



## Commands a to cable p

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## access-criteria

To configure access criteria for the Entitlement Control Message Generator (ECMG), use the **access-criteria** command in tier-based configuration mode. To disable the access criteria, use the **no** form of this command.

**access-criteria** *ecmg-id* *access-criteria*

**no access-criteria**

### Syntax Description

<i>ecmg-id</i>	Specifies an existing ECMG ID. The valid range is from 2 to 4.
<i>access-criteria</i>	Specifies the access criteria in Hexadecimal without the 0x prefix.

### Command Default

Access criteria and tier-based scrambling are disabled.

### Command Modes

Tier-based configuration (config-tier)

### Command History

Release	Modification
Cisco IOS-XE Release 3.4.0SQ	This command was introduced.

### Usage Guidelines

The value of *access-criteria* is provided by the Conditional Access (CA) vendor.

### Examples

The following example shows how to configure access criteria for an ECMG with ECMG ID 2 and access criteria A076B300005E:

```
Router# configure terminal
Router(config)# cable video scrambler linecard 3 tier-based
Router(config-tier)# access-criteria 2 A076B300005E
```

### Related Commands

Command	Description
<b>cable video scrambler</b>	Configures scrambling for the video sessions.
<b>show cable video scrambler</b>	Displays the scrambling information for the video sessions.

## active

To activate a QAM partition, use the **active** command in cable video server configuration mode or QAM partition configuration mode. To deactivate, use the **no** form of this command.

**active**

**no active**

### Command Default

QAM partition is not active.

### Command Modes

QAM partition configuration (config-qp)

### Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.
Cisco IOS-XE Release 3.3.0SQ	This command was integrated in to Cisco IOS-XE Release 3.3.0SQ.

### Usage Guidelines

Only one video server can be activated. Effective with Cisco IOS-XE Release 3.3.0SQ, the **active** command activates the QAM partition configuration. A reset indication message is sent to the GQI server for the GQI protocol, when the QAM partition is activated. For the Edge Resource Management Interface (ERMI) protocol, an ERMI-1 connection is established and resources are advertised to the Edge Resource Manager (ERM).

When the QAM partition is deactivated, the Session Resource Manager (SRM) is closed for the GQI protocol. For ERMI protocol, a notification message is sent and the connection is closed.

### Examples

This example shows how to activate a QAM partition:

```
Router# configure terminal
Router(config)# cable qam-partition 1
Router(config-qp)# protocol gqi
Router(config-qp)# mgmt-ip 1.1.1.1
Router(config-qp)# mac-address
1234.abcd.4e4e
Router(config-qp)# server 192.168.0.10
Router(config-qp)# active
```

### Related Commands

Command	Description
<b>cable qam-partition</b>	Configures the QAM partition for a video server.

<b>Command</b>	<b>Description</b>
<b>mgmt-ip-address mac-address</b>	Configures the management port IP address and MAC address.
<b>protocol</b>	Configures the protocol used by the external server.
<b>server</b>	Configures the IP address of the external server.
<b>snmp-server enable traps qp-lbg qam-change</b>	Enables trap notifications when a QAM has been added to or deleted from a QAM Partition.
<b>snmp-server enable traps qp-lbg qp-state-change</b>	Enables trap notifications when a QAM partition's state has been changed.

## asm

To configure an Any Source Multicast (ASM) label definition, use the **asm** command in cable video label configuration mode. To remove the ASM label, use the **no** form of this command.

```
asm label {filter pid pid-list| group IP-address [cbr| GigabitEthernet| TenGigabitEthernet interface|
bitrate bps| jitter ms]}
```

```
no asm label [filter pid {all| pid-list}]
```

### Syntax Description

<i>label</i>	Specifies the name of the session.
<b>group</b>	Indicates the multicast group.
<i>group-ip</i>	Specifies the destination IP address.
<b>cbr</b>	(Optional) Specifies that the session is supposed to be constant bitrate.
<b>bitrate</b>	(Optional) Sets the bitrate allocated for the session.
<i>bps</i>	(Optional) Specifies the bitrate value. Valid range is 1 to 52000000 bps.
<b>GigabitEthernet</b>	(Optional) Indicates the Gigabit Ethernet interface. Valid slot range is 1 to 12.
<b>TenGigabitEthernet</b>	(Optional) Indicates the 10-Gigabit Ethernet interface. Valid range for slot is 1 to 12.
<i>interface</i>	Specifies the interface slot and port.
<b>jitter</b>	(Optional) Specifies the amount of jitter allowed in a network.
<i>ms</i>	(Optional) Specifies the jitter value. Valid range is 10 to 200 ms. Default is 200 ms.

### Command Default

This command has no default behavior or values.

### Command Modes

Cable video label configuration (cfg-video-lbl)

**Command History**

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.
Cisco IOS-XE Release 3.3.1SQ	This command was modified. The <b>bitrate</b> keyword was made optional.

**Usage Guidelines**

The Cisco RFGW-10 supports Any Source Multicast (ASM). An ASM video label is identified by the group IP address.

An ASM video session can be mapped to multiple QAM channels. All cloned sessions of the same video label share the same attributes.



**Note**

To avoid oversubscription, ensure that the actual bitrate of the video session does not exceed the allocated bitrate.

The following example shows the ASM configuration on the Cisco RFGW-10:

```
Router# configure terminal
Router(config)# cable video labels
Router(cfg-video-lbl)# asm asm1 group 226.1.1.1 bitrate 3750000
Router(cfg-video-lbl)# exit
```

Effective with Cisco IOS-XE Release 3.3.1SQ, this example shows the ASM configuration without the **bitrate** keyword

```
Router(cfg-video-lbl)# asm asm1 group 226.1.1.1
```

**Related Commands**

Command	Description
<b>cable video labels</b>	Enters the cable video label configuration.
<b>cable video ip multicast</b>	Configures video multicast sessions on the QAM subinterface.
<b>show cable video label</b>	Displays the labels configured on the chassis.
<b>ssm</b>	Configures an SSM video session definition.

# auto-channel-id

To configure automatic channel ID selection, use the **auto-channel-id** command in Entitlement Control Message Generator (ECMG) configuration mode. To disable the automatic channel ID selection, use the **no** form of this command.

**auto-channel-id**

**no auto-channel-id**

**Syntax Description** This command has no arguments or keywords.

**Command Default** Automatic channel ID selection is disabled.

**Command Modes** ECMG configuration (config-ecmg)

Command History	Release	Modification
	Cisco IOS-XE Release 3.4.0SQ	This command was introduced.

**Usage Guidelines** Automatic channel ID selection using the **auto-channel-id** command is performed only when multiple connections use the same IP address and port.

**Examples** The following example shows how to configure automatic channel ID selection for ECMG with ECMG ID 2:

```
Router# configure terminal
Router(config)# cable video scrambler linecard 3 ecmg 2 update
Router(config-ecmg)# auto-channel-id
```

## Related Commands

Command	Description
<b>cable video scrambler</b>	Configures scrambling for the video sessions.
<b>show cable video scrambler</b>	Displays the scrambling information for the video sessions.

## auto-sync

To enable automatic synchronization of the configuration files in NVRAM, use the **auto-sync** command in the main CPU redundancy configuration mode. To disable automatic synchronization, use the **no** form of this command.

