** form of this command.

cable downstream dsg dcd-enable
no cable downstream dsg dcd-enable

Syntax Description This command has no arguments or keywords.

Command Default DCD messages are disabled.

Command Modes Interface configuration (config-if)

Release	Modification
12.3(13a)BC	This command was introduced to support A-DSG 1.1 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines Global configuration for Advanced-mode DOCSIS Set-top Gateway (A-DSG) must be complete before configuring interface definitions. This command is used when there are no enabled rules or tunnels for A-DSG on a Cisco CMTS router.

Examples The following example shows how to enable DCD messages on a downstream interface on a Cisco CMTS router along with several other A-DSG interface configuration commands:

```
interface Cable6/0
 cable downstream dsg dcd-enable
 cable downstream dsg chan-list 2
 cable downstream dsg timer 3
 cable downstream dsg vendor-param 2
 cable downstream dsg rule 1 priority 1 clients 1 tunnel 1
 cable downstream dsg rule 1 vendor-param 1
 cable downstream dsg rule 1 classifiers 1 5
 cable downstream dsg rule 2 priority 1 clients 2 tunnel 2
```

Command	Description
cable downstream dsg chan-list	Associates the A-DSG channel list entry to a downstream channel, to be included in the DCD message on a Cisco CMTS router.

Command	Description
cable downstream dsg rule	Defines and associates an A-DSG rule to a downstream channel on a Cisco CMTS router.
cable downstream dsg timer	Associates an A-DSG timer entry to a downstream channel and includes the DCD message on a Cisco CMTS router.
cable downstream dsg vendor-param	Associates A-DSG vendor parameters to a downstream and includes them in the DCD message on a Cisco CMTS router.

cable downstream dsg disable

To exclude the primary capable interface from DOCSIS Set-Top Gateway DSG forwarding, use the **cable downstream dsg disable** command in cable interface configuration mode. To remove the configuration, use the **no** form of this command.

cable downstream dsg disable
no cable downstream dsg disable

Syntax Description This command has no arguments or keywords.

Command Default None

Command Modes Interface configuration (config-if)

Release	Modification
12.2(33)SCG	This command was introduced.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines The **cable downstream dsg disable** command is associated with the [Advanced Mode DOCSIS Set-Top Gateway 1.2 for the Cisco CMTS Routers](#) feature.

When DSG is enabled on the MAC domain interface and DSG forwarding is disabled on the primary capable interface, the Cisco CMTS router does not create multicast service flows on the primary capable interface.

If DSG forwarding is already enabled on the primary capable interface, the Cisco CMTS router removes multicast service flows from the interface.

Examples

The following example shows how to disable A-DSG forwarding on a primary capable modular interface on the Cisco CMTS router:

```
Router# configure terminal
Router(config)# interface modular-cable 1/0/0:0
Router(config-if)# cable downstream dsg disable
Router(config-if)# end
```

Command	Description
cable dsg cfr	Defines and enables A-DSG classifiers on the Cisco CMTS router.
show cable dsg cfr	Displays DSG classifier details.

cable downstream dsg rule



Note Effective with Cisco IOS Release 12.3(17a)BC2, the **cable downstream dsg rule** command is removed from Cisco IOS software.

To define and associate an Advanced-mode DOCSIS Set-top Gateway (A-DSG) rule to the downstream channel on a Cisco CMTS router, use the **cable downstream dsg rule** command in interface configuration mode. To remove the DSG rule configuration, use the **no** form of this command.

```
cable downstream dsg rule rule-id [clients clnt-list-id tunnel tun-id | priority priority | vendor-param
vsif-grp-id | ucid ucid1 | [ucid1 ucid2 . . . ucidn] | cfr cfr-index [cfr-index . . .] | disable]
no cable downstream dsg rule rule-id [clients clnt-list-id tunnel tun-id | priority priority |
vendor-param vsif-grp-id | ucid ucid1 | [ucid1 ucid2 . . . ucidn] | cfr cfr-index [cfr-index . . .] |
disable]
```

Syntax Description

<i>rule-id</i>	Defines the DSG rule identifier.
clients <i>clnt-list-id</i>	Sets the DSG clients and associates the clients with the channel list identifier for this DSG rule.
tunnel <i>tun-id</i>	Sets the DSG tunnel to be associated with this rule, and defines the DSG tunnel identifier.
priority <i>priority</i>	Sets the priority of the DSG rule.
vendor-param <i>vsif-grp-id</i>	Associates DSG vendor-specific parameters with the specified DSG rule.
ucid <i>ucid1</i> [<i>ucid1</i> <i>ucid2</i> ... <i>ucidn</i>]	Sets the upstream channel identifier for the DSG rule.
cfr <i>cfr-index</i> [<i>cfr-index</i> ...]	Sets the index for the classifier value associated with the DSG rule.
disable	Disables a DSG rule.

Command Default

DSG rules are disabled by default when they are created.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(13a)BC	This command was introduced to support A-DSG 1.1 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.3(17a)BC2	This command was removed.
IOS-XE 3.15.OS	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

Global configuration for A-DSG must be complete before configuring interface definitions.

Because rules are disabled when they are created, you must enable the configuration using the **no cable downstream dsg rule disable** command. To disable a DSG rule configuration, use the **cable downstream dsg rule disable** command.

You can associate DSG clients, vendor specific parameters, classifiers, DSG tunnel address, upstream channel identifier range, and rule priority to a downstream channel. You can apply more than one rule to a downstream channel. All configured rules that are enabled are included in the Downstream Channel Descriptor (DCD) message.

Examples

The following example shows configuration and association of DSG rules on a downstream cable interface on a Cisco CMTS router, followed by an example of enabling the configured DSG rules:

```
interface Cable6/0
 cable downstream dsg rule 1 clients 1 tunnel 1
 cable downstream dsg rule 1 priority 1
 cable downstream dsg rule 1 vendor-param 1
 cable downstream dsg rule 1 classifiers 1 5
 cable downstream dsg rule 2 clients 2 tunnel 2
 cable downstream dsg rule 2 priority 1
!
! Enable the DSG rule configuration
!
no cable downstream dsg rule 1 disable
no cable downstream dsg rule 2 disable
```

The following example shows how to disable DSG rules that were previously enabled:

```
interface cable6/0
 cable downstream dsg rule 1 disable
 cable downstream dsg rule 2 disable
```

Related Commands

Command	Description
cable downstream dsg chan-list	Associates an A-DSG channel list to a downstream channel on a Cisco CMTS router.
cable downstream dsg dcd-enable	Enables DCD messages to be sent on a downstream channel on a Cisco CMTS router.
cable downstream dsg timer	Associates an A-DSG timer entry to a downstream channel and includes the DCD message on a Cisco CMTS router.
cable downstream dsg vendor-param	Associates A-DSG vendor parameters to a downstream and includes them in the DCD message on a Cisco CMTS router.

cable downstream dsg tg

To associate an Advanced-Mode DOCSIS Set-Top Gateway (A-DSG) tunnel group to a MAC domain interface on a Cisco CMTS router, use the **cable downstream dsg tg** command in cable interface configuration mode. To remove this association, use the **no** form of this command.

```
cable downstream dsg tg tgid [channel channel_ID | priority DSG-rule-priority [enable | disable]
| ucid ID1 [ID2 ID3 ID4] | vendor-param vendor-group-ID]
no cable downstream dsg tg tgid
```

Syntax Description		
dsg tg <i>tgid</i>		Specifies the DSG tunnel group ID. The valid range is from 1 to 65535.
channel <i>channel_ID</i>		(Optional) Specifies the downstream channel ID. The valid range is from 1 to 65535.
priority <i>DSG-rule-priority</i>		(Optional) Specifies the DSG rule priority for the cable interface. The valid range is from 0 to 255.
enable		(Optional) Enables the DSG rule priority on a DSG tunnel group.
disable		(Optional) Disables the DSG rule priority on a DSG tunnel group.
ucid <i>upstream-channel-ID</i>		(Optional) Specifies the upstream channel ID (UCID). You can specify a maximum of four upstream channel IDs. Cisco cBR-8 router—The valid range is 0 to 8.
vendor-param <i>vendor-group-ID</i>		(Optional) Specifies the vendor specific parameters group ID. The valid range is from 1 to 65535.

Command Default The DSG traffic is not forwarded to the MAC domain.

Command Modes Interface configuration (config-if)

Command History	Release	Modification
	12.2(33)SCG	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines The **cable downstream dsg tg** command is used to configure the [Advanced Mode DOCSIS Set-Top Gateway 1.2 for the Cisco CMTS Routers](#) feature.

If you do not specify a downstream channel ID using the **channel** keyword, the Cisco CMTS router automatically assigns a free channel to associate the MAC domain interface with the DSG tunnel group. This channel is created with default parameters.

If you specify the **channel** keyword in the **no** form of the command, only the MAC domain to DSG tunnel group association is removed from the configuration. If the **no** form of the command is used without the **channel** keyword, both the tunnel group association and the channel are removed.

Examples

The following example shows how to associate an A-DSG tunnel group to a MAC domain interface:

```
Router(config)# interface cable 5/1/0
Router(config-if)# cable downstream dsg tg 1
Router(config-if)# cable downstream dsg tg 1 channel 22
Router(config-if)# cable downstream dsg tg 1 priority 2 enable
Router(config-if)# cable downstream dsg tg 1 ucid 1 2 3 4
Router(config-if)# cable downstream dsg tg 1 vendor-param 20
```

Examples for Cisco cBR Series Converged Broadband Router

This example shows how to associate an A-DSG tunnel group to a MAC domain interface on a Cisco cBR-8 router:

```
Router(config)# interface cable 1/0/0
Router(config-if)# cable downstream dsg tg 1
Router(config-if)# cable downstream dsg tg 1 channel 2
Router(config-if)# cable downstream dsg tg 1 priority 0 enable
Router(config-if)# cable downstream dsg tg 1 ucid 1 2 3 4
Router(config-if)# cable downstream dsg tg 1 vendor-param 20
```

Related Commands

Command	Description
cable downstream dsg disable	Excludes the primary capable interface from A-DSG forwarding.

cable downstream dsg tg channel

To associate an Advanced-mode DOCSIS Set-Top Gateway (A-DSG) tunnel group to a downstream interface on a Cisco CMTS router, use the **cable downstream dsg tg channel** command in interface configuration mode. To remove this configuration, use the **no** form of this command.

```
cable downstream dsg tg group-id channel channel-id
no cable downstream dsg tg group-id channel channel-id
```

Syntax Description

<i>group-id</i>	Specifies the A-DSG tunnel group identifier as a number from 1 to 65535.
<i>channel-id</i>	Specifies the downstream channel identifier as a number from 1 to 65535.

Command Default

The A-DSG tunnel group is not associated to a downstream interface.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(17a)BC2	This command was introduced to support A-DSG 1.2 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

The **cable dsg tg channel** global configuration command establishes the configuration of tunnels in a tunnel group. Tunnel groups are enabled by default.

Then, you can associate the tunnel group to a downstream cable interface using the **cable downstream dsg tg channel** interface configuration command.

Examples

The following example shows the configuration and activation of a tunnel group with ID of 1 and channel ID of 2 in global configuration, followed by association of the tunnel group to a downstream interface on a Cisco CMTS router:

```
cable dsg tg 1 channel 2
interface cable 8/1/2
  cable downstream dsg tg 1 channel 2
```

Examples

This example shows the configuration and activation of a tunnel group with ID of 1 and channel ID of 1 in global configuration, followed by association of the tunnel group to a downstream interface on a Cisco cBR-8 router:

```
cable dsg tg 1 channel 1
```

```
interface cable 1/0/0
 cable downstream dsg tg 1 channel 1
```

Related Commands

Command	Description
cable downstream dsg chan-list	Associates an A-DSG channel list entry to a downstream channel and includes it in the DCD message on a Cisco CMTS router.
cable downstream dsg dcd-enable	Enables DCD messages to be sent on a downstream channel on a Cisco CMTS router.
cable downstream dsg timer	Associates an A-DSG timer entry to a downstream channel and includes the DCD message on a Cisco CMTS router.
cable downstream dsg vendor-param	Associates A-DSG vendor parameters to a downstream and includes them in the DCD message on a Cisco CMTS router.
cable dsg tunnel	Associates a group of A-DSG tunnels to one or more downstream interfaces on a Cisco CMTS router.

cable downstream dsg timer

To associate an Advanced-mode DOCSIS Set-Top Gateway (A-DSG) timer entry to a downstream channel and include it in the Downstream Channel Descriptor (DCD) message on a Cisco CMTS router, use the **cable downstream dsg timer** command in interface configuration mode. To remove this setting, use the **no** form of this command.

cable downstream dsg timer *timer-index*
no cable downstream dsg timer *timer-index*

Syntax Description

<i>timer-index</i>	Identifier for the DSG timer setting in the index.
--------------------	--

Command Default

The downstream DSG timer is not configured by default.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(13a)BC	This command was introduced to support A-DSG 1.1 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

Global configuration for A-DSG must be complete before configuring interface definitions.

Examples

The following example shows the configuration DSG timers for inclusion in DCD messages on a downstream cable interface on a Cisco CMTS router:

```
interface Cable6/0
 cable downstream dsg timer 3
```

Examples for Cisco cBR Series Converged Broadband Router

This example shows how to associate an A-DSG tunnel group to a MAC domain interface on a Cisco cBR-8 router:

```
Router(config)# interface cable 1/0/0
Router(config-if)# cable downstream dsg timer 1
```

Related Commands

Command	Description
cable downstream dsg chan-list	Associates an A-DSG channel list entry to a downstream channel and include it in the DCD message on a Cisco CMTS router.
cable downstream dsg dcd-enable	Enables DCD messages to be sent on a downstream channel on a Cisco CMTS router.
cable downstream dsg rule	Defines and associates an A-DSG rule to a downstream channel on a Cisco CMTS router.
cable downstream dsg vendor-param	Associates A-DSG vendor parameters to a downstream and includes them in the DCD message on a Cisco CMTS router.

cable downstream dsg vendor-param

To associate Advanced-mode DOCSIS Set-Top Gateway (A-DSG) vendor parameters to a downstream, to be included in the Downstream Channel Descriptor (DCD) message on a Cisco CMTS router, use the **cable downstream dsg vendor-param** command in interface configuration mode. To remove this configuration from a Cisco CMTS router, use the **no** form of this command.

```
cable downstream dsg vendor-param vsif-grp-id
no cable downstream dsg vendor-param vsif-grp-id
```

Syntax Description

<i>vsif-grp-id</i>	Associates a vendor parameter with a group identifier.
--------------------	--

Command Default

This command is not configured by default.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.3(13a)BC	This command was introduced to support A-DSG 1.1 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

Global configuration for A-DSG must be complete before configuring interface definitions.

Examples

The following example shows configuration of A-DSG vendor parameters on a downstream interface, along with several other downstream interface commands on a Cisco CMTS router:

```
interface Cable6/0
 cable downstream dsg dcd-enable
 cable downstream dsg chan-list 2
 cable downstream dsg timer 3
 cable downstream dsg vendor-param 2
 cable downstream dsg rule 1 priority 1 clients 1 tunnel 1
 cable downstream dsg rule 1 vendor-param 1
 cable downstream dsg rule 1 classifiers 1 5
 cable downstream dsg rule 2 priority 1 clients 2 tunnel 2
```

Related Commands

Command	Description
cable downstream dsg chan-list	Associates an A-DSG channel list entry to a downstream channel and include it in the DCD message on a Cisco CMTS router.

Command	Description
cable downstream dsg dcd-enable	Enables DCD messages to be sent on a downstream channel on a Cisco CMTS router.
cable downstream dsg rule	Defines and associates an A-DSG rule to a downstream channel on a Cisco CMTS router.
cable downstream dsg timer	Associates an A-DSG timer entry to a downstream channel and includes the DCD message on a Cisco CMTS router.

cable downstream freq-profile

To set the frequency profile for the cable interface line card, use the **cable downstream freq-profile** command in global configuration mode.

```
cable downstream freq-profile id
```

Syntax Description

Syntax Description *id* Downstream frequency profile ID. 0 to 3 are system defined, 4 to 15 are user defined.

Command Default None

Command Modes Global configuration (config)

Command History

Command History	Release	Modification
	IOS-XE 3.15.0S	This command was introduced on the Cisco eBR Series Converged Broadband Routers.

Usage Guidelines Use this command to set the frequency profile for the cable interface line card.

Examples

The following example shows how to enable the downstream frequency profile configuration:

```
Router# configure terminal
Router(config)# cable downstream freq-profile 4
Router(config-freq-prof)#
```

Related Commands

Command	Description
lane start-freq	Set the start frequency for a specific lane.

cable downstream frequency

To note the downstream center frequency for the cable interface line card to reflect the digital carrier frequency of the downstream radio frequency carrier (the channel) for that downstream port, use the **cable downstream frequency** command in cable interface configuration mode. On cable interfaces with an integrated upconverter, to unset the downstream frequency and to disable the RF output from the integrated upconverter, use the **no** form of this command.

cable downstream frequency *down-freq-hz*
no cable downstream frequency

Syntax Description

<i>down-freq-hz</i>	<p>The known center frequency of the downstream carrier in Hz (the valid range is 55,000,000 to 858,000,000). The usable range depends on whether the downstream is configured for DOCSIS or EuroDOCSIS operations:</p> <ul style="list-style-type: none"> • DOCSIS = 88,000,000 to 855,000,000 MHz • Extended frequency range = 70,000,000 to 855,000,000 MHz • EuroDOCIS = 112,000,000 to 858,000,000 MHz <p>The Cisco IOS supports a superset of these standards, and setting a center frequency to a value outside these limits violates the DOCSIS or EuroDOCSIS standards. Cisco does not guarantee the conformance of the downstream and upconverter outputs when using frequencies outside the DOCSIS or EuroDOCSIS standards.</p>
---------------------	---

Command Default

Disabled. On the Cisco uBR7100 series routers, the default downstream center frequency for the integrated upconverter is 500 MHz.

Command Modes

Interface configuration—cable interface only (config-if)

Command History

Release	Modification
11.3 XA	This command was introduced to support NTSC/DOCSIS Annex B RF operation.
12.0(7)XR2, 12.0(8)SC	Modified to support PAL/SECAM EuroDOCSIS RF operation.
12.1(2)EC1	Supports both Annex A and Annex B.
12.1(5)EC1	Modified to support the integrated upconverter on the Cisco uBR7100 series universal broadband router.
12.2(11)CY, 12.2(11)BC3	Support was added for the Cisco uBR-MC5X20S cable interface line card.
12.2(15)CX	Support was added for the Cisco uBR-MC16U/X and Cisco uBR-MC28U/X cable interface line cards.
12.2(15)BC2	Support was added for the extended frequency range and for the Cisco uBR-MC5X20U cable interface line card. In addition, the command was changed to accept only center frequencies in 250 KHz increments (previously, the command allowed 125 KHz increments).

Release	Modification
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

This command is either optional or required, depending on the cable interface line card being used.

- On the Cisco uBR7100 series routers using the integrated upconverter (the DS0 RF output), and on cable interfaces that support integrated upconverters (such as the Cisco uBR-MC16U, Cisco uBR-MC28U, and Cisco uBR-MC5X20U), this command configures the frequency for the integrated upconverter. The **no** form of this command unsets the frequency and disables the output from the integrated upconverter.
- For cable interfaces that use an external upconverter (such as the Cisco uBR-MC16S and the DS0 (IF) output on Cisco uBR7100 series routers), this command is informational-only, because it does not affect the external upconverter. The external upconverter must be programmed separately with the appropriate center frequency.



Note The **no** form of this command is supported only on the Cisco uBR-MC16U/X, Cisco uBR-MC28U/X, and Cisco uBR-MC5X20S/U cable interface line cards, and on the Cisco uBR7100 series universal broadband router.



Note We recommend configuring this command on all cable interfaces, even those that are using external upconverters. This is because this command is required to enable the downstream frequency override feature and for N+1 line card redundant operation when using SNMP-capable external upconverters.

The downstream frequency of your RF output must be set to match the expected input frequency of your upconverter. To do this, you enter the fixed center frequency of the downstream channel for the downstream port. (You can also select a default that does not set a specific fixed value.) The valid range for a fixed center frequency is 54,000,000 to 858,000,000 Hz. The center frequency is also used to configure an IF-to-RF upconverter that must be installed in your downstream path.

The digital carrier frequency is specified to be the center of a 6.0 MHz channel. For example, EIA channel 95 spans 90.000 to 96.000 MHz. The center frequency is 93.000 MHz, which is the digital carrier frequency that should be configured as the downstream frequency. The typical range for current CATV headends is 88,000,000 to 860,000,000 Hz.

In Cisco IOS software releases before Cisco IOS Release 12.2(15)BC2, the **cable downstream frequency** command allowed the center frequency to be specified in 125 KHz increments. In Cisco IOS Release 12.2(15)BC2 and later releases, this was changed to allow only 250 KHz increments, because of the requirements of the Broadband Processing Engine cable interface line cards that use an internal upconverter (Cisco uBR-MC16U, Cisco uBR-MC28U, and Cisco uBR-MC5X20S/U).



Note DOCSIS allows downstreams to use any center frequency within 88,000,000 to 855,000,000 MHz. However, when most cable modems first come online, they initially start scanning the downstream for the frequencies that are in the NTSC channel plan. If a valid downstream is not found among those frequencies, the cable modems then begin scanning the remaining frequencies. For the fastest and most efficient registration times, we recommend configuring downstreams for the frequencies that are specified in the NTSC channel plan.



Note For cBR Series Converged Broadband Routers, the frequency configuration will be available as a part of the RF channel configuration.

Examples

The following example shows how to set the downstream center frequency display value:

```
Router(config)# interface c6/0
Router(config-if)# cable downstream frequency 96000000
```

Related Commands

Command	Description
cable downstream annex	Sets the MPEG framing format for a downstream port on a cable interface line card to either Annex A (Europe) or Annex B (North America).
cable downstream rf-power	Configures the desired RF output power on the integrated upconverter.
cable downstream rf-shutdown	Enables or disables the RF output from the integrated upconverter.
show controllers cable	Displays status and configuration information for the cable interface. On supported cable interfaces, this includes information about the integrated upconverter.

cable downstream if-output

To activate a downstream port on a cable interface and to generate either a standard modulated signal or a test signal, use the **cable downstream if-output** command in cable interface configuration mode. To disable all signal output on the intermediate frequency (IF) carrier and to shut down the interface, use the **no** form of this command.

cable downstream if-output [**continuous-wave** | **prbs**]
no cable downstream if-output

Syntax Description

continuous-wave	Outputs an unmodulated carrier signal on the downstream, shutting down normal data network operations.
prbs	Outputs a Pseudo Random Bit Stream (PRBS) test signal on the downstream, shutting down normal data network operations.

Command Default

The downstream interface is enabled for normal data use.

Command Modes

Interface configuration—cable interface only (config-if)

Command History

Release	Modification
11.3 XA	This command was introduced.
12.0(7)XR2, 12.0(7)T, 12.0(0)SC, 12.1(2)EC1	This command was modified to support Annex A (EuroDOCSIS) downstreams, and the continuous-wave and prbs options were added.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

Typically, a downstream is configured to output a modulated signal, using the **cable downstream if-output** command, allowing data transmissions to be sent over the HFC cable network. However, this command can also be used to test the cable plant or to shut down the interface completely:

- **cable downstream if-output continuous-wave**—Generates an unmodulated, continuous sine wave on the downstream interface. You can use a spectrum analyzer to verify the frequency, amplitude, and power of the wave. The test signal continues on the downstream until you resume normal modulated operations using the **cable downstream if-output** command.
- **cable downstream if-output prbs**—Generates a PRBS test signal on the downstream interface. You can use a spectrum analyzer to verify the frequency, amplitude, and power of the wave. The test signal continues on the downstream until you resume normal modulated operations using the **cable downstream if-output** command.

- **no cable downstream if-output**—Terminates all signal output and shuts down the downstream interface. The interface remains shut down until you reactive the downstream using the **cable downstream if-output** command.



Note Generating a PRBS or continuous-wave test signal or shutting down the interface automatically stops the modulated carrier data signal and disconnects all CMs on that downstream. These commands should not be used on a live network except as part of troubleshooting major network problems.

Examples

The following example shows how to enable downstream port 0 on a cable interface:

```
Router# configure terminal
Router# interface c6/0
Router(config-if)# cable downstream if-output
```

The following example shows a PRBS test signal being generated on a downstream for a period of time. The downstream is then shut down so that the test engineer can verify that no signal is being sent on the downstream. After the tests have been run, the downstream is reactivated for normal modulated data use:

```
Router# configure terminal
Router# interface c6/0
Router(config-if)# cable downstream if-output prbs
(the signals are verified by a spectrum analyzer...)
Router#(config-if)# no cable downstream if-output
(the downstream is checked to verify no signals are being sent on it...)
Router#(config-if)# cable downstream if-output
Router#(config-if)# exit
```

cable downstream interleave-depth

To set the downstream interleave depth, use the **cable downstream interleave-depth** command in cable interface configuration mode. To restore the default setting, use the **no** form of this command.

```
cable downstream interleave-depth {8 | 16 | 32 | 64 | 128}
no cable downstream interleave-depth
```

Syntax Description	8 16 32 64 128	Indicates the downstream interleave depth in number of rows of codewords.
---------------------------	------------------------	---

Command Default The downstream interleave depth value is 32.

Command Modes Interface configuration—cable interface only (config-if)

Command History

Command History	Release	Modification
	11.3 XA	This command was introduced.
	12.0(7)XR2, 12.(0)SC, 12.1(2)EC1	This command was modified to support Annex A operation (which uses a fixed interleave).
	12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines



Note This command is not supported on the Cisco uBR-MC16E cable interface line card or on the Cisco uBR7111E and Cisco uBR7114E universal broadband routers, because the interleave on the EuroDOCSIS downstream is fixed.

This command sets the minimum latency of the system. A higher interleave depth provides more protection from bursts of noise on the HFC network by spreading out the bits for each codeword over a greater transmission time.

Interleave transmissions do not transmit each codeword by itself, but instead send bits from multiple codewords at the same time, so that a noise burst affects the minimum number of bits per codeword, which allows the Forward Error Correction (FEC) algorithm a greater chance of detecting and correcting any transmission errors.

A higher interleave depth transmits bits from a greater number of codewords, increasing the efficacy of the FEC algorithm. However, a higher depth also increases downstream latency, which might slow TCP/IP

throughput for some configurations, so you need to choose an interleave depth that is appropriate both for your plant's noise levels and application needs.

If your cable plant is experiencing high noise levels, consider increasing the interleave from the default of 32 to 64. For plants with exceptionally high noise levels, increase the interleave to 128 to provide the maximum protection from noise bursts.

Low interleave depth values typically cause some packet loss on typical HFC networks, because burst noise lasts beyond the error correction block correctable length. However, on cable plants with exceptionally low noise levels, Cisco recommends initially using the default value of 32, and then trying an interleave of either 16 or 8 to see if this increases performance without increasing the number of errors that result from noise.

The table below shows interleave characteristics and their relation to each other.



Note The table below does not apply to EuroDOCSIS cable plants because the interleave depth for EuroDOCSIS cable interfaces is fixed.

Table 3: DOCSIS Downstream Cable Interleave Descriptions

I (Number of Taps)	J (Increment)	Burst Protection 64-QAM/256 QAM	Latency 64-QAM/256 QAM
8	16	5.9 microseconds/4.1 milliseconds	0.22 ms/0.15 ms
16	8	12 microseconds/8.2 milliseconds	0.48 ms/0.33 ms
32	4	24 microseconds/16 milliseconds	0.98 ms/0.68 ms
64	2	47 microseconds/33 milliseconds	2.0 ms/1.4 ms
128	1	95 microseconds/66 milliseconds	4.0 ms/2.8 ms



Tip Changing the interleave depth affects the PHY layer on the downstream and disconnects all online CMs. For this reason, if you are using N+1 HCCP redundancy, you should configure this command on both the Protect and Working interfaces, so that the PHY layer is properly configured before a switchover occurs. Otherwise, online CMs could be disconnected when a switchover occurs. (This also applies to the **cable downstream annex** and **cable downstream modulation** commands.)

Examples

The following example shows how to configure the downstream interleave depth to 128 microseconds:

```
Router# configure terminal
Router(config)# interface cable 3/0
Router(config-if)# cable downstream interleave-depth 128
```

cable downstream modulation

To set the modulation format for a downstream port on a cable interface line card, use the **cable downstream modulation** command in cable interface configuration mode.

```
cable downstream modulation {64qam | 256qam}
```

Syntax Description

Syntax Description

64qam Modulation rate is 6 bits per downstream symbol.

256qam Modulation rate is 8 bits per downstream symbol.

Command Default

The default modulation for Cisco RF Gateway 10 is 64 QAM.

Command Modes

Interface configuration—cable interface only (config-if)

Command History

Command History

Release	Modification
11.3 XA	This command was introduced.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

Downstream modulation defines the speed in bits per second at which data travels downstream to the subscriber's CM. A symbol is the basic unit of modulation. QPSK encodes 2 bits per symbol, 16-QAM encodes 4 bits per symbol, 64-QAM encodes 6 bits per symbol, and 256-QAM encodes 8 bits per symbol.



Note Setting a downstream modulation format of 256-QAM requires approximately a 6-dB higher signal-to-noise ratio (SNR) than 64-QAM at the subscriber's cable modem. If your network is marginal or unreliable at 256-QAM, use the 64-QAM format instead.



Tip Changing the modulation format affects the PHY layer on the downstream and disconnects all online CMs. For this reason, if you are using N+1 HCCP redundancy, you should configure this command on both the Protect and Working interfaces, so that the PHY layer is properly configured before a switchover occurs. Otherwise, online CMs could be disconnected when a switchover occurs. (This also applies to the **cable downstream annex** and **cable downstream interleave-depth** commands.)

Examples

The following example shows how to set the downstream modulation to 256-QAM:

```
Router# configure terminal  
Router(config)# interface cable 3/0  
Router(config-if)# cable downstream modulation 256qam
```

cable downstream ofdm-chan-profile

To define the OFDM channel profile on the OFDM channel, use the **cable downstream ofdm-chan-profile** command in global configuration mode. To remove the profile, use **no** form of this command.

cable downstream ofdm-chan-profile *id*

no cable downstream ofdm-chan-profile *id*

Syntax Description

Syntax Description *id* Downstream OFDM modulation profile ID. Valid range is from 20 to 255.

Command Default

None

Command Modes

Global configuration (config)

Command History

Command History	Release	Modification
	IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

Use this command to define the OFDM channel profile for the OFDM channel.

Examples

The following example shows how to enable the OFDM channel profile configuration:

```
Router# configure terminal
Router(config)# cable downstream ofdm-chan-profile 21
Router(config-ofdm-chan-prof)#
```

Related Commands

Command	Description
cyclic-prefix	Specify the channel cyclic-prefix.
description (OFDM channel profile)	Specify a user defined description for the profile.
interleaver-depth	Specify the channel interleaver-depth.
pilot-scaling	Specify the value used to calculate the number of continuous pilots.
profile-control	Specify default modulation or profile as the channel control profile.
profile-data	Specify default modulation or profile as the channel data profile.
profile-ncp	Specify default modulation or profile as the channel ncp profile.
roll-off	Specify the channel roll-off value.

Command	Description
subcarrier-spacing	Specify the spacing for specific subcarriers configured in this profile.
show cable ofdm-chan-profiles	Verify the OFDM channel profile configuration.

cable downstream ofdm-flow-to-profile

To override the profile selection logic, use the **cable downstream ofdm-flow-to-profile** command in global configuration mode.

Cisco cBR-8 Converged Broadband Router

cable downstream ofdm-flow-to-profile [**interface Integrated-Cable** *slot/subslot/port:chan*]**profile-data** *profile ID* **mac-address** *cable-modem-mac*

Syntax Description	<i>profile ID</i>	Data profile identifier.
	<i>cable-modem-mac</i>	MAC address of the cable modem.
	slot/subslot/port:chan	Specifies the OFDM channel.
Command Default	None	
Command Modes	Global configuration (config)	
Command History		
Command History	Release	Modification
	IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.
	Cisco IOS XE Everest 16.6.1	This command was modified on the Cisco cBR Series Converged Broadband Routers. The interface integrated-Cable keyword was added.

Usage Guidelines

When this command is configured, all the service flows on the cable modem, identified by its MAC address, are mapped to the specified data profile. With the Interface option, profile override can be specified for a particular downstream OFDM channel. Thus with two OFDM downstream channels on a single CM, each channel can have a unique profile override. When the ofdm-flow-to-profile override is configured and no OFDM channel is specified, the profile Id will apply to all OFDM channels in use on the cable modem.

Examples

The following example shows how to override the selection logic:

```
Router(config)# cable downstream ofdm-flow-to-profile profile-data 2 mac-address
fc52.8d5e.9e55
```

Once this command is configured, all the service flows on the cable modem whose MAC address is fc52.8d5e.9e55, are mapped to the profile ID 2.

The following example shows how to override the selection logic on a specific channel.

```
Router(config)# cable downstream ofdm-flow-to-profile interface integrated-Cable 1/0/0:158
profile-data 3 mac-address 4800.33ea.7012
```

```
Router(config)# cable downstream ofdm-flow-to-profile interface integrated-Cable 1/0/0:159
profile-data 2 mac-address 4800.33ea.7012
```

Related Commands	Command	Description
	cable downstream ofdm-prof-mgmt unfit-profile-age <i>age</i>	Configure the unfit profile age.
	cable downstream ofdm-prof-mgmt recommend-profile-age <i>age</i>	Configure the recommended profile age.
	cable downstream ofdm-prof-mgmt rxmer-poll-interval <i>interval</i>	Configure the RxMER poll interval.
	cable downstream ofdm-prof-mgmt exempt-sc-pct <i>percent</i>	Configure the percentage of subcarriers that can be exempted from bit loading comparison.
	no cable downstream ofdm-prof-mgmt prof-dwngrd-auto	Disable the automatic profile downgrade upon CM status event 16.
	cable downstream ofdm-prof-mgmt mer-margin-qdb <i>quarter-decibel</i>	Configure the offset.

cable downstream ofdm-modulation-profile

To define the OFDM modulation profile on the OFDM channel, use the **cable downstream ofdm-modulation-profile** command in global configuration mode. To remove the profile, use **no** form of this command.

cable downstream ofdm-modulation-profile *id*

no cable downstream ofdm-modulation-profile *id*

Syntax Description

Syntax Description

id Downstream OFDM modulation profile ID. Valid range is from 8 to 255.

Command Default

None

Command Modes

Global configuration (config)

Command History

Command History

Release	Modification
IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

Use this command to define the OFDM modulation profile for the OFDM channel.

Examples

The following example shows how to enable the OFDM modulation profile configuration:

```
Router# configure terminal
Router(config)# cable downstream ofdm-modulation-profile 21
Router(config-ofdm-mod-prof)#
```

Related Commands

Command	Description
assign	Assign modulations to subcarriers.
description (OFDM modulation profile)	Specify a user defined description for the profile up to 64 characters.
start-frequency	(Optional) Specify the starting frequency associated with the first configurable subcarrier in the profile determined by the width.
subcarrier-spacing	Specify the spacing for specific subcarriers configured in this profile.
width	Specify width of profile in Hz.
show cable ofdm-modulation-profiles	Verify the OFDM modulation profile configuration.

cable downstream ofdm-power-profile

To configure an OFDM Power Profile on a DOCSIS 3.1 system, use the **cable downstream ofdm-power-profile** command in the global configuration mode.

cable downstream ofdm-power-profile *{profile_id}*

Syntax Description	<p><i>profile_id</i> Specify a global power profile ID. You can define up to 64 OFDM power profiles with IDs from 1 to 64.</p> <p>This profile ID is used to apply the power profile to an OFDM channel in a controller-integrated cable OFDM channel configuration. You can apply a single OFDM power profile to multiple OFDM channels.</p>	
Command Default	None	
Command Modes	Global configuration (config)	
Command History	Release	Modification
	Cisco IOS-XE Release 16.5.1	This command was introduced on the Cisco cBR Series Converged Broadband Routers.
Usage Guidelines	Use this command to apply a power profile to an OFDM channel on the Cisco cBR Series Converged Broadband Router.	

The following example shows how to configure an OFDM power profile:

```
Router# configure terminal
Router(config)# cable downstream ofdm-power-profile 3
power-adjust-default 0.0
power-tilt-linear 3.5
band-index 0
power-adjust 4.0

controller Integrated-Cable 3/0/0
...
  rf-chan 158
    power-profile 3
```

Related Commands	Command	Description
	power-adjust-default	<p>Specifies the default power level value applied to bands that are not configured using other means. This value is also the starting power level for band 0 when a linear power-tilt is configured.</p> <p>The value is specified in dB. The valid range is limited by integrated-controllers in which the ofdm-power-profile is configured. The range remains between -9 and +8 dB.</p>

Command	Description
power-tilt-linear	<p>Specifies the amount of linear tilt that is corrected across the OFDM channel. The power tilt is applied from the band value 0, specified by the <code>power-adjust-default</code> value, to the last band value, specified by the <code>power-tilt-linear</code> value.</p> <p>Each band in-between is set to a power level based on the linear interpolation between these two values (to the nearest 1/10th dB).</p> <p>The integrated-cable controllers in which the OFDM power profile is configured limits the valid range for <code>power-tilt-linear</code>. The range remains between -9 dB and +8 dB.</p>
band-index	Specifies a particular band or sequence of bands.
power-adjust	Specifies a power-level override for the current <code>band-index</code> range. Each band is set to the specified value. This command takes precedence over the <code>power-tilt-linear</code> values.
ofdm-channel-width	<p>Specifies the channel width of the OFDM power profile in hertz (Hz).</p> <p>This width should match the OFDM channel width as configured in the integrated-cable (IC) controller OFDM channels.</p> <p>If the channel width of the OFDM power profile is larger than the IC controller OFDM channel width, the system allows configurations. However, it does not use all band settings of the 6 MHz bands of the power-profile.</p> <p>If the channel width of the OFDM power profile is smaller than the IC controller OFDM channel width, configuring the OFDM power profile in the IC controller OFDM channel is not allowed.</p>
controller Integrated-Cable <i>{slot}/{subslot}/{port}</i> rf-channel <i>{158 - 162 }</i> power-profile <i>{ofdm-power-profile-id}</i>	The <i>{ofdm-power-profile-id}</i> specifies the global OFDM power profile that is applied to the OFDM channel of this controller.

cable downstream ofdm-prof-mgmt exempt-sc-pct

To configure a percentage of subcarriers that can be exempted from bit loading comparison, use the **cable downstream ofdm-prof-mgmt exempt-sc-pct** *percent* command in global configuration mode.