**auto-sync** {**startup-config**| **config-register**| **bootvar**| **running-config**| **standard**}

**no auto-sync** {**startup-config**| **config-register**| **bootvar**| **standard**}

### Syntax Description

<b>startup-config</b>	Specifies synchronization of the startup configuration files.
<b>config-register</b>	Specifies synchronization of the configuration register values.
<b>bootvar</b>	Specifies synchronization of the following boot variables: <ul style="list-style-type: none"> <li>• <b>BOOT</b>—Set by the <b>boot system</b> <i>device:filename</i> command.</li> <li>• <b>CONFIG_FILE</b>—Set by the <b>boot config</b> <i>device:filename</i> command.</li> <li>• <b>BOOTLDR</b>—Set by the <b>boot bootldr</b> <i>device:filename</i> command.</li> </ul>
<b>running-config</b>	Specifies synchronization of the running configuration files.
<b>standard</b>	Specifies synchronization of all of the system files (startup configuration, boot variables, and running config configuration registers).

### Command Default

At the Cisco RF Gateway 10 chassis level, all the system files are synchronized by default.

### Command Modes

Main CPU redundancy configuration (config-r-mc)

### Command History

Release	Modification
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.

**Usage Guidelines**

We recommend that you use the **auto-sync standard** command to ensure that all system files are synchronized between the two Supervisor modules. The **no auto-sync** command is not used in production plants.

**Examples**

The following example shows the synchronization of all system files on the Cisco RFGW-10 chassis:

```
Router#configure terminal
Router (config) #redundancy
Router (config-red) #main-cpu
Router (config-r-mc) #auto-sync standard
Router (config-r-mc) #end
```

**Related Commands**

Command	Description
<b>main-cpu</b>	Enters the main CPU redundancy configuration mode.
<b>redundancy</b>	Enters the redundancy configuration mode.

# banner lcd

To configure the string on the front panel display, use the **banner lcd** command in global configuration mode. To disable the string, use the **no** form of this command.

**banner lcd** *text*

**no banner lcd**

## Syntax Description

<i>text</i>	Specifies the information that is displayed on the front panel.
-------------	---

## Command Default

The platform hostname is displayed by default.

## Command Modes

Global configuration (config)

## Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.

## Usage Guidelines

You can use this command to specify additional information when identifying the chassis or including extra contact information.

## Examples

The following example shows the configuration of the banner on the Cisco RFGW-10:

```
Router#configure terminal
Router(config)#banner lcd This is RFGW-10
```

# block

To configure the block frequency in the lane for a frequency profile on the Cisco RFGW-10 DS-384 line card, use the **block** command in frequency profile lane configuration mode.

**block** *block-id* **start-freq** *frequency*

## Syntax Description

<i>block_id</i>	Block ID in the lane frequency profile. Valid range is from 1 to 4.
<b>start-freq</b>	Specifies the starting frequency of the block.
<i>frequency</i>	Downstream start frequency of a block in a lane. Valid range is from 48000000 to 999000000 Hz. <b>Note</b> The valid range of the block depends on the starting frequency of the parent lane.

## Command Default

The command has no default behavior or values.

## Command Modes

Frequency profile lane configuration mode (config-freq-prof-lane)

## Command History

Release	Modification
Cisco IOS-XE Release 3.2.0SQ	This command was introduced.

## Usage Guidelines

Cisco IOS Release Cisco IOS-XE Release 3.2.0SQ supports global templates or profiles on the Cisco RFGW-10 DS-384 line card. A wider range of frequency spectrum is supported on the upconverter on the line card. The Supervisor card uses two frequency schemes—static frequency scheme and user-defined frequency scheme—to configure the frequency profiles at the port level.



### Note

The frequency schemes are applicable to Cisco RFGW-10 DS-384 line card only.

The user-defined frequency scheme allows you to define the frequency at the chassis level, and apply the cable downstream frequency spectrum to any port on any Cisco RFGW-10 DS-384 line card.

A frequency profile has four frequency lanes in the 1 GHz spectrum. Each lane has a frequency of 216 MHz. Each lane has 4 blocks of 54 MHz, and each block has 8 carriers. The start frequency assigned to a carrier must be in the frequency range of 216 MHz.



**Note** The channel frequencies cannot overlap with each other. Each lane cannot exceed 32 carriers, and a block cannot exceed the frequency of 54 MHz and 8 carriers.



**Note** This command is applicable on the Cisco RFGW10-DS-384 line card.

### Examples

The following example creates the blocks in frequency profile lane configuration mode:

```
Router(config)# cable downstream freq-profile 1
Router(config-freq-prof)# lane 1 start-freq 48000000
Router(config-freq-prof-lane)# block 1 start-freq 48000000
Router(config-freq-prof-lane)# block 2 start-freq 96000000
Router(config-freq-prof-lane)# exit
Router(config-freq-prof)#
```

### Related Commands

Command	Description
<b>cable downstream freq-profile</b>	Creates the frequency profile for a Cisco RFGW-10 DS-384 line card.
<b>lane</b>	Creates the lane frequency for the frequency profile.

# cable clock auto-revert

To set the clock in auto-revert mode, use the **cable clock auto-revert** command in global configuration mode. To disable the clock auto-revert mode, use the **no** form of this command.

**cable clock auto-revert prefer** *slot*

**no cable clock auto-revert prefer**

## Syntax Description

<b>prefer</b>	Specifies the TCC card that should be made active.
<i>slot</i>	TCC card slot. Valid slots are 13 and 14.

## Command Default

The clock is not in auto-revert mode.

## Command Modes

Global configuration (config)

## Command History

Release	Modification
Cisco IOS-XE Release 3.2.0SQ	This command was introduced on the Cisco RF Gateway 10.

## Usage Guidelines

Use the **cable clock auto-revert prefer** command to choose which TCC card should active, when both the TCC cards are connected to DTI servers, and are in the same clock state.

## Examples

The following example shows the auto-revert preference set to TCC card in slot 14:

```
Router (config) # cable clock auto-revert prefer 14
```

## Related Commands

Command	Description
<b>clear cable clock counters</b>	Clears DTI client transition counters of a TCC DTI card.
<b>show cable clock</b>	Displays information on DTI client, and server statistic counts, and path traceability of a TCC card.

## cable clock disable freerun-switchover

To disable Timing, Communication, and Control (TCC) card switchover when there is no DTI connection, use the **cable clock disable freerun-switchover** command in privileged EXEC mode.

**cable clock disable freerun-switchover**

**no cable clock disable freerun-switchover**

**Command Default**      **no cable clock disable freerun-switchover**

**Command Modes**      Privileged EXEC (#)

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	Cisco IOS-XE Release 3.5.7SQ	This command was introduced on the Cisco RF Gateway 10.

**Usage Guidelines**      This command is used to disable the TCC card switchover when there is no DTI server configured.

**Examples**      The following example shows how to disable the switchover of a TCC card when there is no DTI connection.

```
Router#configure terminal  
Router(config)#cable clock disable freerun-switchover
```

## cable clock dti-server-type

To set the DTI server type, use the **cable clock dti-server-type** command in global configuration mode. To reset the DTI server type to the default type, use the no form of the command.

**cable clock dti-server-type** {polylink| symmetricom}

**no cable clock dti-server-type** {polylink| symmetricom}

### Syntax Description

<b>polylink</b>	Sets the DTI server type as Polylink.
<b>symmetricom</b>	Sets the DTI server type as Symmetricom.

### Command Default

Symmetricom is the default DTI server type.

### Command Modes

Global configuration (config)

### Command History

Release	Modification
Cisco IOS-XE 3.4.1SQ	The command was introduced.

### Usage Guidelines

Effective with Cisco IOS-XE Release 3.4.1SQ, the Cisco RFGW-10 supports Symmetricom and Polylink DTI server types.

By default, the Symmetricom DTI server type is configured. Use this command to change the DTI server type to Polylink.



#### Note

After you set the server type, you need to restart all the TCC cards to change the DTI server type. If you restart the TCC cards, all the line cards in the chassis will be reset and may result in service outage.

### Examples

The following example show how to configure the DTI server type:

```
Router# enable
Router# configure terminal
Router(config)# cable clock dti-server-type polylink
Router(config)# exit
```

## cable clock free-run

To set the clock in free-run mode, use the **cable clock free-run** command in global configuration mode. To disable the clock from free-run mode, use the **no** form of this command.

**cable clock slot free-run**

**no cable clock slot free-run**

### Syntax Description

<i>slot</i>	Specifies the slot in the TCC card. Valid slots are 13 and 14.
-------------	--

### Command Default

The clock is not in free-run mode.

### Command Modes

Global configuration (config)

### Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.

### Usage Guidelines

We recommend to avoid running free-run mode in a Timing, Communication and Control (TCC) card server and client setup.

### Examples

The following example shows the configuration of the TCC card in slot 13 in the free-run state:

```
Router(config)# cable clock 13 free-run
```

### Related Commands

Command	Description
<b>clear cable clock counters</b>	Clears DTI client transition counters of a TCC DTI card.
<b>show cable clock</b>	Displays information on DTI client, and server statistic counts, and path traceability of a TCC card.

# cable depi dest-ip

To configure Downstream External PHY Interface (DEPI) sessions manually on QAM line cards, use the **cable depi dest-ip** command in the QAM subinterface configuration mode. To remove a session, use the **no** form of this command.

**cable depi dest-ip** *IP address*

**no cable depi dest-ip** *IP address*

## Syntax Description

<i>IP address</i>	IP address of the destination network.
-------------------	--

## Command Default

This command has no default behavior or values.

## Command Modes

QAM subinterface configuration (config-subif)

## Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.
Cisco IOS-XE Release 3.2.0SQ	This command was modified. The <b>session-id</b> keyword was removed from the command.

## Usage Guidelines

This command is used to configure DEPI sessions manually instead of signalled remote sessions. When you configure a DEPI session on the QAM channel, a route is established.

## Examples

The following example shows DEPI sessions created manually created on a QAM line card 7 on the Cisco RFGW-10:

```
Router(config)# interface qam-red 7/1.1
Router(config-subif)# cable mode depi local lbg 1
Router(config-subif)# cable depi dest-ip 10.1.1.1
```

## Related Commands

Command	Description
<b>cable depi offset</b>	Sets the DOCSIS Timing Offset (DTI) value for the DEPI session.
<b>cable mode depi</b>	Sets the mode and usage of a QAM channel on a line card.

Command	Description
<b>show cable depi-sessions</b>	Displays the manual and L2TP DEPI sessions configured on the Cisco RFGW-10.

## cable depi offset

To set the DOCSIS timing offset on the QAM channel for a line card in a Downstream External PHY Interface (DEPI), use the **cable depi offset** command in global configuration mode and QAM interface and subinterface configuration mode. To disable the offset, use the **no** form of this command.

**cable depi offset** *ticks*

**no cable depi offset** *ticks*

### Syntax Description

<i>ticks</i>	Specifies the offset value. Valid range is from 0 to 32768 for 1/10.24 MHz. Default is 0.
--------------	---

### Command Default

This command has no default behavior or values.

### Command Modes

Global configuration (config)

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

### Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.

### Usage Guidelines

This command sets the DOCSIS timing offset (DTI) for a QAM channel in a DEPI mode. The DTI Offset enables DOCSIS timing offset adjustment per QAM channel. The actual timing offset needs to be measured on each QAM channel.

To configure all the QAM ports to the same timing offset, use the **cable depi offset** command at the port level. However, this sets the offset value on all the QAM channels on that port.

You can also configure the entire chassis with the same timing offset.

### Examples

The following example shows how to configure the timing offset adjustment on slot 7 RF port 3:

```
Router(config)# interface qam 7/3
Router(config-if)# cable depi offset 950
```

The following example shows how to configure the timing offset adjustment on line card slots 3 and 5 RF port range 1 - 12. The timing offset value of line card slots 3 and 5 will be adjusted by 150 ticks.

```
Router(config)# interface range qam 3/1 - 12, qam 5/1 - 12
Router(config-if-range)# cable depi offset 150
```

The following example shows the DTI offset being set to 324 ticks on QAM channels:

```
Router(config)# interface qam-red 3/1.1
Router(config-subif)# cable mode depi local
Router(config-subif)# cable depi offset 324
```

### Related Commands

Command	Description
<b>cable depi dest-ip</b>	Sets the destination IP address for a DEPI session.
<b>cable mode depi</b>	Sets the mode and usage of a QAM channel on a line card.

## cable downstream 8Mhz-overlap-start-freq

To configure the starting frequency for the 8 MHz overlap fixed scheme for Annex A on a QAM port, use the cable downstream 8Mhz-overlap-start-freq command.

**cable downstream 8Mhz-overlap-start-freq** *frequency*

### Syntax Description

<i>frequency</i>	Starting frequency on the QAM interface on the Cisco RFGW10 DS-384 line card. Valid range for 8MHz per Annex A is 45000000-995000000.
------------------	---

### Command Default

This command is disabled by default.

### Command Modes

QAM interface configuration (config-if)

### Command History

Release	Modification
Cisco IOS-XE Release 3.4.1SQ	Configures the starting frequency for the Annex A-8Mhz block overlap fixed scheme on this port.

### Usage Guidelines

The **cable downstream 8Mhz-overlap-start-freq** command sets the starting frequency of the 8MHz block overlap for Annex A on a QAM.

### Examples

This example shows how to configure the starting frequency for the 8 MHz Annex A block overlap:

```
Router# configure terminal
Router(config)# interface qam3/1
Router(config-if)# cable downstream 8Mhz-overlap-start-freq 45000000

%%WARNING: This is annex A/8Mhz blocks overlap start-freq and allowed bandwidth
is 744Mhz for this port.
Continue? [Yes/No][confirm]Y
```

## cable downstream annex

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

**cable downstream annex** {A| B| C}

### Syntax Description

<b>A</b>	Annex A: The downstream uses the EuroDOCSIS J.112 standard.
<b>B</b>	Annex B: The DOCSIS-compliant cable plants that support North American channel uses ITU J.83 Annex B downstream radio frequency.
<b>C</b>	Annex C: A variant of DOCSIS 1.1 designed to operate in Japanese cable systems.

### Command Default

Annex B is the default for all Cisco cable interface line cards.

### Command Modes

RF profile configuration (config-rf-prof)  
QAM interface and subinterface configuration (config-if and config-subif)

### Command History

Release	Modification
12.2(44)SQ	This command was integrated into Cisco IOS Release 12.2(44)SQ. Support for Cisco RF Gateway 10 was added.
Cisco IOS-XE Release 3.2.0SQ	This command was modified. The annex type can be set globally on the RFGW-10 using the RF profile configuration.

### Usage Guidelines

The Cisco RFGW-10 supports Annex A, Annex B, and Annex C operation.



#### Note

If the Annex is changed, the cable modems may go offline.