Cisco cBR-8 Converged Broadband Router

cable downstream ofdm-prof-mgmt exempt-sc-pct *percent*

Syntax Description	<i>percent</i>	Percentage of subcarriers that can be exempted from bit loading comparison. The valid range is from 0 to 100 percent.
Command Default	2 percent	
Command Modes	Global configuration (config)	
Command History		
Command History	Release	Modification
	IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.
Usage Guidelines	The configured percentage value is used while comparing a modem's desired bit loading values (derived from its RxMER) to the profiles. It is also used while comparing profiles to determine their ordering.	
Examples	<p>The following example shows how to configure the percentage of subcarriers that can be exempted from bit loading comparison:</p> <pre>Router(config)# cable downstream ofdm-prof-mgmt exempt-sc-pct 20</pre>	
Related Commands	Command	Description
	cable downstream ofdm-prof-mgmt unfit-profile-age <i>age</i>	Configure the unfit profile age.
	cable downstream ofdm-prof-mgmt recommend-profile-age <i>age</i>	Configure the recommended profile age.
	cable downstream ofdm-prof-mgmt rxmer-poll-interval <i>interval</i>	Configure the RxMER poll interval.
	cable downstream ofdm-prof-mgmt mer-margin-qdb <i>quarter-decibel</i>	Configure the offset.
	no cable downstream ofdm-prof-mgmt prof-dwngrd-auto	Disable the automatic profile downgrade upon CM status event 16.
	cable downstream ofdm-flow-to-profile profile-data <i>profile ID mac-address cable-modem-mac</i>	Override the selection logic.

cable downstream ofdm-prof-mgmt mer-margin-qdb

To configure the offset in quarter-decibel (DB), when RxMER is mapped to the ideal bit loading, use the **cable downstream ofdm-prof-mgmt mer-margin-qdb** command in global configuration mode.

Cisco cBR-8 Converged Broadband Router

cable downstream ofdm-prof-mgmt mer-margin-qdb *quarter-decibel*

Syntax Description	<i>quarter-decibel</i> Quarter-decibel to configure the offset. The valid value is from 0 to 40 quarter-DB.														
Command Default	0 quarter-DB														
Command Modes	Global configuration (config)														
Command History															
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>IOS-XE 3.18.0SP</td> <td>This command was introduced on the Cisco cBR Series Converged Broadband Routers.</td> </tr> </tbody> </table>	Release	Modification	IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.										
Release	Modification														
IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.														
Usage Guidelines	This value is used to control the aggressiveness in mapping RxMER values to the desired bit loading values by a CM. The configured offset value is added to the RxMER before using the default RxMER to bit loading mapping table published in DOCSIS 3.1 OSSI.														
Examples	<p>The following example shows how to configure the offset:</p> <pre>Router(config)# cable downstream ofdm-prof-mgmt mer-margin-qdb 20</pre>														
Related Commands	<table border="1"> <thead> <tr> <th>Command</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>cable downstream ofdm-prof-mgmt unfit-profile-age <i>age</i></td> <td>Configure the unfit profile age.</td> </tr> <tr> <td>cable downstream ofdm-prof-mgmt recommend-profile-age <i>age</i></td> <td>Configure the recommended profile age.</td> </tr> <tr> <td>cable downstream ofdm-prof-mgmt rxmer-poll-interval <i>interval</i></td> <td>Configure the RxMER poll interval.</td> </tr> <tr> <td>cable downstream ofdm-prof-mgmt exempt-sc-pct <i>percent</i></td> <td>Configure the percentage of subcarriers that can be exempted from bit loading comparison.</td> </tr> <tr> <td>no cable downstream ofdm-prof-mgmt prof-dwngrd-auto</td> <td>Disable the automatic profile downgrade upon CM status event 16.</td> </tr> <tr> <td>cable downstream ofdm-flow-to-profile profile-data <i>profile ID mac-address cable-modem-mac</i></td> <td>Override the selection logic.</td> </tr> </tbody> </table>	Command	Description	cable downstream ofdm-prof-mgmt unfit-profile-age <i>age</i>	Configure the unfit profile age.	cable downstream ofdm-prof-mgmt recommend-profile-age <i>age</i>	Configure the recommended profile age.	cable downstream ofdm-prof-mgmt rxmer-poll-interval <i>interval</i>	Configure the RxMER poll interval.	cable downstream ofdm-prof-mgmt exempt-sc-pct <i>percent</i>	Configure the percentage of subcarriers that can be exempted from bit loading comparison.	no cable downstream ofdm-prof-mgmt prof-dwngrd-auto	Disable the automatic profile downgrade upon CM status event 16.	cable downstream ofdm-flow-to-profile profile-data <i>profile ID mac-address cable-modem-mac</i>	Override the selection logic.
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cable downstream ofdm-prof-mgmt unfit-profile-age <i>age</i>	Configure the unfit profile age.														
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cable downstream ofdm-prof-mgmt rxmer-poll-interval <i>interval</i>	Configure the RxMER poll interval.														
cable downstream ofdm-prof-mgmt exempt-sc-pct <i>percent</i>	Configure the percentage of subcarriers that can be exempted from bit loading comparison.														
no cable downstream ofdm-prof-mgmt prof-dwngrd-auto	Disable the automatic profile downgrade upon CM status event 16.														
cable downstream ofdm-flow-to-profile profile-data <i>profile ID mac-address cable-modem-mac</i>	Override the selection logic.														

cable downstream ofdm-prof-mgmt prof-dwngrd-auto

To disable the automatic profile downgrade upon CM-status event 16, use the **no cable downstream ofdm-prof-mgmt prof-dwngrd-auto** command in global configuration mode.

Cisco cBR-8 Converged Broadband Router
no cable downstream ofdm-prof-mgmt prof-dwngrd-auto

Command Default

The automatic profile downgrade upon CM-status event 16 is enabled by default.

Command Modes

Global configuration (config)

Command History

Command History

Release	Modification
IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Examples

The following example shows how to disable the automatic profile downgrade upon CM-status event 16:

```
Router(config)# no cable downstream ofdm-prof-mgmt prof-dwngrd-auto
```

Related Commands

Command	Description
cable downstream ofdm-prof-mgmt unfit-profile-age <i>age</i>	Configure the unfit profile age.
cable downstream ofdm-prof-mgmt recommend-profile-age <i>age</i>	Configure the recommended profile age.
cable downstream ofdm-prof-mgmt rxmer-poll-interval <i>interval</i>	Configure the RxMER poll interval.
cable downstream ofdm-prof-mgmt exempt-sc-pct <i>percent</i>	Configure the percentage of subcarriers that can be exempted from bit loading comparison.
cable downstream ofdm-prof-mgmt mer-margin-qdb <i>quarter-decibel</i>	Configure the offset.
cable downstream ofdm-flow-to-profile profile-data <i>profile ID mac-address cable-modem-mac</i>	Override the selection logic.

cable downstream ofdm-prof-mgmt prof-order-method

To configure the type of OFDM Profile Downgrade method **cable downstream ofdm-prof-mgmt prof-order-method** command in global configuration mode. Using the **no cable downstream ofdm-prof-mgmt prof-order-method** command, configures the default option (**bit-loading**).

Cisco cBR-8 Converged Broadband Router

cable downstream ofdm-prof-mgmt prof-order-method { **bit-loading** | **capacity** }

no cable downstream ofdm-prof-mgmt prof-order-method

Syntax Description	bit-loading	Legacy method of profile downgrade.
	capacity	Configure this option if you wish to downgrade the profile based on the capacity. This option does not skip any good profiles.

Command Default The **bit-loading** option is configured by default.

Command Modes Global configuration (config)

Command History

Command History	Release	Modification
	Cisco IOS XE Dublin 17.12.1z	This command is introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines The following example shows how to configure the **capacity** method of downgrading OFDM profiles.

```
Router(config)# cable downstream ofdm-prof-mgmt prof-order-method capacity
```

Related Commands	Command	Description
	cable downstream ofdm-prof-mgmt recommend-profile-age <i>age</i>	Configure the recommended profile age.

cable downstream ofdm-prof-mgmt prof-upgrade-pma

To enable the external profile management application (PMA), use the **cable downstream ofdm-prof-mgmt prof-upgrade-pma** command in global configuration mode. This will disable internal PMA. To disable external PMA, use **no** form of this command. This will enable internal PMA.

Cisco cBR-8 Converged Broadband Router
cable downstream ofdm-prof-mgmt prof-upgrade-pma

Command Modes

Global configuration (config)

Command History

Command History

Release	Modification
IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Examples

The following example shows how to disable the PMA:

```
Router(config)# cable downstream ofdm-prof-mgmt prof-upgrade-pma
```

Related Commands

Command	Description
cable downstream ofdm-prof-mgmt unfit-profile-age <i>age</i>	Configure the unfit profile age.
cable downstream ofdm-prof-mgmt recommend-profile-age <i>age</i>	Configure the recommended profile age.
cable downstream ofdm-prof-mgmt rxmer-poll-interval <i>interval</i>	Configure the RxMER poll interval.
cable downstream ofdm-prof-mgmt exempt-sc-pct <i>percent</i>	Configure the percentage of subcarriers that can be exempted from bit loading comparison.
cable downstream ofdm-prof-mgmt mer-margin-qdb <i>quarter-decibel</i>	Configure the offset.
cable downstream ofdm-flow-to-profile profile-data <i>profile ID mac-address cable-modem-mac</i>	Override the selection logic.
no cable downstream ofdm-prof-mgmt prof-dwngrd-auto	Disable the automatic profile downgrade upon CM status event 16.

cable downstream ofdm-prof-mgmt recommend-profile-age

To configure the recommended profile age, use the **cable downstream ofdm-prof-mgmt recommend-profile-age** command in global configuration mode.

Cisco cBR-8 Converged Broadband Router

cable downstream ofdm-prof-mgmt recommend-profile-age *age*

Syntax Description

<i>age</i>	Recommended profile age in minutes. The valid range is from 5 to 1440 minutes.
------------	--

Command Default

120 minutes

Command Modes

Global configuration (config)

Command History

Command History

Release	Modification
IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

If the recommended profile for a cable modem exceeds this age, that profile is no longer valid.

Examples

The following example shows how to configure the recommended profile age:

```
Router(config)# cable downstream ofdm-prof-mgmt recommend-profile-age 20
```

Related Commands

Command	Description
cable downstream ofdm-prof-mgmt unfit-profile-age <i>age</i>	Configure the unfit profile age.
cable downstream ofdm-prof-mgmt rxmer-poll-interval <i>interval</i>	Configure the RxMER polling interval.
cable downstream ofdm-prof-mgmt exempt-sc-pct <i>percent</i>	Configure the percentage of subcarriers that can be exempted from bit loading comparison.
cable downstream ofdm-prof-mgmt mer-margin-qdb <i>quarter-decibel</i>	Configure the offset.
no cable downstream ofdm-prof-mgmt prof-dwngrd-auto	Disable the automatic profile downgrade upon CM status event 16.
cable downstream ofdm-flow-to-profile profile-data <i>profile ID mac-address cable-modem-mac</i>	Override the selection logic.

cable downstream ofdm-prof-mgmt rxmer-poll-interval

To configure the Receive Modulation Error Ratio (RxMER) poll interval, use the **cable downstream ofdm-prof-mgmt rxmer-poll-interval** command in global configuration mode.

Cisco cBR-8 Converged Broadband Router

cable downstream ofdm-prof-mgmt rxmer-poll-interval *interval*

Syntax Description

<i>interval</i>	RxMER poll interval in minutes. The valid range is from 5 to 1440 minutes.
-----------------	--

Command Default

60 minutes

Command Modes

Global configuration (config)

Command History

Command History

Release	Modification
IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

The CMTS uses OPT message with bit-0 option to collect RxMER data from CMs, after the initial CM registration and periodically thereafter. The RxMER collection period or the poll interval is configurable. The collected RxMER data is used to compute the recommended profile for each CM.

Examples

The following example shows how to configure the RxMER poll interval:

```
Router(config)# cable downstream ofdm-prof-mgmt rxmer-poll-interval 20
```

Related Commands

Command	Description
cable downstream ofdm-prof-mgmt unfit-profile-age <i>age</i>	Configure the unfit profile age.
cable downstream ofdm-prof-mgmt recommend-profile-age <i>age</i>	Configure the recommended profile age.
cable downstream ofdm-prof-mgmt exempt-sc-pct <i>percent</i>	Configure the percentage of subcarriers that can be exempted from bit loading comparison.
cable downstream ofdm-prof-mgmt mer-margin-qdb <i>quarter-decibel</i>	Configure the offset.
no cable downstream ofdm-prof-mgmt prof-dwngrd-auto	Disable the automatic profile downgrade upon CM status event 16.
cable downstream ofdm-flow-to-profile profile-data <i>profile ID mac-address cable-modem-mac</i>	Override the selection logic.

cable downstream ofdm-prof-mgmt unfit-profile-age

To configure the unfit profile age, use the **cable downstream ofdm-prof-mgmt unfit-profile-age** command in global configuration mode. Using the **no cable downstream ofdm-prof-mgmt unfit-profile-age** command reverts to the default **unfit-profile-age** configuration of 60 minutes.

Cisco cBR-8 Converged Broadband Router

cable downstream ofdm-prof-mgmt unfit-profile-age { *age* | **disable** }

no cable downstream ofdm-prof-mgmt unfit-profile-age

Syntax Description

<i>age</i>	Unfit profile age in minutes. The valid range is 5–1440 minutes.
disable	Disable OFDM Unfit Profile aging. This is equivalent to an infinite timer.

Command Default

60 minutes

Command Modes

Global configuration (config)

Command History

Command History

Release	Modification
IOS-XE 3.18.0SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.
Cisco IOS XE Dublin 17.12.1z	The disable option is introduced.

Usage Guidelines

If the unfit profile for a cable modem exceeds this age, the profile is no longer considered unfit for that CM.

Examples

The following example shows how to configure the unfit profile age:

```
Router(config)# cable downstream ofdm-prof-mgmt unfit-profile-age 20
```

Examples

The following example shows you how to disable OFDM Unfit Profile aging (Cisco IOS XE Dublin 17.12.1z and later):

```
Router(config)# cable downstream ofdm-prof-mgmt unfit-profile-age disable
```

Related Commands

Command	Description
cable downstream ofdm-prof-mgmt recommend-profile-age <i>age</i>	Configure the recommended profile age.
cable downstream ofdm-prof-mgmt rxmer-poll-interval <i>interval</i>	Configure the RxMER poll interval.

Command	Description
cable downstream ofdm-prof-mgmt exempt-sc-pct <i>percent</i>	Configure the percentage of subcarriers that can be exempted from bit loading comparison.
cable downstream ofdm-prof-mgmt mer-margin-qdb <i>quarter-decibel</i>	Configure the offset.
no cable downstream ofdm-prof-mgmt prof-dwngrd-auto	Disable the automatic profile downgrade upon CM status event 16.
cable downstream ofdm-flow-to-profile profile-data <i>profile ID mac-address cable-modem-mac</i>	Override the selection logic.

cable downstream override

To enable cable downstream frequency override, use the **cable downstream override** command in cable interface configuration mode. To disable the override feature, use the **no** form of this command.

cable downstream override
no cable downstream override

Syntax Description

This command has no keywords or arguments.

Command Default

Cable downstream frequency override is enabled by default.

Command Modes

Interface configuration—cable interface only (config-if)
 MAC domain profile configuration (config-profile-md)

Command History

Release	Modification
12.0(13)SC	This command was introduced.
12.1(5)EC1	This command was integrated into Cisco IOS Release 12.1(5)EC1.
12.1(6) and 12.1(6)T	This command was integrated into Cisco IOS Release 12.1(6) and Cisco IOS Release 12.1(6)T.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

This command is never needed for normal operations, because downstream frequency override is enabled by default for DOCSIS operations. However, this command can be used to disable the frequency override feature for test and lab use, so as to force the CMTS on that interface to use a particular downstream frequency, regardless of the signal quality.



Note Because frequency override is enabled by default, this command does not appear as part of a cable interface's configuration section in the Cisco CMTS router configuration file unless the **no cable downstream override** command has been given.

Examples

The following example shows how to disable the downstream frequency override feature on a particular cable interface:

```
Router# configure terminal
Router(config)# interface cable 6/0
Router(config-if)# no cable downstream override
```

```
Router(config-if)# exit
```

Examples for Cisco cBR Series Converged Broadband Router

This example shows how to disable the downstream frequency override feature on a particular cable interface:

```
Router# configure terminal
Router(config)# interface cable 1/0/0
Router(config-if)# no cable downstream override
Router(config-if)# exit
```

Use the **show running-config | include override** to see the disabled status of the command:

```
Router#show running-config | include override
no cable downstream override
Router#
```

cable downstream power-down-2nd-module

To reduce power consumption on Cisco cBR-8 by powering down the second PHY module on the CCAP line card, use the **cabledownstreampower-down-2nd-module slot** command in global configuration mode.

cable downstream power-down-2nd-module slot

Command Default None.

Command Modes Global configuration (config).

Command History	Release	Modification
	Cisco IOS XE Fuji 16.9.1	This command was introduced on the Cisco cBR Series Converged Broadband Router.

Examples

The following example shows how to set up the power saving configuration.

```
Router# configure terminal
Router(config)# cable downstream power-down-2nd-module slot 1
```

cable downstream qam-profile

To set the QAM profile for the cable interface line card, use the **cable downstream qam-profile** command in global configuration mode.

cable downstream qam-profile *id*

Syntax Description

Syntax Description *id* Downstream QAM profile ID. 0 to 3 are system defined, 4 to 31 are user defined.

Command Default

None

Command Modes

Global configuration (config)

Command History

Command History

Release	Modification
IOS-XE 3.15.0S	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

Use this command to set the QAM profile for the cable interface line card.

Examples

The following example shows how to enable the downstream QAM profile configuration:

```
Router# configure terminal
Router(config)# cable downstream qam-profile 4
Router(config-qam-prof)#
```

Related Commands

Command	Description
annex	Set the MPEG framing format.
interleaver-depth	Set the interleaver-depth.
modulation	Set the QAM modulation format.
spectrum-inversion	Set the spectrum-inversion on or off.
symbol-rate	Set the symbol rate.

cable downstream qos wfq weight

To specify custom DOCSIS priority to excess ratio mappings for downstream service flows, use the **cable downstream qos wfq weight** command in cable interface configuration mode. Use the **no** form of this command to revert to the default mappings.

cable downstream qos wfq weights *weight1...weight8*
no cable downstream qos wfq weights

Syntax Description	<p>weights <i>weight</i></p> <p>Specifies the custom excess ratios for 8 priorities.</p> <ul style="list-style-type: none"> <i>weight1...weight8</i> —Custom weight. Valid values range from 1 to 100.
---------------------------	--

Command Default DOCSIS priority to excess ratio mapping is used.

Command Modes Interface configuration (config-if)

Command History	Release	Modification
	12.2(33)SCC	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines This command configures custom DOCSIS priority to excess ratio mappings for downstream service flows.

Examples

This example shows how to configure custom DOCSIS priority to excess ratio mappings for downstream service flows on a cable interface of Cisco uBR series router:

```
Router# configure terminal
Router(config)# interface cable 8/0/0
Router(config-if)# cable downstream qos wfq weights 10 20 30 40 50 60 70 80
```

Examples for Cisco cBR Series Converged Broadband Router

This example shows the configuration of QoS WFG weights on the wideband cable interface of a Cisco cBR-8 router:

```
Router(config)#interface wideband-Cable 1/0/0:0
Router(config-if)#cable downstream qos wfq weights 10 20 30 40 50 60 70 80
```

This example shows the configuration on integrated cable interface of a Cisco cBR-8 router:

```
Router(config)#interface integrated-Cable 1/0/0:1
```

```
Router(config-if)#cable downstream qos wfq weights 10 20 30 40 50 60 70 80
```

Related Commands

Command	Description
show cr10k-rp queue	Displays the queue parameters associated with downstream service flow queues (including the excess ratio). (This command is not supported in Cisco cBR-8 routers.)
show running-config interface cable	Displays the configuration for the specified cable interface on a Cisco uBR series router.
show running-config interface [wideband-Cable integrated-Cable	Displays the configuration for the specified cable interface on a Cisco cBR-8 router.

cable downstream rate-limit



Note Effective with Cisco IOS Release 12.2(33)SCF, the **cable downstream rate-limit** command is not supported for Cisco uBR-MC88U line card in Cisco IOS software.

To enable DOCSIS rate limiting on downstream traffic, use the **cable downstream rate-limit** command in cable interface configuration mode. To disable DOCSIS rate limiting on downstream traffic, use the **no** form of this command.

cable downstream rate-limit [**token-bucket** [[**shaping** [**granularity** *msec* | **max-delay** *msec*]] | **weighted-discard**]] [*exp-weight*]
no cable downstream rate-limit

Syntax Description

token-bucket	(Optional) Specifies the token-bucket filter algorithm, which enforces an average long-term transmission rate while permitting occasional bursts.
shaping	(Optional in Release 12.1 EC, Required in Release 12.2 BC) Enables rate limiting on the downstream port using the token-bucket policing algorithm with default traffic shaping parameters.
granularity <i>msec</i>	(Optional) Specifies traffic shaping granularity in milliseconds. Valid values are 1, 2, 4, 8, or 16 milliseconds.
max-delay <i>msec</i>	(Optional) Specifies the maximum traffic-shaping buffering delay in milliseconds. Valid values are 128, 256, 512, or 1028 milliseconds. As a general guideline, the lower the downstream rates, the higher the delay should be to ensure full use of the bandwidth.
weighted-discard	(Optional) Specifies the weighted discard algorithm.
<i>exp-weight</i>	(Optional) Specifies the weight for the exponential moving average of loss rate. Valid values are from 1 to 4.

Command Default

In Cisco IOS Release 12.1 EC and earlier releases, the system defaults to monitoring the traffic to and from each CM over each 1-second period, and if the CM exceeds its bandwidth quota for that second, the CMTS router drops packets for the rest of the second (**no cable downstream rate-limit**).

In Cisco IOS Release 12.2 BC and later releases, the **token-bucket** and **shaping** keywords are on by default, and the **max-delay** option is set to 128 milliseconds (**cable downstream rate-limit token-bucket shaping max-delay 128**).



Note In Cisco IOS Release 12.2 BC, do not use the **cable downstream rate-limit token** command without specifying the **shaping** option, because this results in packet drops.

Command Modes

Interface configuration—cable interface only (config-if)

Command History

Release	Modification
11.3(6) NA	This command was introduced.
12.0(4)XI, 12.0(5)T1, 12.1(1)EC1	The shaping keyword was added.
12.2(4)BC1	Support was added to the 12.2 BC train, and the defaults were changed so that the shaping keyword is on by default, to accommodate DOCSIS 1.1 requirements.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
12.2(33)SCF	This command does not support Cisco uBR-MC88U line card in Cisco IOS software.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

The **cable downstream rate-limit** command specifies the type of DOCSIS rate limiting that the CMTS router imposes on downstream traffic that is sent to the CMs. When rate-limiting is enabled, traffic to the CM is examined to ensure it will not exceed the limit set for the CM.

For DOCSIS networks, the best rate limiting algorithm combines the **token-bucket** and **shaping** to use keywords, which is optimized for relatively steady data rates, such as are used for web browser, without allowing the user to exceed the maximum allowable download rate that is specified in the DOCSIS configuration file.



Note The **token-bucket** and **shaping** options are the default in Cisco IOS Release 12.2 BC and should not be changed. If using a 64 kbps downstream rate, you can avoid a performance impact by turning off the **shaping** option, but this is not recommended for DOCSIS 1.1 operation because it can result in erratic traffic patterns and packet drops on the downstream.

If a packet would exceed the traffic limits for a CM, the CMTS router will buffer the packet, up to the maximum delay time given by the **max-delay** option, so that the traffic can be sent at a later time when it would not violate the maximum downstream traffic limits. If the packet is still too large, or if the volume of traffic consistently exceeds the traffic limits, even after the delay, the CMTS router begins dropping packets.

The default behavior of the **cable downstream rate-limit** command was changed in Cisco IOS Release 12.2 BC to accommodate the different requirements of DOCSIS 1.1 operation (which requires the use of the token-bucket rate-limiting algorithm). This default is optimized for downstream traffic rates that are higher than 84 kbps.

If you are using a 64 kbps downstream traffic rate on a Cisco CMTS router that is running Cisco IOS Release 12.2 BC, you should set the **max-delay** option to 256 milliseconds to avoid a performance impact on TCP/IP traffic that uses packets larger than 1024 bytes (such as FTP or HTTP web traffic). Alternatively, you can set the **max-burst** option on the **cable service class** command to 3044, which is two packets of the minimum size for DOCSIS 1.1 networks.

Understanding the max-delay and granularity Options

The Cisco CMTS router uses a calendar-queuing system to process the packets being shaped. The calendar queue is a time wheel that is as big as the value specified by the **max-delay** option (128, 256, 512, or 1028 milliseconds), and is divided into “buckets” of the size specified by the **granularity** option (1, 2, 4, 8, or 16 milliseconds).

The number of buckets depends on both the **max-delay** and **granularity** options. For example, if the **max-delay** option is set to 256 milliseconds, and the **granularity** option is set to 4 milliseconds, the calendar queue contains 256/4, or 64, buckets, where a new bucket is processed every 4 milliseconds.

When the Cisco CMTS router adds a shaped packet to the queue, it adds the packet into the bucket that corresponds to the deadline by which the packet must be processed. At the end of every granularity time period, the Cisco CMTS router processes the packets that are in the corresponding bucket.

Decreasing the **max-delay** value increases how often the packets in the entire queue are processed, while decreasing the **granularity** value increases the accuracy of the shaping mechanism. Decreasing these values, however, could result in a possible increase in CPU processor usage. In most circumstances, this increase in processor usage is negligible, but it should be monitored whenever fine-tuning the **max-delay** or **granularity** values.



Tip For more information about the DOCSIS 1.1 rate-limiting specifications, see section C.2.2.5.2, *Maximum Sustained Traffic Rate*, in the DOCSIS 1.1 specification.

Examples

The following example shows how to apply the token-bucket filter algorithm on a Cisco uBR7200 series router running Cisco IOS Release 12.1 EC:

```
Router(config)# interface cable 6/0
Router(config-if)# cable downstream rate-limit token-bucket
```

The following example shows how to apply the token-bucket filter algorithm on a Cisco uBR10012 router running Cisco IOS Release 12.2 BC:

```
Router(config)# interface cable 5/1/0
Router(config-if)# cable downstream rate-limit token-bucket shaping
```

The following example shows how to use token-bucket shaping with a **max-delay** of 256 milliseconds on a Cisco uBR7100 series router:

```
Router(config)# interface cable 1/0
Router(config-if)# cable downstream rate-limit token-bucket shaping max-delay 256
```

Related Commands

Command	Description
cable service class	Sets the parameters for a DOCSIS 1.1 cable service class.
cable upstream rate-limit	Sets DOCSIS rate limiting for an upstream port on a cable interface line card.

cable downstream rf-power

To set the RF power output level on an integrated upconverter on the Cisco uBR7100 series router, Cisco uBR-MC16U, Cisco uBR-MC28U, or Cisco uBR10-MC5X20S/U cable interface line card, use the **cable downstream rf-power** command in cable interface configuration mode. To reset the RF output power level to its default value, use the **no** form of this command.

```
cable downstream rf-power {power-level | hccp-delta diff-pwr | hccp-override override-pwr}
no cable downstream rf-power {power-level | hccp-delta diff-pwr | hccp-override override-pwr}
```

Syntax Description

<i>power-level</i>	RF output power level in dBmV. The valid range is from 45 to 63 dBmV. Note The official range for acceptable power levels in the DOCSIS specification is 50 to 61 dBmV. Cisco cable interfaces exceed the DOCSIS standard, but power levels outside the DOCSIS standards should be used only in lab and test environments.
hccp-delta <i>diff-pwr</i>	(Protect interfaces only) When using N+1 Hotstandby Connection-to-Connection Protocol (HCCP) redundancy, the protect interface adds the <i>diff-pwr</i> value to the current power value of the working interface when a switchover occurs. This allows the router to accommodate relative differences between the RF power levels in working and protect interfaces. The valid value for <i>diff-pwr</i> ranges from -12 to +12 dBmV.
hccp-override <i>override-pwr</i>	(Protect interfaces only) When using N+1 HCCP redundancy, the protect interface uses the override power value instead of the power value of the working interface when a switchover occurs. This allows the router to accommodate absolute differences between the RF power levels in working and protect interfaces. The valid value for <i>override-pwr</i> ranges from 45 to 63 dBmV. Note The official range for acceptable power levels in the DOCSIS specification is 50 to 61 dBmV. Cisco cable interfaces exceed the DOCSIS standard, but power levels outside the DOCSIS standards should be used only in lab and test environments.

Command Default

50 dBmV for the Cisco uBR7100 series router
 55 dBmV for the Cisco uBR-MC5X20S cable interface line card on the Cisco uBR10012 router
 55 dBmV for the Cisco uBR-MC16U and Cisco uBR-MC28U cable interface line cards
 55 dBmV for the Cisco uBR10-MC5X20U-D cable interface line card on the Cisco uBR10012 router

Command Modes

Interface configuration (config-if).

Command History

Release	Modification
12.1(5)EC1	This command was introduced to provide support on the integrated upconverter on the Cisco uBR7100 series router.
12.2(11)CY, 12.2(11)BC3	Support was added for the Cisco uBR10-MC5X20S cable interface line card on the Cisco uBR10012 router.

Release	Modification
12.2(15)CX	Support was added for the Cisco uBR-MC16U and Cisco uBR-MC28U cable interface line cards.
12.2(15)BC2	Support was added for the Cisco uBR-MC5X20U cable interface line card. Support was also added for the hccp-delta and hccp-override options.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
12.2(33)SCC4	Support for the following keywords was moved to the global redundancy configuration mode: <ul style="list-style-type: none"> • hccp-delta • hccp-override
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines



Note In Cisco IOS Release 12.2(33)SCC4, the support for the **hccp-delta** and **hccp-override** keywords is moved from the interface configuration mode to the global redundancy configuration mode. You can now configure these keyword options using the **member subslot** command.

The **hccp-delta** and **hccp-override** options can be configured only on a protect interface (an interface that has been configured with the **hccp protect** command). However, it is possible to manually edit a configuration file on a TFTP server to include these options on a working interface configuration, and then download that configuration to the router from the TFTP server.

If you manually edit the Cisco IOS configuration files, ensure that you specify these options only on protect interfaces. If you specify the **hccp-delta** or **hccp-override** option on a working interface, the router will modify the configured downstream power with the given power delta or override value.

The official range for acceptable power levels in the DOCSIS standard depends on the stacking level. The DOCSIS levels are as follows:

1:1 stacking—52 dBmV ~ 60 dBmV

2:1 stacking—48 dBmV ~ 56 dBmV

4:1 stacking—44 dBmV ~ 52 dBmV



Note Cisco cable interfaces exceed the DOCSIS standard, but power levels outside the DOCSIS standards should be used only in lab and test environments.

Examples

The following example shows how to configure the integrated upconverter on a Cisco uBR7100 series router for an RF output power level of 45 dBmV:

```
Router(config)# cable interface 1/0
Router(config-if)# cable downstream rf-power 45
```

The following example shows how to configure the first integrated upconverter on a Cisco uBR10012 router for an RF output power level of 53 dBmV:

```
Router(config)# cable interface 5/1/0
Router(config-if)# cable downstream rf-power 53
```

The following commands shows how to configure the first integrated upconverter to the default power level of 55 dBmV on the Cisco uBR10012 router:

```
Router(config)# cable interface 5/1/0
Router(config-if)# no cable downstream rf-power
Router(config-if)# exit
```

The following example shows how to configure a protect interface to add 3 dBmV to the current working RF power level when a switchover occurs:

```
Router(config)# cable interface 6/0/0
Router(config-if)# cable downstream rf-power hccp-delta 3
Router(config-if)# exit
```

The following example shows how to configure a protect interface to use an RF power level of 48 dBmV instead of the current working RF power level when a switchover occurs:

```
Router(config)# cable interface 6/0/0
Router(config-if)# cable downstream rf-power hccp-override 48
Router(config-if)# exit
```



Note The **hccp-delta** and **hccp-override** commands configure the power of the protect interface at the time of the switchover. To display the RF power currently being used on a cable interface, use the **show controller cable** command.

Related Commands

Command	Description
cable downstream frequency	Configures the cable downstream center frequency on the integrated upconverter.
cable downstream rf-shutdown	Enables or disables the RF output from the integrated upconverter.
debug cable upconverter	Enables debugging of the internal upconverter operation.
show controllers cable	Displays status and configuration information for the cable interface, including the integrated upconverter, if present.

cable downstream rf-shutdown

To disable the RF output from an integrated upconverter on the Cisco uBR7100 series router, Cisco uBR-MC16U, Cisco uBR-MC28U or the Cisco uBR10-MC5X20S/U cable interface line card and Cisco RF Gateway 10, use the **cable downstream rf-shutdown** command in cable interface configuration mode and QAM interface and subinterface configuration mode. To enable the RF output on the integrated upconverter, use the **no** form of this command.

cable downstream rf-shutdown
no cable downstream rf-shutdown

Syntax Description This command has no arguments or keywords.

Command Default RF output is disabled.

Command Modes Interface configuration—cable interface only (config-if)

QAM interface and subinterface configuration (config-if and config-subif)

Command History

Release	Modification
12.1(5)EC1	This command was introduced to provide support on the integrated upconverter on the Cisco uBR7100 series router.
12.2(11)CY, 12.2(11)BC3	Support was added for the Cisco uBR10-MC5X20S cable interface line card on the Cisco uBR10012 router.
12.2(15)CX	Support was added for the Cisco uBR-MC16U and Cisco uBR-MC28U cable interface line cards.
12.2(15)BC2	Support was added for the Cisco uBR-MC5X20U cable interface line card.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
12.2(44)SQ	This command was integrated into Cisco IOS Release 12.2(44)SQ. Support for the Cisco RF Gateway 10 was added.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

By default, the integrated upconverter on the Cisco uBR7100 series router, Cisco uBR-MC16U, Cisco uBR-MC28U, and the Cisco uBR10-MC5X20S/U cable interface line cards is disabled, and the downstream port does not output any signal. The **no** form of this command enables the integrated upconverter, allowing it to output an RF signal through the downstream port.

However, before a valid DOCSIS downstream signal can be output, the following must also be done:

- A valid downstream RF frequency must be configured using the **cable downstream frequency** cable interface command.
- The cable interface must be enabled using the **no shutdown** command on the cable interface.



Note This command does not affect the IF output from the DS0 downstream port on the Cisco uBR7100 series router. The Cisco uBR10-MC5X20S/U, Cisco uBR-MC16U, and Cisco uBR-MC28U cable interface line cards do not provide IF output for their downstream ports.

Executing this command at the port level command modifies all the QAM channels on that port. However no channel is affected if the command is executed at the channel level.

Examples

The following example enables the integrated upconverter on the Cisco uBR7100 series router:

```
Router(config)# cable interface 1/0
Router(config-if)# no cable downstream rf-shutdown
```

The following example enables the second integrated upconverter on a Cisco uBR-MC5X20S cable interface line card in the Cisco uBR10012 router:

```
Router(config)# cable interface 7/0/1
Router(config-if)# no cable downstream rf-shutdown
```

The following commands must also be given before the DS0 RF port can transmit a valid RF signal:

```
Router(config-if)# cable downstream frequency
center-frequency
Router(config-if)# no shutdown
Router(config-if)# exit
router(config)#
```

Cisco RF Gateway 10

The following example enables the integrated upconverter on the Cisco RFGW-10:

```
Router(config)#configure terminal
Router(config-if)#interface qam 3/1.1
Router(config-subif)#cable downstream rf-shutdown
```

Related Commands

Command	Description
cable downstream frequency	Configures the downstream center frequency on the integrated upconverter.
cable downstream rf-power	Configures the desired RF output power on the integrated upconverter.
debug cable upconverter	Enables debugging of the internal upconverter operation.
show controllers cable	Displays status and configuration information for the cable interface, including information about the integrated upconverter, if present.

Command	Description
show controllers qam	Displays cable downstream information configured on the QAM channel and port.

cable ds-high-low-rate-ratio

If the ratio between the highest and the lowest rates on an interface is too high, the output traffic can become bursty and may experience long delays. To specify the maximum allowed ratio to achieve expected latency requirement, use the **cable ds-high-low-rate-ratio** command in global configuration mode. To remove this configuration, use the **no** form of this command.

cable ds-high-low-rate-ratio *ratio*
no cable ds-high-low-rate-ratio

Syntax Description

<i>ratio</i>	Specifies the ratio of highest to lowest max-rate. Suggested value is 1000.
--------------	---

Command Default

None

Command Modes

Global configuration (config)

Command History

Release	Modification
Cisco IOS XE Everest 16.5.1	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

This command only affects the service flows created after the ratio is configured. We suggest reset all modems after configuring this ratio.

Examples

The following example shows how to specify the maximum allowed ratio to achieve expected latency requirement:

```
Router> enable
Router# configure terminal
Router(config)# cable ds-high-low-rate-ratio 2000
```

cable ds-max-burst

To enable a specialized Enhanced-Rate Bandwidth Allocation (ERBA) feature on the Cisco uBR10012 router with Performance Routing Engine 2 (PRE2) or Performance Routing Engine 4 (PRE4) modules, use the **cable ds-max-burst** command in global configuration mode. To remove this configuration, use the **no** form of this command.

```
cable ds-max-burst [burst-threshold threshold peak-rate peak-rate]  
no cable ds-max-burst
```

Cisco cBR Series Converged Broadband Routers

```
cable ds-max-burst [burst-threshold threshold ]  
no cable ds-max-burst
```

Syntax Description

burst-threshold <i>threshold</i>	(Optional) Defines the burst threshold in Kbytes. The range is from 64 Kbyte to 2 GB. The default is 1MB. For Cisco cBR Series Converged Broadband Routers, the valid rang is from 64Kbyte to 1 GB. This value is used to compare with the per-service flow maximum traffic burst value as defined in DOCSIS 2.0.
peak-rate <i>peak-rate</i>	Peak rate in Kbps. The default is 0, which represents the line rate. (For Cisco uBR10012 Router and CiscouBR7200 Series Routers)The peak-rate value is a global value and is applied to all the service flows created after the configuration of cable ds-max-burst command.