Annex is configured at the QAM interface (config-if) or QAM subinterface (config-subif) on the Cisco RFGW-10 DS-48 line card.

**Note**

Executing port level commands such as **cable downstream annex**, **cable downstream modulation**, **cable downstream stacking**, **cable downstream frequency** and, **cable downstream rf-power** at the QAM channel level modifies all the QAM channels on that port. This is applicable on the Cisco RFGW-10 DS-48 line card.

Annex is a part of RF profile configuration mode for Cisco RFGW-10 DS-384 line card. You can apply Annex only after you create the RF profiles on Cisco RFGW-10 DS-384 channels.

In Cisco IOS-XE Release 3.2.0SQ, RF profiles can be created globally at the chassis level, and applied to any QAM channel on the Cisco RFGW-10 DS-384 line card. The RF profiles are used for grouping QAM channels with same modulation, Annex mode, symbol rate, and interleaver depth.

The **cable downstream rf-profile** command creates the RF profile. The modulation, annex mode, symbol-rate, and interleaver depth are configured in the RF profile configuration mode.

**Note**

RF profiles are supported only on the Cisco RFGW-10 DS-384 line card.

The following example is a sample of a RF profile configuration:

```
Router(config)# cable downstream rf-profile 64qam-B
Router(config-rf-prof)# cable downstream annex B
Router(config-rf-prof)# cable downstream modulation 64
Router(config-rf-prof)# cable downstream interleaver-depth option1 I128-J1 option2 I32-J4
Router(config-rf-prof)# cable downstream symbol-rate 3500000
Router(config-rf-prof)# exit
Router(config)#
```

**Examples**

The following example shows how to set the MPEG framing format to Annex B on a Cisco RFGW-10 DS-48 line card:

```
Router# configure terminal
Router(config)# interface qam 3/1
Router(config-if)# cable downstream annex B
```

The following example shows how to set the annex mode for carriers on Cisco RFGW-10 DS-384 line card. On Cisco RFGW-10 DS-384, the annex modes are configurable only via RF profiles. Once an RF profile with the desired annex mode has been created, use the following commands to configure the QAM channel:

```
Router(config)# interface qam 3/1.1
Router(config-subif)# cable downstream rf-profile 64qam-B
Router(config-subif)# exit
```

**Related Commands**

Command	Description
<b>cable downstream rf-profile</b>	Creates RF profiles on the RFGW-10.
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.

Command	Description
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

## cable downstream frequency

To set the downstream center frequency in 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 QAM interface and subinterface configuration mode. Use the **no** form of this command on the cable interfaces with an integrated upconverter to unset the downstream frequency and to disable the RF output from the integrated upconverter.

**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 Hertz (the valid range is 57,000,000 to 999,000,000). The usable range depends on whether the downstream is configured for DOCSIS or EuroDOCSIS values:</p> <ul style="list-style-type: none"> <li>• DOCSIS = 88,000,000 to 855,000,000 MHz</li> <li>• Extended frequency range = 70,000,000 to 855,000,000 MHz</li> <li>• EuroDOCSIS = 112,000,000 to 858,000,000 MHz</li> </ul> <p>Cisco IOS supports a superset of these standards, and setting a frequency 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

The default frequency on the Cisco RF Gateway 10 is 501 Mhz.

### Command Modes

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

### Command History

Release	Modification
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.

**Usage Guidelines**

You must set the downstream frequency of the RF output to match the expected input frequency of the 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 57,000,000 to 999,000,000 Hz. To install an IF-to-RF upconverter in the downstream path, you can use the center frequency to configure an IF-to-RF upconverter.



**Note**

The downstream center frequency is set to 501 MHz on all first QAM channels on a port. But, if the QAM channel is in the rf-shut mode, you are required to set the frequency settings on all of the QAM channels on the Cisco RF Gateway 10 before enabling them.

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.



**Note**

This command is executed at both the QAM interface as well as the QAM subinterface level. Executing at the subinterface level changes all of the frequencies on that QAM interface. The frequencies are separated by a number determined by the annex.



**Note**

DOCSIS allows downstreams to use any center frequency from 88,000,000 to 855,000,000 MHz. However, when most cable modems are switched on, they scan the downstream frequencies in the NTSC channel plan. If a valid downstream is not found, the cable modems scan the remaining frequencies. For speedy and efficient registration times, we recommend you to configure downstreams to the frequencies specified in the NTSC channel plan.

**Examples**

The following example shows how to set the downstream center frequency display value on a Cisco RFGW-10:

```
Router(config)# interface qam 3/1.1
Router(config-subif)# cable downstream frequency 520000000
```

**Related Commands**

Command	Description
<b>cable downstream annex</b>	Sets the MPEG framing format for a downstream port on a cable interface line card to Annex A (Europe), Annex B (North America) and Annex C (Japan).
<b>cable downstream rf-power</b>	Configures the specified RF output power on the integrated upconverter.
<b>cable downstream rf-shutdown</b>	Enables or disables the RF output from the integrated upconverter.

Command	Description
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

## cable downstream frequency (channel)

To set the center frequency on the QAM channel, use the **cable downstream frequency** command in QAM subinterface configuration mode. To disable the center frequency, use the **no** form of this command.

**cable downstream frequency** *qam-center-frequency* [**lane** *lane-id* **block** *block-id*]

**no cable downstream frequency** *qam-center-frequency*

### Syntax Description

<i>frequency</i>	<p>Sets the center frequency on the QAM subinterface on the Cisco RFGW10-DS-384 line card. Valid ranges in MHz per Annex type are:</p> <ul style="list-style-type: none"> <li>• Annex A: 1003-744; default is 259</li> <li>• Annex B, Annex C: 1002-768; default is 234</li> </ul>
------------------	--

### Command Default

By default, QAM channels are not assigned with a default center frequency.

### Command Modes

QAM subinterface configuration (config-subif)

### Command History

Release	Modification
Cisco IOS-XE Release 3.2.0SQ	This command was introduced.

### Usage Guidelines

The **cable downstream frequency** assigns the lane and block assigned at the QAM interface level to the subinterface on the Cisco RFGW-10 DS-384.

The center frequency assigned to Cisco RFGW-10 DS-384 QAM channel should be within the frequency range as specified by the freq-profile at the QAM interface (port level).

The Cisco RFGW-10 DS0-384 supports a maximum of 8 QAM channels per block. Thus, while configuring the center frequencies on the QAM channels, ensure that only a maximum of 8 carriers belong to a particular block (as defined by the freq-profile applied at the QAM interface).



#### Note

This command is applicable on both the line cards, but **lane** and **block** parameters are only applicable on Cisco RFGW-10 DS-384 line card.

**Examples**

The following example shows the frequency configuration assigned to the QAM channel:

```
Router(config)# interface qam 9/1.1
Router(config-subif)# cable downstream frequency 714000000 lane 2 block 4
Router(config-if)#
```

**Related Commands**

Command	Description
<b>cable downstream rf-profile</b>	Create RF profiles at the Cisco RFGW-10 chassis level, and apply it across any QAM channel on the Cisco RFGW-10 DS-384 line card.
<b>cable downstream freq-profile</b>	Creates the frequency profile configuration on the Cisco RFGW10.

# cable downstream freq-profile

To create the frequency profile at the Cisco RF Gateway 10 chassis level, and apply it to any RF port on the Cisco RFGW-10 DS-384 line card, use the **cable downstream freq-profile** command in global configuration mode. To disable the frequency profile applied to the RF port, use the **no** form of this command.