Command Default

This configuration is disabled on the Cisco uBR10012 router. This command is neither required nor supported on the Cisco uBR7100 Series, Cisco uBR7225VXR and Cisco uBR7246VXR router.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(21)BC	This command was introduced in support of ERBA on the Cisco uBR10012 router with PRE2 modules.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA.
12.2(33)SCB	The peak-rate option was introduced and support for Performance Routing Engine 4 (PRE4) was added in Cisco IOS Release 12.2(33)SCB.
IOS-XE 3.15.0S	This command was integrated into Cisco IOS-XE Release 3.15.0S. Support for the Cisco cBR Series Converged Broadband Routers was added.

Usage Guidelines

Cisco IOS Release 12.3(21)BC introduces the ERBA feature on the Cisco uBR10012 CMTS with Performance Routing Engine 2 (PRE2) modules. The ERBA feature in Cisco IOS release 12.3(21)BC is characterized by the following enhancements:

- Enables support for the DOCSIS1.1 *Downstream Maximum Transmit Burst* parameter on the Cisco CMTS by using **cable ds-max-burst** configuration command. This command is not supported on the Cisco uBR7225VXR, Cisco uBR7246VXR and the Cisco uBR7100 Series routers, as this parameter is supported by default.
- Allows DOCSIS1.0 modems to support the *DOCSIS1.1 Downstream Maximum Transmit Burst* parameter by using DOCSIS QoS profile. This feature uses the **cable qos pro max-ds-burst** configuration command.



Note The **cable ds-max-burst** and related commands are supported only on the Cisco uBR10012 router with PRE2 or PRE4 modules on Cisco IOS Release 12.3(21)BC or later releases.

To display service flows on the Cisco uBR10012 router with PRE2 or PRE4, and identify which service flows have maximum burst enabled, use the following command in privileged EXEC mode:

show cr10k-rp cable slot/subslot/port sid service-flow ds

- *slot* = 5 to 8
- *subslot* = 0 or 1
- *port* = 0 to 4 (depending on the cable interface)

For additional information about the **cable qos profile** command and configuring QoS profiles, see the *DOCSIS 1.1 for the Cisco CMTS* document on Cisco.com:

https://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst9400/software/release/16-6/configuration_guide/qos/b_166_qos_9400_cg/b_166_qos_9400_cg_chapter_01.html

Examples

The following example shows how to configure ERBA on the Cisco uBR10012 router, with a sample burst threshold setting:

```
Router> enable
Router# configure terminal
Router(config)# cable ds-max-burst burst-threshold 2048
peak-rate 1000
Router(config)# Ctrl^Z
Router# show cr10k-rp cable 7/0/0 sid service-flow ds
```

When this feature is enabled, new service flows with burst size larger than the burst threshold are supported. However, the existing service flows are not affected.

When this feature is disabled, no new service flows are configured with the *Downstream Maximum Transmit Burst* parameter—the **cable ds-max-burst** command settings. However, the existing service flows are not affected.

The following example illustrates configuration of the ERBA maximum burst for the specified service flow:

```
Router# sh cr10k-rp c7/0/0 1 service-flow ds
RP SFID  LC SFID  Conform      Exceed      Conform      Exceed      Total      QID
          Xmit Pkts  Xmit Pkts   Drop Pkts   Drop Pkts   Pkts
32930    10        41          0           0           0           41         131349
Forwarding interface: Modular-Cable1/0/0:0
32931    13        0           0           0           0           0          131350
Forwarding interface: Modular-Cable1/0/0:0
```

Related Commands	Command	Description
	cable qos profile	Configures a QoS profile.
	show cable qos permission	Displays the status of permissions for changing QoS tables for a cable router.
	show cable qos profile	Displays the QoS profiles that have been defined.
	show cr10k-rp cable sid service-flow ds	Displays service flows on the Cisco uBR10012 router with PRE2, and identifies which service flows have maximum burst enabled.

cable ds-resiliency

To reserve a resiliency bonding group or wideband (WB) interface for a line card on the Cisco CMTS, use the **cable ds-resiliency** command in interface configuration mode. To remove this setting, use the **no** form of this command.

cable ds-resiliency
no cable ds-resiliency

Syntax Description This command has no arguments or keywords.

Command Default None

Command Modes Interface configuration (config-if)

Command History	Release	Modification
	12.2(33)SCG	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines The **cable ds-resiliency** command is used to configure the Downstream Resiliency Bonding Group feature. Remove all existing configuration commands from the WB interface when setting aside that interface as a WB resiliency bonding group.

The **cable ds-resiliency** command is used in conjunction with the **cable resiliency ds-bonding** command to configure the Downstream Resiliency Bonding Group feature.

Examples

The following example shows how to reserve a wideband cable interface in slot 5, subslot 1, and port 2 for a resiliency bonding group:

```
Router(config) interface wideband-cable 5/1/2:0
Router(config-if) # cable ds-resiliency
```

Related Commands	Command	Description
	cable resiliency ds-bonding	Enables the Downstream Resiliency Bonding Group feature on the Cisco CMTS router.
	show cable modem resiliency	Displays resiliency status of the cable modem in resiliency mode on the Cisco CMTS router.
	show cable resiliency	Displays all information about the resiliency bonding groups on the Cisco CMTS router.

cable dsg



Note Effective with Cisco IOS Release 12.3(13a)BC, the **cable dsg** command is not available in Cisco IOS software.

To enable the DOCSIS Set-Top Gateway (DSG) on a cable interface on a Cisco CMTS router, and to configure its tunnel-mapping parameters, use the **cable dsg** command in interface or subinterface configuration mode. To remove the DSG tunnel from the interface, use the **no** form of this command.

cable dsg *tunnel-MAC-address group-ip-address CA-vendor-name*
no cable dsg *tunnel-MAC-address group-ip-address CA-vendor-name*

Syntax Description

<i>tunnel-MAC-address</i>	Well-known MAC address for the DSG tunnel.
<i>group-ip-address</i>	Multicast group IP address for the DSG stream.
<i>CA-vendor-name</i>	Name for the Conditional Access (CA) vendor that owns the DSG tunnel. This parameter is a string up to 7 characters in length and should match the vendor of the CA server. A maximum of four vendors per router are supported.

Command Default

No DSG tunnels are defined.

Command Modes

Interface configuration—cable interface only (config-if)

Subinterface configuration—cable interface only (config-subif)

Command History

Release	Modification
12.2(15)BC2	This command was introduced for the Cisco uBR7100 series and Cisco uBR7246VXR routers.
12.3(9a)BC	This command was introduced for the Cisco uBR10012 router.
12.3(13a)BC	This command was removed.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

This command enables DSG operations on the cable interface, creating a DSG tunnel that uses the specified IGMP multicast address and well-known MAC address.

The *tunnel-MAC-address* could optionally be an Internet Group Management Protocol (IGMP) multicast address, using the algorithm for converting host group IP address to an Ethernet MAC address that is given in RFC 1112. If the MAC address is 0000.0000.0000, the DSG tunnel uses the algorithm given in RFC 1112 to derive the multicast address for the tunnel as follows:

An IP host group address is mapped to an Ethernet multicast address by placing the low-order 23-bits of the IP address into the low-order 23 bits of the Ethernet multicast address 01-00-5E-xx-xx-xx (hex). Because

there are 28 significant bits in an IP host group address, more than one host group address may map to the same Ethernet multicast address.

For example, if you specify the command **cable dsg 0.0.0 228.9.9.9 AAA**, the command uses the IGMP IP address of 228.9.9.9 to generate the MAC address of 0100.5E09.0909 for the DSG tunnel. If the IGMP address were 228.129.9.9, the resulting MAC address would be 0100.5E01.0909.

You can specify only Global Scope (224.0.1.0 through 238.255.255.255) and Administratively Scoped (239.0.0.0 through 239.255.255.255) addresses. You cannot use Local Scope addresses (224.0.0.0 through 224.0.0.255).

Entering the **cable dsg** command also automatically configures the interface for the appropriate IGMP static group, using the **ip igmp static-group** command. Do not manually enter another **ip igmp static-group** command for this interface, because the system assumes that this IGMP configuration is for a separate configuration that cannot be used by the DSG subsystem.



Note If any previously configured static groups exist on this interface, you should remove those other **ip igmp static-group** commands on a cable interface before you can enter the **cable dsg** command. If you do not remove those other groups, the **cable dsg** command displays a warning notifying you that you should remove them.

The **no cable dsg** command automatically removes the IGMP static group from the interface by issuing the **no ip igmp static-group** command. Do not manually remove this static group yourself.

In addition, you must have enabled Protocol Independent Multicast (PIM) on the cable interface, using the **ip pim** interface configuration command, before enabling and configuring DSG operations. The DOCSIS Set-Top Gateway feature supports the following PIM modes:

- **ip pim sparse-mode** command—Configures sparse mode of operation.
- **ip pim sparse-dense-mode** command—Configures the interface for either sparse mode or dense mode of operation, depending on the mode in which the multicast group is operating.
- **ip pim dense-mode** command—Configures dense mode of operation.

Limitations and Restrictions

The DOCSIS Set-Top Gateway feature also has the following limitations:

- If using bundled interfaces, configure the DSG configurations only on the primary interface, not on the subordinate interfaces. However, when DSG has been properly configured on the primary interface, DSG traffic can flow across both the primary and subordinate interfaces.
- If using subinterfaces, you must configure the DSG tunnels only on subinterfaces. When DSG tunnels are configured on a subinterface, you cannot also configure the tunnels on the main interface. If you configure DSG tunnels on both the main interface and subinterfaces, the main interface can drop packets.

We also recommend putting all DSG configurations on the same, single subinterface. Although you can configure DSG tunnels on multiple subinterfaces, this is not guaranteed to be supported in future software releases.

- You can configure up to four separate Conditional Access (CA) vendors per router.
- You can configure a maximum of eight DSG tunnels (as identified by the well-known MAC address) per CA vendor, for a maximum possible total of 32 DSG tunnels per router.

- Each CA vendor can have one or more DSG tunnels on each cable interface, but each DSG tunnel must be using a separate IP multicast address.
- IP multicast routing should be enabled on the router, using the **ip multicast-routing** command.
- Multicast rate-limiting can be enabled optionally on a cable interface that is configured for DSG operations, using the **ip multicast rate-limit out group-list** command.
- For best performance, fast switching of IP multicast should be enabled on incoming and outgoing interfaces, using the **ip mroute-cache** command.
- You cannot use the same IP multicast groups for both DSG traffic and for other IP multicast traffic. If an IP multicast group is being used for DSG traffic, do not use the **ip igmp static-group** command to manually configure that same IP multicast group for other, non-DSG traffic.
- Different CA vendors cannot share IP multicast addresses. Each vendor must use a unique set of IP multicast addresses, and after an IP multicast address is assigned to a DSG tunnel, that same address cannot be used for any other purpose. However, all other multicast addresses and groups can still be used on the interface for other multicast applications.
- DSG-related IP unicast traffic is not supported. The CMTS receives the unicast traffic from the DSG network controllers, but it does not forward that traffic to the set-top boxes.
- DSG traffic should be less than 2.048 Mbps per vendor, so as to conform to the DSG specifications.
- DSG does not support Baseline Privacy Interface (BPI)-encrypted IP multicast streams.



Note In Cisco IOS Release 12.2(15)BC2, N+1 HCCP high availability redundancy does not preserve the DSG traffic and configuration after a switchover. If you configure a cable interface for both N+1 HCCP redundancy and for DSG operations, DSG traffic does not continue after a switchover.

Examples

The following example shows how to configure a cable interface on a Cisco uBR7246VXR router to enable the DSG feature on cable interface 3/0, using a well-known MAC address of 0001.0002.0003 and a destination IP address of 225.2.3.4:

```
interface cable 3/0
 ip pim dense-mode
 ip multicast rate-limit out group-list 123 1024
 cable dsg 1.2.3 225.2.3.4 CCC
```



Note The above configuration also automatically configures the interface with the appropriate **ip igmp static-group** command (**ip igmp static-group 225.3.4.5**). This command will appear in the interface configuration and should not be removed manually.

The following example shows the error message that appears if you specify a broadcast IP address that has already been added to the router's IGMP database. This entry typically would have been created manually on the router or dynamically by a customer premise equipment (CPE) device that is attached to a cable modem on the cable network.

```
interface cable 3/0
 cable dsg 1.1.1 224.3.3.10 cisco
Multicast group 224.3.3.10 is already in use on the interface Cable3/0, please retry.
```

The following example shows how to delete a DSG tunnel on a cable interface:

```
interface cable 4/0
 no cable dsg 0020.0020.0020 230.8.8.8 abc
4d17h: DSG: interface Cable5/0 left the igmp static group 230.8.8.8.
4d17h: DSG: tunnel 0020.0020.0020 is removed
4d17h: DSG: the specified DSG entry has been removed.
```

The following example shows the error message that appears when a unicast IP address is specified instead of a multicast IP address:

```
interface cable 4/0
 cable dsg 1.1.1 192.168.13.10 cisco
Only multicast is supported for current version.
```

Related Commands

Command	Description
cable dsg keepalive	Enables keepalive messages over DSG tunnels on all cable interfaces.
debug cable dsg	Enables general, DCD, or packet-related debugging for DSG on a Cisco CMTS router.
show cable dsg	Displays the current DSG tunneling parameters.

cable dsg cfr

To define and enable Advanced-Mode DOCSIS Set-Top Gateway (A-DSG) classifiers on a Cisco CMTS router, use the **cable dsg cfr** command in global configuration mode. To remove one or more specified A-DSG classifiers from a Cisco CMTS router, use the **no** form of this command. To disable one or more specified A-DSG classifiers but retain their configuration, use the **disable** form of this command.

cable dsg cfr *index* [**dest-ip** {*ipaddrhostname*}] [**tunnel** *index*] [**dest-ports** *start end*] [**priority** *priority*] [**src-ip** {*ipaddrhostname*} [**src-prefix-len** *length*]] [**disable** | **enable**] [**in-dcd** {**yes** | **no** | **ignore**}]

no cable dsg cfr *index*

Syntax Description

<i>index</i>	DSG index. The valid range is from 1 to 65535.
<i>ipaddr</i>	(Optional) Destination multicast group IP address. This argument is required for a new classifier, but optional for an existing classifier.
<i>hostname</i>	(Optional) Fully-qualified domain name (FQDN). This argument is required for a new classifier, but optional for an existing classifier.
tunnel <i>index</i>	(Optional) Defines a tunnel index identified by a number from 1 to 65535.
dest-ports <i>start end</i>	(Optional) Defines the destination TCP/UDP with the starting and ending port ranging from 0 to 65535.
priority <i>priority</i>	(Optional) Defines the classifier priority.
src-ip <i>ipaddr</i>	(Optional) Defines the source IP address and prefix length, if desired.
src-prefix-len <i>length</i>	(Optional) Defines the source prefix length.
disable	(Optional) Disables the classifier. This is the default.
enable	(Optional) Enables the classifier.
in-dcd { yes no ignore }	(Optional) Defines whether to include, exclude, or ignore the DSG rules of the Downstream Channel Descriptor (DCD) message. <ul style="list-style-type: none"> • yes—Includes the classifier. • no—Excludes the classifier. • ignore—Excludes the classifier from the DCD message and enables the DSG rule regardless of the tunnel MAC address.

Command Default

The A-DSG classifiers are undefined by default on a Cisco CMTS router. When configured, A-DSG classifiers are enabled by default.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(13a)BC	This command was introduced to support A-DSG 1.1 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.3(17a)BC	The in-dcd keyword option was added.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
12.2(33)SCD5	This command was modified. The ignore option was added to the in-dcd keyword.
12.2(33)SCG	This command was modified. The <i>hostname</i> argument was added to specify the FQDN for the destination or source IP address.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

The **cable dsg cfr** command is used to configure the [Advanced Mode DOCSIS Set-Top Gateway 1.2 for the Cisco CMTS Routers](#) feature.

The **cable dsg cfr** command creates an index to which one or several A-DSG classifiers apply. The A-DSG classifiers can only be mapped to one DSG tunnel. The Cisco CMTS router applies the classifier parameters to the packets received from the DSG server in order to assign the packet to the appropriate DSG tunnel.

When you use the **in-dcd yes** option, the classifiers are also included in the DSG rules as part of the DCD message.

When you use the **in-dcd ignore** option, the DSG rule is enabled after bypassing the RFC-1112 MAC address check, and the DSG classifier is not included in the DCD message.

The **no** form of the **cable dsg cfr** command disables the DSG rule if the tunnel MAC address is derived from the RFC-1112.

During the software downgrade process, if the software does not support the **in-dcd ignore** option then the **in-dcd yes** option is used.

Examples

The following example shows how to configure an A-DSG classifier on a Cisco CMTS router:

```
Router(config)# cable dsg cfr 1

Router(config)# cable dsg cfr 2 dest-ip 209.165.200.225 tunnel 1 dest-port 0 65535 priority
1
Router(config)# cable dsg cfr 2 dest-ip 209.165.200.226 dest-ports 22 777 enable in-dcd yes
Router(config)# cable dsg cfr 3 dest-ip 209.165.200.227 dest-ports 22 777 src-ip
ciscovideo.com
```

Examples

This example shows how to configure an A-DSG classifier on a Cisco cBR-8 router:

```
Router(config)# cable dsg cfr 1

Router(config)# cable dsg cfr 2 dest-ip 209.165.200.225 tunnel 1 dest-port 0 65535 priority
1
Router(config)# cable dsg cfr 2 dest-ip 209.165.200.226 dest-ports 22 777 enable in-dcd yes
```

```
Router(config)# cable dsg cfr 3 dest-ip 209.165.200.227 dest-ports 22 777 src-ip
ciscovideo.com
```

Related Commands

Command	Description
cable dsg chan-list	Configures the A-DSG downstream channel list on a Cisco CMTS router.
cable dsg client-list	Configures the A-DSG client parameters and the associated DSG rule on a Cisco CMTS router.
cable dsg tg channel	Associates a group of A-DSG tunnels to one or more downstream interfaces on a Cisco CMTS router.
cable dsg tg channel ucid	Configures the upstream channel IDs for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg tg channel vendor-param	Specifies a vendor-specific group for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg timer	Configures the A-DSG timer on a Cisco CMTS router.
cable dsg tunnel	Creates A-DSG tunnels on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.
cable dsg vendor param	Configures vendor-specific parameters for an A-DSG on a Cisco CMTS router.

cable dsg chan-list

To configure the Advanced-mode DOCSIS Set-Top Gateway (A-DSG) downstream channel list on a CMTS router, use the **cable dsg chan-list** command in global configuration mode. To remove the A-DSG channel list, use the **no** form of this command.

```
cable dsg chan-list list-index index entry-index freq freq
no cable dsg chan-list list-index index entry-index freq freq
```

Syntax Description

<i>list-index</i>	Defines the DSG channel list and index identifier as a number in the range 1 to 65535.
index <i>entry-index</i>	Defines the DSG channel frequency entry index as a number in the range 1 to 65535.
freq <i>freq</i>	Defines the center frequency of the downstream channel in the range 47000000 to 862000000 Hz.