**cable downstream freq-profile** *freq-profile-id*

**no cable downstream freq-profile line** *freq-profile-id*

## Syntax Description

<i>freq-profile-id</i>	Profile ID applied to the RF port. Default is 1.
------------------------	--

## Command Default

Default frequency profile (default-freq-profile) is created.

## Command Modes

Global configuration (config)

## Command History

Release	Modification
Cisco IOS-XE Release 3.2.0SQ	This command was introduced.

## Usage Guidelines

Cisco IOS-XE Release 3.2.0SQ supports global templates or profiles on the Cisco RFGW-10 DS-384 line card. Each port on the Cisco RFGW10 DS-384 line card provides a frequency range from 45 MHz to 1003 MHz. The Supervisor card uses two frequency schemes—static frequency scheme and the user-defined frequency scheme—to configure the frequency profile at port level.

The **cable downstream freq-profile** command configures the frequency spectrum in a user-defined frequency scheme on the Cisco RFGW-10 chassis. The frequency scheme is applied to any port on the Cisco RFGW10 DS-384 line card. In the frequency profile configuration mode, you can set the lane and block frequency.



### Note

This command is applicable only on the Cisco RFGW10-DS-384 line card.



### Tip

Configure the **cable downstream annex** before creating the frequency profile. If the Annex mode is not configured, the default Annex B value is set on the line card.

## Examples

The following example creates a frequency profile on the Cisco RFGW-10:

```
Router(config)# cable downstream freq-profile freq-profile1
Router(config-freq-prof)# ?
```

```
Frequency Profile subcommands:  
  exit  Exit from freq profile config mode  
  lane  lane configurations
```

**Related Commands**

Command	Description
<b>lane</b>	Configures the lane frequency in a frequency profile.
<b>block</b>	Configures the block frequency in a lane in the frequency profile.
<b>show cable freq-profile</b>	Displays all the frequency profiles configured on the Cisco RFGW-10 DS-384 line card.

## cable downstream if-output

To activate a downstream port on a cable interface and to generate a standard modulated signal or a test signal, use the **cable downstream if-output** command in QAM interface and subinterface 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]**

**no cable downstream if-output**

### Syntax Description

<b>continuous-wave</b>	Displays an unmodulated carrier signal on the downstream, disabling normal data network operations.
------------------------	---

### Command Default

The downstream interface is enabled for normal data use.

### Command Modes

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

### Command History

Release	Modification
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.

### Usage Guidelines

You can use the **cable downstream if-output** command to perform the following actions:

- Configure a downstream to relay a modulated signal
- Transmit data over the Hybrid Fiber Coaxial (HFC) cable network
- Test the cable plant
- Disable the interface

**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. You can use the **cable downstream if-output** command to test the signal continuity on the downstream until you resume normal modulated operations.

**no cable downstream if-output**—Terminates all signal output and shuts down the downstream interface. The interface is disabled until you reactivate the downstream using the **cable downstream if-output** command.

**Examples**

The following example shows how to enable downstream on QAM interface 3 on the Cisco RFGW-10:

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

**Related Commands**

Command	Description
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

## cable downstream interleaver-depth

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

**cable downstream interleaver-depth** *depth-value*

**no cable downstream interleaver-depth**

depth-value	<p>Downstream interleave depth values.</p> <ul style="list-style-type: none"> <li>• I12-J17 RFGW_MB_FEC-I-12-J-17</li> <li>• I128-J1 RFGW_MB_FEC-I-128-J-1</li> <li>• I128-J2 RFGW_MB_FEC-I-128-J-2</li> <li>• I128-J3 RFGW_MB_FEC-I-128-J-3</li> <li>• I128-J4 RFGW_MB_FEC-I-128-J-4</li> <li>• I128-J5 RFGW_MB_FEC-I-128-J-5</li> <li>• I128-J6 RFGW_MB_FEC-I-128-J-6</li> <li>• I128-J7 RFGW_MB_FEC-I-128-J-7</li> <li>• I128-J8 RFGW_MB_FEC-I-128-J-8</li> <li>• I16-J8 RFGW_MB_FEC-I-16-J-8</li> <li>• I32-J4 RFGW_MB_FEC-I-32-J-4</li> <li>• I64-J2 RFGW_MB_FEC-I-64-J-2</li> <li>• I8-J16 RFGW_MB_FEC-I-8-J-16</li> </ul>
-------------	--

### Command Default

The default interleave depth value is 5 (I=32, J=4).

### Command Modes

RF profile configuration (config-rf-profile)  
QAM interface and subinterface configuration (config-subif)

### Command History

Release	Modification
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.

Release	Modification
Cisco IOS-XE Release 3.2.0SQ	This command was modified. The modulation format can be set globally on the Cisco RFGW-10 DS-384 line card using the RF profile configuration.

### Usage Guidelines

In Cisco IOS Release 3.2.0SQ, RF profiles can be created globally at the chassis level, and applied to any QAM channel on the Cisco RFGW-10 DS-384 line card. The RF profiles are used for grouping QAM channels with same modulation, annex mode, symbol rate, and interleaver depth.

The **cable downstream rf-profile** command creates the RF profile. The modulation, annex mode, symbol-rate, and interleaver depth are configured in the RF profile configuration mode.



### Note

RF profiles are supported on the Cisco RFGW-10 DS-384 line card.

The syntax for the Cisco RFGW-10 DS-384 line card at the RF profile configuration level is:

**cable downstream interleaver-depth option1 depth-value option2 depth-value**

**no cable downstream interleaver option1**

<b>option1</b>	Indicates the interleaver-depth FEC I/J values at the RF profile.
<b>option2</b>	Indicates the interleaver-depth FEC I/J values that are available at the subinterface level when the profile is assigned to the QAM subinterface.

Once the RF profile is created with the FEC I/J values, assign the RF profile to the carrier subinterface. The following example is a sample of a RF profile configuration:

```
Router(config)# cable downstream rf-profile 1
Router(config-rf-prof)# cable downstream interleaver depth option1 I12-J17 option2 I12-J17
Router(config-rf-prof)# exit
Router(config)#
```

The FEC I/J values specified in **option2** are applied to the carrier, and are available at the QAM subinterface level. The following is an example of interface 3/1.1 with the FEC I/J values on the Cisco RFGW-10 DS-384 line card:

```
Router(config)# interface qam 3/1.1
Router(config-subif)# cable downstream interleave-depth I12-J17
Router(config-subif)# exit
```

This command sets the minimum latency of the system. A higher interleave depth relays the bits of each code word over a great transmission time and protects the noise bursts on the hybrid fiber coaxial (HFC) network.

Interleave transmissions do not transmit each code word by itself, but instead relay the bits from multiple code words at the same time. This noise burst affects the minimum number of bits per code word and 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 code words, 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 appropriate to the plant's noise levels and application needs.

If your cable plant is experiencing high noise levels, increase the default value of 32 to 64. For plants with exceptionally high noise levels, increase the interleave value to 128 to secure the cable network from noise bursts.

Low interleave depth values cause some packet loss on HFC networks, because burst noise lasts beyond the error correction block correctable length. However, on cable plants with exceptionally low noise levels, we recommend you to use the default value of 32, and then try an interleave of either 16 or 8 to confirm an increase in performance without increasing the number of errors that result from noise.

This table shows interleave characteristics and their relation to one another.

**Table 1: 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



**Note**

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



**Note**

Executing this command at the QAM channel level (subinterface) changes the interleave level of that subinterface. However, executing the command at the QAM port level (interface), changes the interleaver levels of all QAM channels on that QAM port.

**Examples**

The following example shows downstream I/J values to 128/5 on QAM interface 3 on Cisco RFGW-10:

```
Router# configure terminal
```

```
Router(config)# interface qam 3/1.1
```

```
Router(config-subif)# cable downstream interleave-depth I12-J17
```

**Related Commands**

Command	Description
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

## cable downstream interleaver-level

To set the downstream interleave level, use the cable **downstream interleaver-level** command in QAM subinterface configuration mode. To restore the default setting, use the **no** form of this command.

**cable downstream interleaver-level {1|2}**

**no cable downstream interleaver-level**

### Syntax Description

The following level values are supported on Cisco RF Gateway 10:

<b>1</b>	Indicates the downstream interleaver level. Default is 2.
<b>2</b>	

### Command Default

The default interleaver level is 2.

### Command Modes

QAM subinterface configuration (config-subif)

### Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.

### Usage Guidelines

This command modifies the interleaver level on the downstream radio frequency carrier on a downstream QAM channel. Interleaver level indicates modifiable FEC I/J values. Level 1 indicates non-modifiable FEC I/J values. The I/J values are set to 128/1. For level 2, there are different FEC I/J values that can be configured.

### Examples

The following example shows the interleaver level value set to 2 on QAM subinterface 3:

```
Router# configure terminal
Router(config)#interface qam 3/1.1
Router(config-subif)#cable downstream interleaver-level 1
```

### Related Commands

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

Command	Description
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

## cable downstream lqam-group

To create logical QAM groups on the QAM channel on the Cisco RFGW-10 DS-384 line card, use the **cable downstream lqam-group** command in QAM interface and QAM subinterface configuration mode. To remove the logical QAM group configuration, use the **no** form of this command.

**cable downstream lqam-group** *group\_ID*

**no cable downstream lqam-group** *group\_ID*

### Syntax Description

<i>group_ID</i>	Logical QAM group on QAM interface on the line card. Valid range is from 1 to 48.
-----------------	---

### Command Default

This command is not enabled by default.

### Command Modes

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

### Command History

Release	Modification
Cisco IOS-XE Release 3.2.0SQ	This command was introduced.

### Usage Guidelines

A logical QAM group is a group of QAMs that share the same RF parameters in an RF profile such as Annex, Modulation format, symbol rate etc. There are 48 groups on Cisco RFGW-10 DS-384 line card.

The logical QAM ID uniquely identifies the channels on the Cisco RFGW-10 DS-384 line card. Logical QAM IDs 0 to 7 are assigned to QAM group 1, logical QAM IDs 8 to 15 are assigned to QAM group 2 and so on.



#### Note

Logical QAM group configuration is supported only on the Cisco RFGW-10 DS-384 line card.

The **cable downstream lqam-group** command is used to configure the following:

- [Configuring the Cisco RFGW-10 DS-384 Line Card](#)

### Examples

The following example creates the logical QAM group on the Cisco RFGW-10 DS-384 line card:

```
Router(config-if)# interface qam-red 4/1.2
Router(config-if)# cable downstream lqam-group 2
Router(config)#
```

The following example displays the logical QAM groups on QAM interface 4 on the Cisco RFGW-10 DS-384 line card:

```
Router# show running-config
.
.
.
Interface qam4/2.1
  cable downstream carrier-id 1
  cable downstream lqam-group 40
  cable mode depi remote learn
  cable downstream tsid 42001
  cable depi depi-tunnel tunnel-1
Interface qam4/2.2
  cable downstream carrier-id 2
  cable downstream lqam-group 25
  cable mode depi remote learn
  cable downstream tsid 42002
  cable depi depi-tunnel tunnel-1
Interface qam4/2.3
  cable downstream carrier-id 3
  cable downstream lqam-group 40
  cable mode depi remote learn
  cable downstream tsid 42003
  cable depi depi-tunnel tunnel-1
Interface qam4/5.4
  cable downstream carrier-id 13
  cable downstream lqam-group 40
  cable mode depi remote learn
  cable downstream tsid 42004
  cable depi depi-tunnel tunnel-1
```

#### Related Commands

Command	Description
<b>show cable linecard logical-qamid-mapping</b>	Displays the logical QAM group IDs and QAM carriers mapped to the RF profiles on the Cisco RFGW-10 DS-384 line card.
<b>show controllers qam</b>	Displays information about the downstream configuration on a line card.
<b>show cable rf-profiles</b>	Displays the RF profiles on the line card.
<b>show running-config</b>	Displays the logical QAM groups on a interface.

# cable downstream lock

To lock a downstream port on the cable interface, use the **cable downstream lock** command in QAM interface and subinterface configuration mode. To unlock, use the **no** form of this command.

**cable downstream lock**

**no cable downstream lock**

**Syntax Description** This command has no arguments or keywords.

**Command Default** The lock is not set on QAM interfaces.

**Command Modes** QAM interface and subinterface configuration (config-if and config-subif)

Command History	Release	Modification
	12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.

**Usage Guidelines** This command is used to set the configuration lock on the downstream QAM interfaces on a Cisco RFGW-10 QAM line card. Setting this lock prohibits the user from modifying any RF parameters on that QAM channel. If the lock is set at the port level, then all the QAM Channels on that port will be locked.

Executing this command at a QAM channel level (subinterface) modifies the only the QAM channel. However, executing the command at a QAM port level (interface) modifies all QAM channels (subinterfaces) on that interface.

**Examples** The following example shows how to set the downstream lock on QAM interface 3 on a Cisco RFGW-10:

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

## Related Commands

Command	Description
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

## 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 RF profile configuration, QAM interface, and subinterface configuration mode.

**cable downstream modulation** {64| 256}

### Syntax Description

64	Modulation rate is 6 bits per downstream symbol.
256	Modulation rate is 8 bits per downstream symbol.

### Command Default

The default modulation rate is 64 QAM.

### Command Modes

RF profile configuration (config-rf-profile)  
QAM interface and subinterface configuration (config-if and config-subif)

### Command History

Release	Modification
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.
Cisco IOS-XE Release 3.2.0SQ	This command was modified. The modulation rate can be set globally on the Cisco RFGW-10 using the RF profile configuration.

### Usage Guidelines

Modulation is configured at the QAM interface (config-if) or QAM subinterface (config-subif) on the Cisco RFGW-10 DS-48 line card.



#### Note

Executing port level commands such as **cable downstream annex**, **cable downstream modulation**, **cable downstream stacking**, **cable downstream frequency**, and **cable downstream rf-power** at the QAM channel level modifies all the QAM channels on that port. This is applicable on the Cisco RFGW-10 DS-48 line card.

Modulation is a part of RF profile configuration mode for Cisco RFGW-10 DS-384 line card. You can apply Annex mode only after you create the RF profiles on Cisco RFGW-10 DS-384 channels.

In Cisco IOS-XE Release 3.2.0SQ, RF profiles can be created globally at the chassis level, and applied to any QAM channel on the Cisco RFGW-10 DS-384 line card. The RF profiles are used for grouping QAM channels with same modulation, annex mode, symbol rate, and interleaver depth.



**Note**

A group of eight logical QAM channels can be assigned to an RF profile.

The **cable downstream rf-profile** command creates the RF profile. The modulation, annex mode, symbol-rate, and interleaver depth are configured in the RF profile configuration mode.