Command Default

A-DSG channel lists are disabled and undefined by default.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(13a)BC	This command was introduced on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

The channel list entry created with this command can be associated to a downstream interface and be included in the Downstream Channel Descriptor (DCD) message by using the **cable downstream dsg chan-list** command.

Examples

The following example shows A-DSG channel list global configurations on a Cisco CMTS router:

```
cable dsg chan-list 1 index 1 freq 47000000
cable dsg chan-list 1 index 2 freq 125000000
cable dsg chan-list 1 index 3 freq 555000000
cable dsg chan-list 2 index 1 freq 470000000
cable dsg chan-list 2 index 2 freq 1250000000
cable dsg chan-list 2 index 3 freq 555000000
```

Related Commands

Command	Description
cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.

Command	Description
cable dsg client-list	Configures the A-DSG client parameters and the associated DSG rule on a Cisco CMTS router.
cable dsg tg channel	Associates a group of A-DSG tunnels to one or more downstream interfaces on a Cisco CMTS router.
cable dsg tg channel ucid	Configures the upstream channel IDs for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg tg channel vendor-param	Specifies a vendor-specific group for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg timer	Configures the A-DSG timer on a Cisco CMTS router.
cable dsg tunnel	Creates A-DSG tunnels on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.
cable dsg vendor param	Configures vendor-specific parameters for A-DSG on a Cisco CMTS router.

cable dsg client-list

To configure client parameters for Advanced-mode DOCSIS Set-Top Gateway (A-DSG) on a Cisco CMTS router, use the **cable dsg client-list** command in global configuration mode. This command configures the client parameters and the associated DSG rule. To remove this configuration, use the **no** form of the command.

```
cable dsg client-list client-list-id id-index id {application-id app-id | broadcast [broadcast-id] |
ca-system-id sys-id | mac-addr mac-addr}
no cable dsg client-list client-list-id id-index id {application-id app-id | broadcast [broadcast-id] |
ca-system-id sys-id | mac-addr mac-addr}
```

Syntax Description

<i>client-list-id</i>	Defines an identifier for the <i>DSG client list</i> as a number from 1 to 65535.
id-index <i>id</i>	Defines the DSG client index identifier as a number from 1 to 65535.
application-id <i>app-id</i>	Defines the DSG client type application identifier as a hexadecimal value from 1 to FFFF.
broadcast [<i>broadcast-id</i>]	Defines an optional DSG client type broadcast value: <ul style="list-style-type: none"> • 1—Contains Society of Cable Telecommunications Engineers (SCTE) 65. • 2—Contains SCTE 18. • 3—Contains OpenCable Application Platform (OCAP) Object Carousel (OCAP 1.0) • 4—Contains OpenCable Common Download Carousel (OC-CD). • 5 to 55534—Reserved for future use. • 55535 to 65535—Reserved for Multipler Service Operator (MSO)-specific use.
ca-system-id <i>sys-id</i>	Defines the DSG client type CA system identifier as a hexadecimal value from 1 to FFFF.
mac-addr <i>mac-addr</i>	Defines the DSG client type hexadecimal MAC address.

Command Default

Client lists for A-DSG are not configured by default.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(13a)BC	This command was introduced to support A-DSG on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.3(17a)BC2	The <i>broadcast-id</i> argument was added. Support for the same DSG client identifier to be associated with multiple DSG tunnels was added.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.

Release	Modification
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

Beginning in Cisco IOS Release 12.3(17a)BC2, the same DSG client identifier can be associated with multiple DSG tunnels.

Examples

The following example shows global configuration for four A-DSG client lists:

```
cable dsg client-list 1 id-index 1 broadcast
cable dsg client-list 2 id-index 2 application-id FFFF
cable dsg client-list 3 id-index 3 ca-system-id EEEE
cable dsg client-list 4 id-index 4 mac-addr 0100.5e0a.0a04
```

Related Commands

Command	Description
cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.
cable dsg chan-list	Configures the A-DSG downstream channel list on a Cisco CMTS router.
cable dsg tg channel	Associates a group of A-DSG tunnels to one or more downstream interfaces on a Cisco CMTS router.
cable dsg tg channel ucid	Configures the upstream channel IDs for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg tg channel vendor-param	Specifies a vendor-specific group for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg timer	Configures the A-DSG timer on a Cisco CMTS router.
cable dsg tunnel	Creates A-DSG tunnels on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.
cable dsg vendor param	Configures vendor-specific parameters for A-DSG on a Cisco CMTS router.

cable dsg keepalive



Note Effective with Cisco IOS Release 12.3(13a)BC, the **cable dsg keepalive** command is not available in Cisco IOS software.

To enable keepalive messages over DOCSIS Set-Top Gateway (DSG) tunnels on all cable interfaces, use the **cable dsg keepalive** command in global configuration mode. To disable DSG keepalives, use the **no** form of this command.

cable dsg keepalive
no cable dsg keepalive

Syntax Description This command has no arguments or keywords.

Command Default Keepalive messages are disabled.

Command Modes Global configuration (config)

Command History

Release	Modification
12.2(15)BC2	This command was introduced for the Cisco uBR7100 series and Cisco uBR7246VXR routers.
12.3(9a)BC	This command was introduced for the Cisco uBR10012 router.
12.3(13a)BC	This command was removed.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines By default, a Cisco CMTS router does not send keepalive messages on any DSG tunnels. When keepalives are enabled using the **cable dsg keepalive** command, the Cisco CMTS router sends one keepalive message each second on each DSG tunnel on each downstream. In Cisco IOS Release 12.2(15)BC2, the keepalive packet is a null packet.



Note Do not enable DSG keepalive messages unless your application and DSG set-top boxes require them.



Tip Use the **show cable dsg** command to display whether keepalive messages are enabled.

Examples

The following example shows how to enable DSG keepalives on all cable interfaces on the router:

```
cable dsg keepalive
```

The following example shows how to disable DSG keepalives on all cable interfaces, which is the default configuration:

```
no cable dsg keepalive
```

Related Commands

Command	Description
cable dsg	Enables DSG on a cable interface, and configures its tunnel-mapping parameters.
debug cable dsg	Enables the display of debugging messages for the operation of the DSG feature.
show cable dsg	Displays the current DSG tunneling parameters.

cable dsg name-update-interval

To update fully-qualified domain name (FQDN) classifiers on a Cisco CMTS router based on the DNS server record, use the **cable dsg name-update-interval** command in global configuration mode. To remove this configuration, use the **no** form of this command.

cable dsg name-update-interval *minutes*
no cable dsg name-update-interval *minutes*

Syntax Description

<i>minutes</i>	Interval in minutes to check the DNS server for any FQDN classifier changes. The valid range is from 1 to 60. The default value is 5.
----------------	---

Command Default

The default value of 5 minutes is configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(33)SCG	This command was introduced.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

The **cable dsg-name-update-interval** command is used to configure the [Advanced Mode DOCSIS Set-Top Gateway 1.2 for the Cisco CMTS Routers](#) feature.

Use the **cable dsg name-update-interval** command to configure the DSG name process feature. This feature supersedes the Time to Live (TTL) value associated with the DNS server while obtaining the latest DNS server record.

Examples

The following example shows how to specify the DSG name interval on the Cisco CMTS router:

```
Router(config)# cable dsg name-update-interval 3
```

Related Commands

Command	Description
cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.
show cable dsg cfr	Displays DSG classifier details.

cable dsd tg

To associate a group of Advanced-Mode DOCSIS Set-Top Gateway (A-DSG) tunnels to one or more downstream interfaces on a Cisco CMTS router, use the **cable dsd tg** command in global configuration mode. To remove this configuration, use the **no** form of this command.

```
cable dsd tg group-id [channel channel_ID | priority DSG-rule-priority [enable | disable] | ucid ID1
ID2 ID3 ID4] | vendor-param vendor-group-ID]
no cable dsd tg group-id
```

Syntax Description

<i>group-id</i>	A-DSG tunnel group identifier. The valid range is from 1 to 65535.
<i>channel-id</i>	(Optional) The downstream channel identifier. The valid range is from 1 to 65535.
priority <i>DSG-rule-priority</i>	(Optional) Specifies the A-DSG rule priority. The valid range is from 0 to 255.
enable	(Optional) Enables the specified A-DSG tunnel group.
disable	(Optional) Disables the specified A-DSG tunnel group. This is the default.
ucid <i>upstream-channel-ID</i>	(Optional) Specifies the upstream channel ID. You can specify a maximum of four upstream channel IDs.
vendor-param <i>vendor-group-ID</i>	(Optional) Specifies the vendor specific parameters group ID. The valid range is from 1 to 65535.

Command Default

The A-DSG tunnel group configuration is enabled by default.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(17a)BC2	This command was introduced to support A-DSG version 1.2 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
12.2(33)SCG	The channel keyword was made optional, and the following new keywords were added: <ul style="list-style-type: none"> • ucid • vendor-param
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

The **cable dsd tg** command establishes the configuration of the tunnel group. You can use the **disable** and **enable** keyword forms of the command to deactivate and activate the tunnel group configuration.

Examples

The following example shows configuration and activation of a DSG tunnel group with channel ID, A-DSG rule priority, upstream channel ID, and vendor parameter group ID:

```
Router(config)# cable dsg tg 1
Router(config)# cable dsg tg 1 channel 2
Router(config)# cable dsg tg 1 channel 2 enable
Router(config)# cable dsg tg 1 channel 2 priority 3
Router(config)# cable dsg tg 1 channel 2 priority 3 enable
Router(config)# cable dsg tg 1 channel 2 ucid 1
Router(config)# cable dsg tg 1 channel 2 vendor-param 30
```

Related Commands

Command	Description
cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.
cable dsg chan-list	Configures the A-DSG downstream channel list on a Cisco CMTS router.
cable dsg client-list	Configures the A-DSG client parameters and the associated DSG rule on a Cisco CMTS router.
cable dsg tg channel ucid	Configures the upstream channel IDs for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg tg channel vendor-param	Specifies a vendor-specific group for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg timer	Configures the A-DSG timer on a Cisco CMTS router.
cable dsg tunnel	Creates A-DSG tunnels on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.

cable dsg tg channel

To associate a group of Advanced-mode DOCSIS Set-top Gateway (A-DSG) tunnels to one or more downstream interfaces on a Cisco CMTS router, use the **cable dsg tg channel** command in global configuration mode. To remove this configuration, use the **no** form of this command.

cable dsg tg *group-id* **channel** *channel-id* [**priority** *rule-priority*] [**enable** | **disable**]
no cable dsg tg *group-id* **channel** *channel-id* [**priority** *rule-priority*]

Syntax Description		
	<i>group-id</i>	Specifies the A-DSG tunnel group identifier as a number from 1–65535.
	<i>channel-id</i>	Specifies the downstream channel identifier as a number from 1–65535.
	priority <i>rule-priority</i>	Specifies the A-DSG rule priority as a number from 0–255.
	enable	Enables the specified A-DSG tunnel group.
	disable	Disables the specified A-DSG tunnel group. This is the default.

Command Default The A-DSG tunnel group configuration is enabled.

Command Modes Global configuration (config)

Command History	Release	Modification
	12.3(17a)BC2	This command was introduced to support A-DSG version 1.2 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines The **cable dsg tg channel** command establishes the configuration of the tunnel group. You can use the **disable** and **enable** keyword forms of the command to deactivate and activate the tunnel group configuration. To remove the configuration, use the **no** form of the command.

Examples The following example shows configuration and activation of a tunnel group with group ID 1 and channel ID 2:

```
Router(config)# cable dsg tg 1 channel 2
```

Related Commands	Command	Description
	cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.

Command	Description
cable dsg chan-list	Configures the A-DSG downstream channel list on a Cisco CMTS router.
cable dsg client-list	Configures the A-DSG client parameters and the associated DSG rule on a Cisco CMTS router.
cable dsg tg channel	Associates a group of A-DSG tunnels to one or more downstream interfaces on a Cisco CMTS router.
cable dsg tg channel ucid	Configures the upstream channel IDs for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg tg channel vendor-param	Specifies a vendor-specific group for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg timer	Configures the A-DSG timer on a Cisco CMTS router.
cable dsg tunnel	Creates A-DSG tunnels on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.

cable dsg tg channel ucid

To configure the upstream channel IDs for an Advanced-mode DOCSIS Set-top Gateway (A-DSG) tunnel group on a Cisco CMTS router, use the **cable dsg tg channel ucid** command in global configuration mode. To remove this configuration, use the **no** form of this command.

```
cable dsg tg group-id channel channel-id ucid upstream-id [upstream-id . . .]
no cable dsg tg group-id channel channel-id ucid upstream-id [upstream-id . . .]
```

Syntax Description

<i>group-id</i>	Specifies the A-DSG tunnel group identifier as a number from 1–65535.
<i>channel-id</i>	Specifies the downstream channel identifier as a number from 1–65535.
<i>upstream-id</i>	Specifies one or more upstream channel IDs as a number from 1–8.

Command Default

Upstream channel IDs are not defined.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(17a)BC2	This command was introduced to support A-DSG version 1.2 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

The **cable dsg tg channel** command must be configured before this command is made available.

Examples

The following example shows configuration of a tunnel group with group ID 1 and channel ID 2, followed by configuration of the upstream channel IDs associated with the tunnel group:

```
Router(config)# cable dsg tg 1 channel 2
Router(config)# cable dsg tg 1 channel 2 ucid 1 2 3 4 5 6 7 8
```

Related Commands

Command	Description
cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.
cable dsg chan-list	Configures the A-DSG downstream channel list on a Cisco CMTS router.
cable dsg client-list	Configures the A-DSG client parameters and the associated DSG rule on a Cisco CMTS router.

Command	Description
cable dsg tg channel	Associates a group of A-DSG tunnels to one or more downstream interfaces on a Cisco CMTS router.
cable dsg tg channel vendor-param	Specifies a vendor-specific group for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg timer	Configures the A-DSG timer on a Cisco CMTS router.
cable dsg tunnel	Creates A-DSG tunnels on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.

cable dsg tg channel vendor-param

To associate a vendor-specific group with an Advanced-mode DOCSIS Set-top Gateway (A-DSG) tunnel group on a Cisco CMTS router, use the **cable dsg tg channel vendor-param** command in global configuration mode. To remove this configuration, use the **no** form of this command.

```
cable dsg tg group-id channel channel-id vendor-param vendor-group
no cable dsg tg group-id channel channel-id vendor-param vendor-group
```

Syntax Description	Parameter	Description
	<i>group-id</i>	Specifies the A-DSG tunnel group identifier as a number from 1–65535.
	<i>channel-id</i>	Specifies the downstream channel identifier as a number from 1–65535.
	<i>vendor-group</i>	Specifies the A-DSG vendor-specific group ID as a number from 1–65535.

Command Default The A-DSG vendor-specific group is not associated.

Command Modes Global configuration (config)

Command History	Release	Modification
	12.3(17a)BC2	This command was introduced to support A-DSG version 1.2 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines The **cable dsg tg channel** command must be configured before this command is made available. You also need to configure the vendor-specific parameter list using the **cable dsg vendor-param** command before you can associate it with the tunnel group.

Examples The following example shows configuration of the vendor-specific parameter list, followed by configuration of a tunnel group and association with the defined vendor group 3:

```
! Configure the vendor-specific parameter list
cable dsg vendor-param 3 vendor 1 oui ABCDEC value 0101AB
!
! Configure the tunnel group and associate the vendor group to the tunnel
!
cable dsg tg 1 channel 2
cable dsg tg 1 channel 2 vendor-param 3
```

Related Commands	Command	Description
	cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.

Command	Description
cable dsg chan-list	Configures the A-DSG downstream channel list on a Cisco CMTS router.
cable dsg client-list	Configures the A-DSG client parameters and the associated DSG rule on a Cisco CMTS router.
cable dsg tg channel	Associates a group of A-DSG tunnels to one or more downstream interfaces on a Cisco CMTS router.
cable dsg tg channel ucid	Configures the upstream channel IDs for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg timer	Configures the A-DSG timer on a Cisco CMTS router.
cable dsg tunnel	Creates A-DSG tunnels on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.
cable dsg vendor-param	Configures A-DSG vendor-specific parameters on a Cisco CMTS router.

cable dsg tg default-priority

To change the default channel priority for a tunnel group on the Cisco CMTS router, use the **cable dsg tg default-priority** command in global configuration mode. To set the channel priority back to the default value of zero, use the **no** form this command.

```
cable dsg tg group-id default-priority DSG-rule-priority
no cable dsg tg group-id priority DSG-rule-priority
```

Syntax Description		
	<i>group-id</i>	Advanced-Mode DOCSIS Set-Top Gateway (A-DSG) tunnel group identifier. The valid range is from 1 to 65535.
	default-priority <i>DSG-rule-priority</i>	Specifies the DSG rule priority of the downstream channels. The range is from 0 to 255. The default is 0.

Command Default The default channel priority for a tunnel group is 0.

Command Modes Global configuration (config)

Command History	Release	Modification
	12.2(33)SCG	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines The **cable dsg tg default-priority** command is associated with the [Advanced Mode DOCSIS Set-Top Gateway 1.2 for the Cisco CMTS Routers](#) feature.

All channels that are configured after setting the default priority use the same priority value.

Examples The following example shows how to specify the default channel priority for a tunnel group on the Cisco CMTS router:

```
Router(config)# cable dsg tg 1 default-priority 20
```

Related Commands	Command	Description
	cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.

cable dsg tg priority

To change the priority of existing Advanced-Mode DOCSIS Set-Top Gateway (A-DSG) channels in a tunnel group on a Cisco CMTS router, use the **cable dsg tg priority** command in global configuration mode. To set the DSG rule priority of all existing channels in a tunnel group to the default value of zero, use the **no** form of this command.

cable dsg tg *group-id* **priority** *DSG-rule-priority*
no cable dsg tg *group-id* **priority** *DSG-rule-priority*

Syntax Description

<i>group-id</i>	A-DSG tunnel group identifier. The range is from 1 to 65535.
priority <i>DSG-rule-priority</i>	Specifies the DSG rule priority of the downstream channels. The range is from 0 to 255. The default is 0.

Command Default

None

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(33)SCG	This command was introduced.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

The **cable dsg tg priority** command is used to configure the [Advanced Mode DOCSIS Set-Top Gateway 1.2 for the Cisco CMTS Routers](#) feature.

This command does not impact the downstream channels configured after setting the priority. The **no** form of the **cable dsg tg priority** command sets the DSG rule priority of all existing channels in a tunnel group to the default value of 0.