**Note**

RF profiles are supported on the Cisco RFGW-10 DS-384 line card.

The following example is a sample of a RF profile configuration:

```
Router(config)# cable downstream rf-profile rf-profile1
Router(config-rf-prof)# cable downstream annex B
Router(config-rf-prof)# cable downstream modulation 64
Router(config-rf-prof)# cable downstream interleaver depth option1 I128-J1 option2 I32-J4
Router(config-rf-prof)# cable downstream symbol-rate 3500000
Router(config-rf-prof)# exit
Router(config)#
```

**Examples**

The following example shows how to set the downstream modulation to 256 QAM on a Cisco RFGW-10 DS-48 line card:

```
Router# configure terminal
Router(config)# interface qam 3/1.1
Router(config-subif)# cable downstream modulation 256
```

The following example applies the modulation that was specified in the global RF profile 1 Cisco RFGW-10 DS-384 line card:

```
Router# configure terminal
Router(config)# interface qam 3/1.1
Router(config-subif)# cable downstream rf-profile 1
```

The following example shows how to set the modulation rate in the RF profile on the Cisco RFGW-10 DS-384 line card:

```
Router(config)# cable downstream rf-profile 1
Router(config-rf-prof)# cable downstream modulation 64
Router(config-rf-prof)# exit
```



**Note**

Changing global RF profile attributes, such as modulation can affect all channels that are currently configured on that RF profile.

**Related Commands**

Command	Description
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

Command	Description
cable downstream rf-profile	Creates RF profiles on the RFGW-10.

## cable downstream max-carriers

To create specific number of QAM carriers per RF port, use the **cable downstream max-carriers** on the Cisco RFGW-10 DS-384 command in QAM interface configuration mode. To disable the QAM carriers per port, use the **no** form of this command.

**cable downstream max-carriers** *carriers*

**no cable downstream max-carriers** *carriers*

### Syntax Description

<i>carriers</i>	Number of carriers per port. Valid range is from 1 to 128.
-----------------	--

### Command Default

No QAM carriers are created when the line card is inserted in the RFGW-10 chassis.

### Command Modes

QAM interface configuration (config-if)

### Command History

Release	Modification
Cisco IOS-XE Release 3.2.0SQ	This command was introduced.

### Usage Guidelines

When the Cisco RFGW-10 DS-384 line card is inserted, prior to any configuration, all the physical port interfaces are automatically created in the configuration file, but they are in shutdown mode. The **cable downstream max-carriers** command creates the carriers under each QAM port interface.

Each QAM port on the Cisco RFGW-10 DS-384 line card can have up to a maximum of 128 carriers configured.



#### Note

If the port is already configured with max-carriers or sub-interfaces, changing the density will affect the power levels and might bring down the carriers due to the licensing restrictions.



#### Note

This command is applicable only on the Cisco RFGW-10 DS-384 line card.

For the Cisco RFGW-10 DS-48 line card, 4 carriers per port are created, and applied to all 12 ports on the line card. To disable QAM interfaces on the Cisco RFGW-10 DS-48 line card, use the **cable downstream stacking** command.

**Examples**

The following example configures 128 QAM carriers on QAM interface 3/1 on the Cisco RFGW-10 DS-384 line card:

```
Router(config)# interface qam 3/1
Router(config-if)# cable downstream max-carriers 128
```

**Related Commands**

Command	Description
<b>cable downstream rf-shutdown</b>	Enables or disables the RF output from the integrated upconverter.

## cable downstream onid

To configure the Original Network ID (ONID) on all the QAM carriers associated with the RF port for the local sessions, use the **cable downstream onid** command in the QAM interface configuration mode. To disable the ONID for all the QAM carriers on a single port, use the **no** form of this command.

**cable downstream onid** *id*

**no cable downstream onid** *id*

### Syntax Description

<i>id</i>	Specifies the ONID that can be configured for all the QAM carriers on the RF port. The range is from 0 to 65535. The default is 0.
-----------	--

### Command Default

The value of the ONID is set to 0.

### Command Modes

QAM interface configuration (config-if)

### Command History

Release	Modification
Cisco IOS-XE Release 3.4.0SQ	This command was introduced on the Cisco RF Gateway 10. This command replaces the <b>onid</b> keyword in the <b>cable downstream tsid</b> command.

### Examples

The following example shows how to configure the ONID:

```
Router# configure terminal
Router(config)# interface qam-red 3/1
Router(config)# cable downstream onid 6
```

### Related Commands

Command	Description
<b>cable downstream serving-area</b>	Configures serving-area on all the QAM carriers associated with the RF-port.

## cable downstream rf-power

To set the RF power output level on the Cisco RF Gateway 10, use the **cable downstream rf-power** command in QAM interface and subinterface 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*

**no cable downstream rf-power** *power-level*

### Syntax Description

<i>power-level</i>	Desired RF output power level in dBmV.
--------------------	--

### Command Default

The default values set are as follows for the different stacking levels:

1:1 stacking—44 dBmV

2:1 stacking—47 dBmV

4:1 stacking—40 dBmV

### Command Modes

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

### Command History

Release	Modification
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.

### Usage Guidelines

The stacking level on Cisco RFGW-10 are as follows:

1:1 stacking—30 dBmV ~ 61 dBmV, default is 44 dBmV

2:1 stacking—30 dBmV ~ 57 dBmV, default is 47 dBmV

4:1 stacking—30 dBmV ~ 53 dBmV, default is 40 dBmV

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.



**Note** Executing port level commands such as **cable downstream annex**, **cable downstream modulation**, **cable downstream stacking**, **cable downstream frequency**, and **cable downstream rf-power** at the QAM channel level modifies all the QAM channels on that port.

### Examples

The following example shows the integrated upconverter on a Cisco RFGW-10 configured for an RF output power level of 50 dBmV:

```
Router(config)# interface qam 3/1.1
Router(config-subif)# cable downstream rf-power 50
```

### Related Commands

Command	Description
<b>cable downstream frequency</b>	Configures the downstream center frequency on the integrated upconverter.
<b>cable downstream rf-shutdown</b>	Enables or disables the RF output from the integrated upconverter.
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

## cable downstream rf-profile

To create RF profiles at the Cisco RF Gateway 10 chassis level and apply them across any QAM channel on the Cisco RFGW-10 DS-384 line card, use the **cable downstream rf-profile** command in global configuration mode, and in QAM subinterface configuration mode. To disable the RF profile configuration, use the **no** form of this command.

**cable downstream rf-profile** *rf-profile-id*

**no cable downstream rf-profile** *rf-profile-id*

### Syntax Description

<i>rf-profile-id</i>	RF profile ID applied to the QAM channel on the line card.
----------------------	--

### Command Default

Default RF profile (default-rf-profile) is created.

### Command Modes

Global configuration (config)

QAM subinterface configuration (config-subif)

### Command History

Release	Modification
Cisco IOS-XE Release 3.2.0SQ	This command was introduced.

### Usage Guidelines

RF profiles can be created globally at the chassis level, and applied to any QAM channel on the Cisco RFGW-10 DS-384 line card. The RF profiles are used for grouping QAM channels with same modulation, annex mode, symbol rate and interleaver depth.



#### Note

A group of eight logical QAM channels can be assigned to an RF profile.

The **cable downstream rf-profile** command creates the RF profile and enters the RF profile configuration mode. The modulation, annex mode, symbol-rate, and interleaver depth can be configured in the RF profile configuration mode. After the RF profile is created, it can be assigned to any QAM channel on the line card.