Examples

The following example shows how to specify the DSG rule priority for all existing A-DSG channels in a tunnel group on a Cisco CMTS router:

```
Router(config)# cable dsg tg 1 priority 20
```

Related Commands

Command	Description
cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.
show cable dsg cfr	Displays DSG classifier details.

cable dsg timer

To configure the Advanced-mode DOCSIS Set-Top Gateway (A-DSG) timer entry to be associated to the downstream channel, and encoded into the downstream channel descriptor (DCD) message on a Cisco CMTS router, use the **cable dsg timer** command in global configuration mode. To remove the cable A-DSG timer, use the **no** form of this command.

```
cable dsg timer index [Tdsg1 Tdsg1] [Tdsg2 Tdsg2] [Tdsg3 Tdsg3] [Tdsg4 Tdsg4]
no cable dsg timer index [Tdsg1 Tdsg1] [Tdsg2 Tdsg2] [Tdsg3 Tdsg3] [Tdsg4 Tdsg4]
```

Syntax Description

<i>index</i>	Defines the DSG timer and associates to an index for the downstream channel as a number from 1 to 65535.
Tdsg1 <i>Tdsg1</i>	(Optional) Sets the DSG Initialization Timeout (Tdsg1). The range is from 1 to 65535.
Tdsg2 <i>Tdsg2</i>	(Optional) Sets the DSG Operational Timeout (Tdsg2). The range is from 1 to 65535.
Tdsg3 <i>Tdsg3</i>	(Optional) Sets the DSG Two-Way Retry Timer (Tdsg3). The range is from 0 to 65535.
Tdsg4 <i>Tdsg4</i>	(Optional) Sets the DSG One-Way Retry Timer (Tdsg4). The range is from 0 to 65535.

Command Default

The A-DSG timer is not defined.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.3(13a)BC	This command was introduced to support A-DSG 1.1 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines

The A-DSG timer entry can be associated to the downstream to encode into the DCD message.

Examples

The following example shows global configuration of three A-DSG timers:

```
cable dsg timer 1 Tdsg1 1 Tdsg2 2 Tdsg3 3 Tdsg4 4
cable dsg timer 2 Tdsg1 2 Tdsg2 22 Tdsg3 33 Tdsg4 44
cable dsg timer 3 Tdsg1 2 Tdsg2 600 Tdsg3 300 Tdsg4 1800
```

Related Commands

Command	Description
cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.
cable dsg chan-list	Configures the A-DSG downstream channel list on a Cisco CMTS router.
cable dsg client-list	Configures the A-DSG client parameters and the associated DSG rule on a Cisco CMTS router.
cable dsg tg channel	Associates a group of A-DSG tunnels to one or more downstream interfaces on a Cisco CMTS router.
cable dsg tg channel ucid	Configures the upstream channel IDs for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg tg channel vendor-param	Specifies a vendor-specific group for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg tunnel	Creates A-DSG tunnels on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.
cable dsg vendor param	Configures vendor-specific parameters for A-DSG on a Cisco CMTS router.

cable dsg tunnel

To create Advanced-mode DOCSIS Set-top Gateway (A-DSG) tunnels on a Cisco CMTS router, use the **cable dsg tunnel** command in global configuration mode. To remove this configuration, use the **no** form of this command. To disable A-DSG tunnels, use the **disable** form of this command.

cable dsg tunnel *tunnel-id* **mac-addr** *mac-addr* **tg** *tunnel-group-id* **clients** *number* [**disable** | **enable**]
no cable dsg tunnel *tunnel-id* **mac-addr** *mac-addr* **tg** *tunnel-group-id* **clients** *number*

Syntax Description		
	<i>tunnel-id</i>	Defines the DSG tunnel with an identifier as a number from 1–65535.
	mac-addr <i>mac-addr</i>	Specifies the multicast group MAC address in hexadecimal format.
	tg <i>tunnel-group-id</i>	Associates a tunnel group ID as a number from 1–65535.
	clients <i>number</i>	Specifies the client to which the configuration applies as a number from 1–65535.
	disable	(Optional) Disables the specified A-DSG tunnel.
	enable	(Optional) Enables the specified A-DSG tunnel.

Command Default A-DSG tunnels are not configured by default, but are enabled by default once configured.

Command Modes Global configuration (config)

Command History	Release	Modification
	12.3(13a)BC	This command was introduced to support A-DSG version 1.1 on the Cisco uBR10012 router and Cisco uBR7200 series routers.
	12.3(17a)BC	The tg and clients keywords were added in support of A-DSG version 1.2.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Usage Guidelines The **cable dsg tunnel** command establishes the configuration of the tunnel. You can use the **disable** and **enable** keywords of the command to deactivate and activate the tunnel configuration. To remove the configuration, use the **no** form of the command.

Each tunnel is mapped to the destination MAC address and once defined, can be associated with a configured QoS service class name using the **cable dsg tunnel srv-class** command.

Examples

The following example shows configuration of four A-DSG tunnels on a Cisco CMTS router:

```
cable dsg tunnel 1 mac-addr 0100.5e0a.0a01
cable dsg tunnel 2 mac-addr 0100.5e0a.0a02
```

```

cable dsg tunnel 3 mac-addr 0100.5e0a.0a03
cable dsg tunnel 4 mac-addr 0100.5e0a.0a04

```

Related Commands

Command	Description
cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.
cable dsg chan-list	Configures the A-DSG downstream channel list on a Cisco CMTS router.
cable dsg client-list	Configures the A-DSG client parameters and the associated DSG rule on a Cisco CMTS router.
cable dsg tg channel	Associates a group of A-DSG tunnels to one or more downstream interfaces on a Cisco CMTS router.
cable dsg tg channel ucid	Configures the upstream channel IDs for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg tg channel vendor-param	Specifies a vendor-specific group for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg timer	Configures the A-DSG timer on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.
cable dsg vendor param	Configures vendor-specific parameters for A-DSG on a Cisco CMTS router.

cable dsg tunnel srv-class

To associate a cable service class with an Advanced-mode DOCSIS Set-top Gateway (A-DSG) tunnel on a Cisco CMTS router, use the **cable dsg tunnel srv-class** command in global configuration mode. To remove this configuration, use the **no** form of this command.

```
cable dsg tunnel tunnel-id srv-class class-name
no cable dsg tunnel tunnel-id srv-class class-name
```

Syntax Description	
<i>tunnel-id</i>	Identifies the DSG tunnel with an identifier as a number from 1–65535.
<i>class-name</i>	Specifies the name of a configured cable service class.

Command Default Cable service classes are not configured or associated with a DSG tunnel.

Command Modes Global configuration (config)

Command History	Release	Modification
	12.3(13a)BC	This command was introduced on the Cisco uBR10012 router and Cisco uBR7200 series routers.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	12.2(33)SCC1	This command was modified to reflect the change in behavior of the command when the default MQoS is configured.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines The A-DSG tunnel and tunnel group must be created before the **cable dsg tunnel srv-class** command becomes available to associate the tunnel with a configured QoS service class.

Examples The following example shows how to configure a cable service class named “test” on a Cisco CMTS router, followed by the association of that test cable service class with a DSG tunnel:

```
Router(config)# cable service class 1 name test
Router(config)# cable service class 1 downstream
Router(config)# cable service class 1 max-rate 20000
Router(config)# cable service class 1 min-rate 3000
Router(config)# cable dsg client-list 1 id-index 1 mac-addr 0050.4d00.0007
Router(config)# cable dsg tg 1 channel 1
Router(config)# cable dsg tunnel 1 mac-addr 0050.4d00.0007 tg 1 clients 1
Router(config)# cable dsg tunnel 1 srv-class test
```

When the service class name is configured without the default MQoS configuration, the following error message is displayed and the configuration is rejected prompting the user to configure the default MQoS.

```
Router(config)# cable dsg tunnel 1 srv-class test
The default mqs doesn't exist, please, create one and then reconfigure service class name
to tunnel 1
Router(config)#
```

When the last service class name is not configured, the following error message is displayed prompting the user to remove the default MQoS (if not needed.)

```
Router(config)# no cable dsg tunnel 1 srv-class test
There is no DSG tunnel associated with a service class name, so, remove the default mqs
if not needed
Router(config)#
```

Related Commands

Command	Description
cable service class	Configures parameters for a DOCSIS service class on a Cisco CMTS router.
cable dsg client-list	Configures the A-DSG client parameters and the associated DSG rule on a Cisco CMTS router.
cable dsg tg channel	Associates a group of A-DSG tunnels to one or more downstream interfaces on a Cisco CMTS router.
cable dsg tg channel ucid	Configures the upstream channel IDs for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg tg channel vendor-param	Specifies a vendor-specific group for an A-DSG tunnel group on a Cisco CMTS router.
cable dsg timer	Configures the A-DSG timer on a Cisco CMTS router.
cable dsg tunnel	Creates A-DSG tunnels on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.
cable dsg vendor param	Configures vendor-specific parameters for A-DSG on a Cisco CMTS router.

cable dsg vendor-param

To configure Advanced-mode DOCSIS Set-top Gateway (A-DSG) vendor-specific parameters on a Cisco CMTS router, use the **cable dsg vendor-param** command in global configuration mode. To remove this configuration, use the **no** form of this command.

cable dsg vendor-param *group-id* **vendor** *vendor-index* **oui** *oui* **value** *value-in-TLV*
no cable dsg vendor-param *group-id* **vendor** *vendor-index* **oui** *oui* **value** *value-in-TLV*

Syntax Description		
	<i>group-id</i>	Defines the DSG vendor parameter and associates with a DSG group.
	vendor <i>vendor-index</i>	Selects the DSG vendor and associated DSG index.
	oui <i>oui</i>	Selects the DSG Organizationally Unique Identifier (OUI) setting.
	value <i>value-in-TLV</i>	Sets the type/length value for the defined DSG vendor.

Command Default The A-DSG vendor-specific parameters are not defined.

Command Modes Global configuration (config)

Command History	Release	Modification
	12.3(13a)BC	This command was introduced to support A-DSG on the Cisco uBR10012 router and Cisco uBR7200 series routers.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines The vendor-specific parameters can be associated to the downstream to encode into the Downstream Channel Descriptor (DCD) message.

To associate a vendor parameter list with a tunnel group, use the **cable dsg tg channel vendor-param** command. The same vendor parameter list can be associated with multiple tunnel groups.

Examples The following sample configuration illustrates global vendor parameters for A-DSG:

```
cable dsg vendor-param 1 vendor 1 oui ABCDEA value 0101AB
cable dsg vendor-param 2 vendor 1 oui ABCDEB value 0101AB
cable dsg vendor-param 3 vendor 1 oui ABCDEC value 0101AB
```

Related Commands	Command	Description
	cable dsg cfr	Defines and enables A-DSG classifiers on a Cisco CMTS router.

Command	Description
cable dsg chan-list	Configures the A-DSG downstream channel list on a Cisco CMTS router.
cable dsg client-list	Configures the A-DSG client parameters and the associated DSG rule on a Cisco CMTS router.
cable dsg tg channel vendor-param	Associates a vendor-specific group with an A-DSG tunnel group on a Cisco CMTS router.
cable dsg timer	Configures the A-DSG timer on a Cisco CMTS router.
cable dsg tunnel	Creates A-DSG tunnels on a Cisco CMTS router.
cable dsg tunnel srv-class	Associates a cable service class with an A-DSG tunnel on a Cisco CMTS router.

cable dynamic-bonding-group

To enable dynamic bonding group, use the **cable dynamic-bonding-group** command. To disable dynamic bonding group, use the no form of the command.

cable dynamic-bonding-group [**eight-contiguous-channel** | **load-balance** | **reclaim-hold-interval** { **percent** *percentage* | **modems** *count* } | **reclaim-threshold** | **registration** | **snmp**]

Syntax Description		
eight-contiguous-channel		Forces the cBR-8 router to create 8-channel DBG with contiguous frequency channels.
load-balance		Specifies that the dynamic bonding group creation can be triggered by the load balancing.
reclaim-hold-interval		Specifies the time interval in seconds between DBG unused and reclaim. The default value is 600 seconds. The range is 30-3600 seconds.
reclaim-threshold percent <i>value</i> modems <i>count</i>		Specifies the bonding group reclaim thresholds. The default values are 5 for <i>value</i> and 6 for <i>count</i> .
registration		Specifies that the dynamic bonding group creation can be triggered by the cable modem registration.
snmp		Enable the snmp trap on dynamic bonding group.

Command Default The Dynamic Bonding Group is disabled by default.

Command Modes Global configuration (config).

Command History	Release	Modification
	Cisco IOS XE 16.7.1	This command is introduced on the Cisco cBR Series Converged Broadband Router.
	Cisco 1x2 / Compact Shelf RPD Software 4.1	This command is modified to add reclaim-threshold , registration , and load-balance options.
	Cisco IOS XE Bengaluru 17.6.1x	This command is modified to add eight-contiguous-channel option.
	Cisco IOS XE Dublin 17.12.1w	This reclaim-hold-interval option is added.

The following example shows how to configure the time interval between DBG unused and reclaim:

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# cable dynamic-bonding-group reclaim-hold-interval 1000
router(config)# end
```

Use the following command to verify the above configuration:

```
router# show run | s reclaim-hold-interval
cable dynamic-bonding-group reclaim-hold-interval 1000
```

The following example enables dynamic bonding group on a modular cable interface using the **cable dynamic-bonding-group** command:

```
router # configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# cable dynamic-bonding-group
router(config)# end
```

The following example shows how to configure the bonding group reclaim thresholds:

```
router # configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# cable dynamic-bonding-group reclaim-threshold percent 5% modems 6
router(config)# end
```

cable dynamic-bw-sharing

To enable dynamic bandwidth sharing (DBS) on a specific modular cable or wideband cable interface, use the **cable dynamic-bw-sharing** command in interface configuration mode. To disable DBS on the interface and revert to static bandwidth sharing, use the **no** form of this command.

cable dynamic-bw-sharing
no cable dynamic-bw-sharing

Syntax Description This command has no arguments or keywords.

Command Default Dynamic bandwidth sharing is disabled and static bandwidth sharing is enabled.

Command Modes Interface configuration (config-if)

Release	Modification
12.3(23)BC1	This command was introduced.
12.2(33)SCB	This command was integrated into Cisco IOS release 12.2(33)SCB.
12.2(33)SCE	The command default was changed. The DBS mode is now enabled by default.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines DBS may be configured on a modular cable or wideband cable interface only when the interface is administratively down. Additionally, the interface must be administrative down when using the no form of this command to disable dynamic bandwidth sharing.



Note Starting with Cisco IOS Release 12.2(33)SCE, the DBS mode is enabled by default, on the WB/MC/IC interfaces. To disable the DBS mode, configure the **no cable dynamic-bw-sharing** command.



Note Starting with Cisco IOS-XE 3.15.0S, DBS is enabled by default on cBR series Converged Broadband Routers and cannot be disabled on.

Examples

The following example enables dynamic bandwidth sharing on a modular cable interface using the **cable dynamic-bw-sharing** command:

```
Router(config)# interface modular-cable 1/0/0:1
Router(config-if)# shutdown
Router(config-if)# cable dynamic-bw-sharing
Router(config-if)# no shutdown
```

The following example enables dynamic bandwidth sharing on a wideband cable interface using the **cable dynamic-bw-sharing** command:

```
Router(config)# interface wideband-cable 1/0/0:0
Router(config-if)# shutdown
Router(config-if)# cable dynamic-bw-sharing
Router(config-if)# no shutdown
```

Related Commands

Command	Description
cable rf-bandwidth-percent	Enables either static or dynamic bandwidth sharing for a modular cable (MC) interface.
cable rf-channel	Associates an RF channel on a Wideband SPA with a wideband channel and allocates bandwidth.
debug cr10k-rp dbs-queue	Displays debug information for dynamic bandwidth sharing (DBS) on the Cisco uBr10012 universal broadband router.
show pxf cable controller	Displays information about the RF channel Versatile Traffic Management System (VTMS) links and link queues.
show pxf cpu queue	Displays parallel express forwarding (PXF) queueing and link queue statistics.

cable dynamic-flow vrf

To configure a VPN routing or forwarding instance for dynamic flow settings, use the **cable dynamic-flow vrf** command. To disable this feature, use the no form of this command.

```
{ no } cable dynamic-flow vrf vrf
```

Syntax Description

vrf Specifies the VPN Routing/Forwarding instance name

Command Default

By default, no VPN routing or forwarding instance is configured.

Command Modes

cable interface (config-if)

MAC domain profile configuration (config-profile-md)

Command History

Release	Modification
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Router.

Example

The following sample shows an example of the **cable dynamic-flow vrf** command.

```
Router# conf t
Router(config)#vrf definition vrpd
Router(config-vrf)#vrf definition vrpd
Router(config-vrf)# rd 27:1
Router(config-vrf)# route-target export 27:1
Router(config-vrf)# route-target import 27:1
Router(config-vrf)#
Router(config-vrf)# address-family ipv4
Router(config-vrf-af)# route-target export 27:1
Router(config-vrf-af)# route-target import 27:1
Router(config-vrf-af)#end

Router# conf t

Router(config)# cable profile mac-domain MD1
Router(config-profile-md) # cable dynamic-flow vrf vrpd
Router(config-profile-md) # no cable dynamic-flow vrf vrpd
Router(config-profile-md)#end
```

cable dynamic-qos trace

To enable the call trace functionality on the Cisco CMTS router for the PacketCable or PacketCable Multimedia (PCMM) service subscribers, use the **cable dynamic-qos trace** command in global configuration mode. To disable this configuration, use the **no** form of this command.

cable dynamic-qos trace *subscriber-number*
no cable dynamic-qos trace

Syntax Description	<i>subscriber-number</i>	Number of subscribers for a PacketCable or PCMM service. The range is from 1 to 20.
---------------------------	--------------------------	---

Command Default None

Command Modes Global configuration (config)

Command History	Release	Modification
	12.2(33)SCF	This command was introduced.
	IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Router.

Examples

The following example shows how to configure the call trace functionality on the Cisco uBR10012 router for the PacketCable or PCMM service subscribers:

```
Router# configure terminal
Router(config)# cable dynamic-qos trace 12
```

Related Commands	Command	Description
	debug cable dynamic-qos subscriber	Enables debugging of the call trace functionality on the Cisco CMTS router for a particular subscriber.
	debug cable dynamic-qos trace	Enables call trace debugging on the Cisco CMTS router for all the subscribers for whom call trace is configured.
	show cable dynamic-qos trace	Displays the number of subscribers for whom call trace is enabled on the Cisco CMTS router.

cable dynamic-secret

To enable the Dynamic Shared Secret feature, so that Data-over-Cable Service Interface Specifications (DOCSIS) configuration files are verified with a Message Integrity Check (MIC) that has been created with a dynamically generated shared secret, use the **cable dynamic-secret** command in cable interface configuration mode or MAC domain profile configuration mode. To disable this feature, use the **no** form of this command.

```
cable dynamic-secret {lock [lock-qos] | mark | reject} [nocrypt]
no cable dynamic-secret
```

Syntax Description

lock	Allows CMs that do not pass MIC verification to come online, but with a restrictive quality of service (QoS) configuration that limits access to the network. The CMTS also locks those CMs so that they must be offline for 24 hours before being allowed to reregister with a valid DOCSIS configuration file. (You can also manually unlock a cable modem using the clear cable modem lock command.)
<i>lock-qos</i>	(Optional) Specifies the QoS profile to be assigned to the CM while it is locked. The valid range is 1 to 256. If not specified, the CM is locked into a CMTS-created profile that limits both the upstream and downstream to 10 Kbps. Note The QoS profile must have already been created before it can assigned using the lock lock-qos option.
mark	Allows CMs to come online even if they do not present a DOCSIS configuration file with a valid CMTS MIC, but the CMTS prints a warning message and marks those CMs with an exclamation point (!) in the show cable modem command.
reject	Rejects registration for CMs with DOCSIS configuration files that contain an invalid CMTS MIC.
nocrypt	(Optional) Specifies that the filename for DOCSIS configuration files should not be encrypted when the Cisco CMTS sends the files to CMs. The CMTS instead transmits the files using their original filenames. The nocrypt option slightly decreases the security provided by the dynamic shared secret feature, but it allows the operator to poll the DOCSIS config file name listed by the cable modem for more convenient network management. Note A cable modem that is running unauthorized or hacked software can return whatever SNMP values the user desires. This information should therefore not be trusted by the billing and provisioning systems.

Command Default

The Dynamic Shared Secret feature is disabled. When enabled, the filenames for DOCSIS configuration files are encrypted.

Command Modes

Interface configuration—cable interface only (config-if)

Wideband-interface profile configuration (config-profile-wb)

MAC domain profile configuration (config-profile-md)



Note Configuring the Dynamic Shared Secret feature on the primary interface in a bundle also automatically configures it for all interfaces in the bundle.

Command History

Release	Modification
12.2(15)BC1	This command was introduced.
12.2(15)BC1b	Support for the nocrypt option was added.
12.3BC	This command was integrated into Cisco IOS Release 12.3BC.
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.
IOS XE Fuji 16.7.1	This command was modified to support MAC domain profile configuration on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines

The **cable dynamic-secret** configuration command automatically creates a unique DOCSIS shared secret on a per-modem basis, creating a one-time-use DOCSIS configuration file that is valid only for the current session. This ensures that a DOCSIS configuration file that has been downloaded for one cable modem can never be used by any other modem, nor can the same modem reuse this configuration file at a later time. This patent-pending feature is designed to guarantee that all registered modems are using only the QOS parameters that have been specified by the DOCSIS provisioning system for that particular modem at the time of its registration.

The **cable dynamic-secret** configuration command enhances the existing shared secret support on the Cisco CMTS by using a one-time, dynamically generated shared secret each time a cable modem registers. This prevents theft-of-service attacks in which users are able to substitute a DOCSIS configuration file that provides a higher-level of service during the registration phase.

The DOCSIS specification allows cable service providers to use a shared secret to create the CMTS MIC value that is stored in a DOCSIS configuration file. If a user attempts to register with the CMTS using a different or modified DOCSIS configuration file, the CMTS can compare the CMTS MIC value sent by the cable modem with the CMTS MIC it has calculated. If the two MIC values are different, the file has been modified.

The **cable dynamic-secret** command allows the CMTS to dynamically create the shared secret at the time that the cable modem is registering, and that shared secret is valid only for that particular session with that particular cable modem. A new dynamically generated shared secret is used each time each cable modem registers, which prevents users from guessing the shared secret and using it again to register with a modified DOCSIS configuration file.

If the cable modem's DOCSIS configuration file fails the CMTS MIC verification check, one of the following messages is displayed on the console:

```
%UBR7200-4-BADCFGFILE: Modem config file platinum.cm at C3/0: CMTS MIC Invalid
%UBR7200-4-BADCFGFILE: Modem config file platinum.cm at C3/0: No CMTS MIC
```

If the error message specifies that the reason for the failure is “CMTS MIC Invalid,” the CMTS MIC was not encoded with the proper dynamically generated shared secret. If the reason is “No CMTS MIC,” the DOCSIS configuration file did not contain any value for the CMTS MIC, which could indicate that the customer has attempted to bypass the DOCSIS security checks by creating the user’s own DOCSIS configuration file without any MIC values.



Note The Dynamic Shared Secret feature does not affect the use of the original shared secret or secondary shared secrets that are configured using the **cable shared-secondary-secret** and **cable shared-secret** commands. (Cisco cBR-8 router does not allow the simultaneous configuration of the two commands.) If these shared secrets are configured, the Cisco CMTS continues to use them to validate the original DOCSIS configuration file that is downloaded from the TFTP server. If the DOCSIS configuration file fails to pass the original or secondary shared secret verification checks, the cable modem is not allowed to register, and the Dynamic Shared Secret feature is not invoked for that particular cable modem.



Note The Cisco uBR7100 series router does not support the Dynamic Shared Secret feature when running in MxU bridging mode.

The original filename for the DOCSIS configuration file is automatically encrypted by default to prevent unauthorized parties from obtaining any useful information from the filename, or from attempting to replace the original file with their own. This encryption can be disabled, using the **nocrypt** option, so that DOCSIS configuration files are sent using their original filenames.



Note Do not use the **cable dynamic-secret** command along with the **ip tftp-source** command in Cisco IOS Release 12.2(15)BC1, because this could result in certain models of CMs not being able to come online but instead be stuck in the init(o) state. This restriction is removed in Cisco IOS Release 12.2(15)BC2 and later releases.

Modes of Operation

The **cable dynamic-secret** command offers three different possible responses to cable modems that fail the CMTS MIC verification check:

- When the **mark** option is used, the CMTS allows CMs to come online even if they fail the CMTS MIC validity check. However, the CMTS also prints a warning message on the console and marks the cable modem in the **show cable modem** command with an exclamation point (!), so that this situation can be investigated. The following message is displayed on the console when such a CM registers with the Cisco CMTS:

```
06:53:57: %UBR7200-4-CMMARKED: Cable Modem 00ff.ffee.ddcc in C3/0 attempted theft of service
```

- When the **lock** option is used, the CMTS assigns a restrictive QoS configuration to CMs that fail the CMTS MIC validity check. If an optional *lock-qos* profile is specified, the CMTS assigns this profile to the CM while it is locked.

If the *lock-qos* profile is not specified, the CMTS uses a special QoS configuration that limits the network access for these CMs by restricting their downstream and upstream service flows to a maximum rate of 10

kbps. (If you do not specify the *lock-qos* profile, you must also allow cable modems to create QoS profiles, using the **cable qos permission** command. If you do not do this and use the **lock** option without specifying a particular QoS profile, locked cable modems will not be allowed to register until the lock clears or expires.)

If a customer resets their CM, the CM will reregister but still uses the restricted QoS profile. A locked CM continues with the restricted QoS profile until it goes offline and remains offline for at least 24 hours, at which point it is allowed to reregister with a valid DOCSIS configuration file. This option frustrates users who are repeatedly registering with the CMTS in an attempt to guess the shared secret, or to determine the details of the Dynamic Shared Secret security system.

In addition, the following message is displayed on the console when a CM is locked.

```
06:53:57: %UBR7200-4-CMLOCKED: Cable Modem 00ff.ffee.ddcc in C3/0 attempted theft of service
```

Locked cable modems are shown with an exclamation point (!) in the **show cable modem** displays:

```
Router# show cable modem

MAC Address      IP Address      I/F      MAC      Prim RxPwr  Timing  Num BPI
                  State          Sid  (db)    Offset  CPE  Enb
0010.9507.01db  144.205.151.130 C5/1/0/U5 online(pt)  1    0.25    938    1    N
0080.37b8.e99b  144.205.151.131 C5/1/0/U5 online      2    -0.25   1268    0    N
0002.fdfa.12ef  144.205.151.232 C6/1/0/U0 online(pt)  13   -0.25   1920    1    N
0002.fdfa.137d  144.205.151.160 C6/1/0/U0 !online    16   -0.50   1920    1    N
0003.e38f.e9ab  144.205.151.237 C6/1/0/U0 !online     3   -0.50   1926    1    N
Router#
```



Tip You can also manually clear the lock on a CM by using the **clear cable modem lock** command.

- When the **reject** option is used, the CMTS refuses to allow CMs to come online if they fail the CMTS MIC validity check. These cable modems appear with a MAC state of “reject(m)” in the displays generated by the **show cable modem** command. After a short timeout period, the CM attempts to reregister with the CMTS. The CM must register with a valid DOCSIS configuration file before being allowed to come online. When the CM does come online, the CMTS prints a warning message on the console and marks the cable modem in the **show cable modem** command with an exclamation point (!), so that this situation can be investigated.



Tip Cisco recommends that you initially use the **mark** option, so that potential problems are identified without immediately interfering with users’ ability to come online. After you identify and resolve these initial problems, reconfigure the cable interfaces with the **reject** or **lock** option to block problem cable modems that attempt to come online without a valid shared secret.



Note To account for possible network problems, such as loss of packets and congestion, the Cisco CMTS will allow a cable modem to attempt to register twice before marking it as having failed the Dynamic Shared Secret authentication checks.

Filename Encryption

By default, the **cable dynamic-secret** command encrypts the original filename for a DOCSIS configuration file when the Cisco CMTS transmits the file to the CM. This filename changes in a semi-random manner, making it difficult for users to predict the filename for the file that should be downloaded to the CM.

This does mean, however, that the filenames specified in the DHCP HELLO and ACK messages are different, and that the filenames on the CM and on the TFTP server are different. This could interfere with custom network management applications and scripts. If this is the case, you can disable the automatic filename encryption by adding the **nocrypt** option to the command.

The **nocrypt** option does slightly decrease the security provided by this feature, so this possibility should be weighed against the ability to more conveniently manage the network.

Interaction with the TFTP Enforce Feature



Note Cisco cBR-8 router does not support **cable tftp-enforce** command.

The **cable tftp-enforce** command provides another layer of protection against theft-of-service attacks by requiring cable modems to download a DOCSIS configuration file through the CMTS cable interface before being allowed to register. When the **cable tftp-enforce** command is used with the **cable dynamic-secret** command, the TFTP enforce checks are done before the dynamic shared-secret checks. If a cable modem fails to download a DOCSIS configuration file through the CMTS, it is not allowed to register, regardless of the dynamic shared-secret checks.

Displaying Rogue Cable Modems

Use the **show cable modem rogue** command to display the cable modems that have failed the dynamic shared-secret authentication checks:

```
Router# show cable modem rogue
          Spoof TFTP
MAC Address  Vendor  Interface  Count  Dnld  Dynamic Secret
AAAA.7b43.aa7f Vendor1  C4/0/U5    2    Yes  45494DC933F8F47A398F69EE6361B017
AAAA.7b43.aa7f Vendor1  C4/0/U5    2    Yes  D47BCBB5494E9936D51CB0EB66EF0B0A
BBBB.7b43.aa7f Vendor2  C4/0/U5    2    No   8EB196423170B26684BF6730C099D271
AAAA.7b43.aa7f Vendor1  C4/0/U5    2    No   DF8FE30203010001A326302430120603
BBBB.7b43.aa7f Vendor2  C4/0/U5    2    No   300E0603551D0F0101FF040403020106
AAAA.7b43.aa7f Vendor1  C4/0/U5    2    Yes  820101002D1A264CE212A1BB6C1728B3
DDDD.7b43.aa7f Vendor4  C4/0/U5    2    Yes  7935B694DCA90BC624AC92A519C214B9
AAAA.7b43.aa7f Vendor1  C4/0/U5    2    No   3AB096D00D56ECD07D9B7AB662451CFF
Router#
```

If the CMTS cannot obtain the DOCSIS configuration file from the TFTP server, a message similar to the following is displayed on the console:

```
%UBR7200-4-NOCFGFILE: Cannot read modem config file platinum.cm from C3/0: <reason>
```

where the reason can be one of the following, depending on the error that the TFTP server reported:

- Compression Failed
- File too big
- Invalid Checksum
- Invalid IP address or hostname
- Uncompression Failed

- User Abort

Examples

The following example shows how to configure a cable interface on a Cisco uBR7200 series router with the **mark** option, so that CMs that fail the MIC verification are allowed to register but are marked in the **show cable modem** displays so that their situation can be further investigated:

```
Router# configure terminal
Router(config)# interface cable 4/0
Router(config-if)# cable dynamic-secret mark
Router(config-if)# exit
Router(config)# exit
Router#
```

The following example shows how to configure the cable interface on a Cisco uBR7100 series router, so that CMs that fail the MIC verification are locked with a QoS profile that limits upstream and downstream service flows to 10 kbps:

```
Router# configure terminal
Router(config)# cable qos permission create
Router(config)# cable qos permission update
Router(config)# interface cable 1/0
Router(config-if)# cable dynamic-secret lock
Router(config-if)# exit
Router(config)# exit
Router#
```



Note If you do not use the **cable qos permission** global configuration command to allow cable modems to create their own QoS profiles, the CMTS rejects this command and displays the following error message: %Need permission for modems to create QoS profile

The following example shows how to configure a cable interface so that CMs that fail the MIC verification are locked with a specific QoS profile:

```
Router# configure terminal
Router(config)# interface cable 1/0
Router(config-if)# cable dynamic-secret lock 31
Router(config-if)# exit
Router(config)# exit
Router#
```



Note If the specified QoS profile does not exist, the CMTS rejects this command and displays the following error message: %Profile *qos-id* to lock modem does not exist

The following example shows how to configure a cable interface on a Cisco uBR7200 series router, so that CMs that fail the MIC verification are not allowed to register and must reregister with a valid DOCSIS configuration file before being allowed to come online:

```
Router# configure terminal
Router(config)# interface cable 3/0
Router(config-if)# cable dynamic-secret reject
Router(config-if)# exit
Router(config)# exit
Router#
```

The following example shows how to disable the Dynamic Shared Secret feature on a cable interface on the Cisco uBR10012 router:

```
Router# configure terminal
Router(config)# interface cable 6/1/0
Router(config-if)# no cable dynamic-secret
Router(config-if)# exit
Router(config)# exit
Router#
```

Related Commands

Command	Description
cable dynamic-secret exclude	Excludes one or more specific cable modems from being processed by the Dynamic Shared Secret feature.
cable shared-secondary-secret	Configures one or more secondary shared secret keys that CMs can use to successfully process the DOCSIS configuration file and register with the CMTS.
cable shared-secret	Configures an authentication shared secret key that CMs must use to successfully process the DOCSIS configuration file and register with the CMTS.
cable tftp-enforce (for uBR series router)	Requires that all CMs on a cable interface attempt to download a DOCSIS configuration file using Trivial File Transfer Protocol (TFTP) through the cable interface before being allowed to register and come online.
clear cable modem lock	Resets the lock on one or more CMs, and reinitializes them, so that they can reregister with a valid DOCSIS configuration file.

Command	Description
show cable modem rogue	Displays a list of cable modems that have been marked, locked, or rejected because they failed the dynamic shared-secret authentication checks.

cable dynamic-secret exclude

To exclude one or more specific cable modems from being processed by the Dynamic Shared Secret feature, use the **cable dynamic-secret exclude** command in global configuration mode. To disable this feature, use the **no** form of this command.

```
cable dynamic-secret exclude {modem mac-address | oui oui-id}
no cable dynamic-secret {modem mac-address | oui oui-id}
```

Syntax Description	
modem <i>mac-address</i>	Specifies the hardware (MAC) address of a specific individual cable modem to be excluded from the Dynamic Shared Secret feature. (You cannot specify a multicast MAC address.)
oui <i>oui-id</i>	Specifies the organization unique identifier (OUI) of a vendor, so that cable modems from this vendor are excluded from the Dynamic Shared Secret feature. The OUI should be specified as three hexadecimal bytes separated by either periods or colons.

Command Default All modems are processed by the Dynamic Shared Secret feature when the feature is enabled.

Command Modes Global configuration (config)

Command History	Release	Modification
	12.3(9a)BC	This command was introduced.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	IOS-XE 3.15.OS	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines When the **cable dynamic-secret** configuration command is configured on a cable interface, it automatically includes all cable modems that register on that interface. To exclude one or more cable modems from being processed by the Dynamic Shared Secret security checks, use the **cable dynamic-secret exclude** command in global configuration mode.

You may exclude cable modems from the Dynamic Shared Secret security checks if they need to download additional files from the TFTP server at registration time. For example, Cisco cable CPE devices, such as the Cisco uBR925 cable access router, can be instructed to download a Cisco IOS configuration file after downloading the DOCSIS configuration file.

However, when Dynamic Shared Secret checks are being used, the Cisco CMTS does not allow the cable modem to download any other files after the first successful download of the DOCSIS configuration file. To allow these cable modems to download their Cisco IOS configuration files, use the **cable dynamic-secret-exclude** command to exclude them from the Dynamic Shared Secret checks.

You can exclude either a specific cable modem by its MAC address, or all of a vendor's cable modems by their OUI value. Excluded cable modems must still register according to the normal DOCSIS provisioning

procedures, but their DOCSIS configuration files are no longer verified by the Dynamic Shared Secret security checks.



Tip When a cable modem is excluded from the Dynamic Shared Secret feature, the Dynamic Secret field in its **show cable modem verbose** display shows “Excluded”.

Examples

The following example shows how to exclude a specific cable modem, with the MAC address of 00d0.45ba.b34b, from being processed by the Dynamic Shared Secret feature:

```
Router# configure terminal
Router(config)# cable dynamic-secret exclude modem 00d0.45ba.b34b
Router(config)# exit
Router#
```

The following example shows how to exclude all cable modems with a vendor OUI value 00.01.B4 from being processed by the Dynamic Shared Secret feature:

```
Router# configure terminal
Router(config)# cable dynamic-secret exclude oui 00.01.B4
Router(config)# exit
```

Related Commands

Command	Description
cable dynamic-secret	Enables the Dynamic Shared Secret feature, so that DOCSIS configuration files are verified with a MIC that has been created with a dynamically generated shared secret.
cable shared-secondary-secret	Configures one or more secondary shared secret keys that CMs can use to successfully process the DOCSIS configuration file and register with the CMTS.
cable shared-secret	Configures an authentication shared secret key that CMs must use to successfully process the DOCSIS configuration file and register with the CMTS.
cable tftp-enforce (for uBR series router)	Requires that all CMs on a cable interface attempt to download a DOCSIS configuration file using Trivial File Transfer Protocol (TFTP) through the cable interface before being allowed to register and come online.
clear cable modem lock	Resets the lock on one or more CMs, and reinitializes them, so that they can reregister with a valid DOCSIS configuration file.
show cable modem rogue	Displays a list of cable modems that have been marked, locked, or rejected because they failed the dynamic shared-secret authentication checks.

cable dynamic-secret tftp insert-upgrade-server

To dynamically insert the IPv4 or IPv6 TLV values in the Data-over-Cable Service Interface Specifications (DOCSIS) configuration file to complete firmware upgrade on cable modems, use the **cable dynamic-secret tftp insert-upgrade-server** command in the global configuration mode.

```
cable dynamic-secret tftp insert-upgrade-server
no cable dynamic-secret tftp insert-upgrade-server
```

Syntax Description This command has no arguments or keywords.

Command Default Disabled

Command Modes Global configuration (config)

Command History	Release	Modification
	12.2(33)SCD2	This command was introduced.
	IOS-XE 3.15.OS	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

Usage Guidelines The Dynamic Shared Secret feature must be configured before you can upgrade the firmware on cable modems. To enable this feature, execute the **cable dynamic-secret** command in the cable interface configuration mode.

Examples The following example dynamically inserts the correct IPv4 or IPv6 TLV values from the DOCSIS configuration file to upgrade firmware on the cable modems.

```
Router(config)# cable dynamic-secret tftp insert-upgrade-server
Router(config)# end
```

Related Commands	Command	Description
	cable dynamic-secret	Enables the Dynamic Shared Secret feature so that DOCSIS configuration files are verified with a Message Integrity Check (MIC) that has been created with a dynamically generated shared secret.
	cable dynamic-secret exclude	Excludes one or more specific cable modems from being processed by the Dynamic Shared Secret feature.
	clear cable modem lock	Resets the lock on one or more CMs, and re-initializes them, so that they can reregister with a valid DOCSIS configuration file.

■ cable dynamic-secret tftp insert-upgrade-server