#### Note

RF profile configuration is supported only on the Cisco RFGW-10 DS-384 line card.

### Examples

The following example creates the RF profile 1 on the Cisco RFGW-10, and enters the RF profile configuration:

```
Router(config)# cable downstream rf-profile 1
```

```
Router(config-rf-prof)# ?
RF Profile cable downstream commands:
  cable  cable keyword under rf profile config mode
  exit   Exit from the rfprof config mode
```

The following example is a sample of a RF profile configuration:

```
Router(config)# cable downstream rf-profile 1
Router(config-rf-prof)# cable downstream annex B
Router(config-rf-prof)# cable downstream modulation 64
Router(config-rf-prof)# cable downstream interleaver depth option1 I128-J1 option2 I32-J4
Router(config-rf-prof)# cable downstream symbol-rate 3500000
Router(config-rf-prof)# exit
Router(config)#
```

### Related Commands

Command	Description
<b>cable downstream annex</b>	Sets the MPEG framing format for a downstream port on a cable interface line card to Annex A (Europe), Annex B (North America) and Annex C (Japan).
<b>cable downstream modulation</b>	Sets the modulation format for a downstream port on the line card
<b>cable downstream interleaver-depth</b>	Sets the interleaver-depth on the line card.
<b>cable downstream symbol-rate</b>	Sets the symbol rate on the line card.
<b>show cable linecard logical-qamid-mapping</b>	Displays the logical QAM group IDs and QAM carriers mapped to the RF profiles on the Cisco RFGW-10 DS-384 line card.

## cable downstream rf-shutdown

To disable the RF output from an integrated upconverter on a Cisco RF Gateway 10, use the **cable downstream rf-shutdown** command in 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**

### Command Default

The RF output is disabled on the upconverter.

### Command Modes

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

### Command History

Release	Modification
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.

### Usage Guidelines

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 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
<b>cable downstream frequency</b>	Configures the downstream center frequency on the integrated upconverter.
<b>cable downstream rf-power</b>	Configures the desired RF output power on the integrated upconverter.
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.

# cable downstream spectral-inversion

To configure channel spectrum inversion (set inverted signal output) of QAM constellation, use the **cable downstream spectral-inversion** command. To remove channel spectrum inversion (set non-inverted signal output), use the **no** form of the command.

**cable downstream spectral-inversion**

**no cable downstream spectral-inversion**

**Syntax Description** This command has no arguments or keywords

**Command Default** Spectrum inversion is enabled.

**Command Modes** Sub interface mode (config-subif)#

Command History	Release	Modification
	Cisco IOS-XE 3.4.0SQ	This command was introduced.

**Usage Guidelines** This command is used to set the QAM Constellation Spectrum Inversion feature on the Cisco DS-384 line card.

The **no** command is used to set the upconverter (UPX) output signal as non-inverted signal. This command is set by default.

**Examples** This example shows the running configuration when QAM cable mode is not enabled:

```
interface Qam-red3/1.1
 cable carrier-id 1
 cable downstream rf-power 38.0
 cable downstream rf-shutdown
 cable downstream interleaver-depth I32-J4
 cable downstream spectral-inversion
 no snmp trap link-status
```

**Examples** This example shows the running configuration when QAM cable mode is is set to video remote:

```
interface Qam-red3/1.1
 cable carrier-id 1
 cable mode video remote
 cable downstream lqam-group 1
 cable downstream tsid 311
 cable downstream rf-profile default-rf-profile
 cable downstream rf-power 39.0
 cable downstream frequency 483000000
 no cable downstream rf-shutdown
```

```
cable downstream interleaver-depth I32-J4
cable downstream spectral-inversion
cable video psi-interval 100
cable video si-interval 200
cable partition 3 external-channel 1
no snmp trap link-status
```

## Examples

This example shows the running configuration when QAM cable mode is set to video remote:

```
interface Qam-red3/1.1
 cable carrier-id 1
 cable mode video remote
 cable downstream lqam-group 1
 cable downstream tsid 311
 cable downstream rf-profile default-rf-profile
 cable downstream rf-power 39.0
 cable downstream frequency 483000000
 no cable downstream rf-shutdown
 cable downstream interleaver-depth I32-J4
 no cable downstream spectral-inversion
 cable video psi-interval 100
 cable video si-interval 200
 cable partition 3 external-channel 1
 no snmp trap link-status
```

# cable downstream stacking

To configure frequency stacking, use the **cable downstream stacking** command in QAM interface and subinterface configuration mode.

**cable downstream stacking** *stacking*

## Syntax Description

<i>stacking</i>	Specifies the stacking level in the RF port. Valid levels are 1, 2 and 4.
-----------------	---

## Command Default

The stacking level is set to 1:4 on all RF ports.

## Command Modes

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

## Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.

## Usage Guidelines

You can configure the stacking level on the RF port and enable the appropriate QAM channels:

- QAM channel 1 is enabled on the specified RF port for stacking level 1.
- QAM channels 1 and 2 are enabled on the specified RF port for stacking level 2.
- QAM channels 1, 2, and 4 are enabled on the specified RF port for stacking level 4.



### Note

Executing port level commands such as **cable downstream annex**, **cable downstream modulation**, **cable downstream stacking**, **cable downstream frequency**, and **cable downstream rf-power** at the QAM channel level modifies all the QAM channels on that port.

## Examples

The following example shows how to configure the downstream channel on the QAM interface for frequency stacking of 4.

```
Router# configure terminal
Router(config)# interface qam 3/1
Router(config-if)# cable downstream stacking 4
Router(config-if)# exit
```

**Related Commands**

Command	Description
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

# cable downstream start-freq

To set the starting frequency on the QAM interface, use the **cable downstream start-freq** command in QAM interface configuration mode. To disable the starting frequency, use the **no** form of this command.

**cable downstream start-freq** *frequency*

**no cable downstream start-freq**

## Syntax Description

<i>frequency</i>	<p>Starting frequency on the QAM interface on the Cisco RFGW10 DS-384 line card. Valid ranges in MHz per Annex type are:</p> <ul style="list-style-type: none"> <li>• Annex A: 1003-744; default is 259</li> <li>• Annex B, Annex C: 1002-768; default is 234</li> </ul>
------------------	--

## Command Default

This command is disabled by default.

## Command Modes

QAM interface configuration (config-if)

## Command History

Release	Modification
Cisco IOS-XE Release 3.2.0SQ	This command was introduced.

## Usage Guidelines

The **cable downstream start-freq** command sets the starting frequency for a QAM port on the Cisco RFGW-10 DS-384 card in the static frequency scheme. In this scheme, the lane and block start frequencies are internally configured for the port by the Supervisor. The carrier frequency can be configured at the carrier.



### Note

The start-frequency configured at the port has to be such that the entire four lanes are within the valid maximum frequency range of 1003 GHz.



### Note

This command is applicable only on the Cisco RFGW-10 DS-384 line card.

## Examples

The following example shows the starting frequency configuration for a QAM port with Annex B:

```
Router(config)# interface qam 4/1
Router(config-if)# cable downstream start-freq 234000000
```

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

**Related Commands**

Command	Description
<b>cable downstream annex</b>	Sets the MPEG framing format for a downstream port on a cable interface line card to Annex A (Europe), Annex B (North America) and Annex C (Japan).
<b>cable downstream frequency (channel)</b>	Sets the center frequency of the QAM channel.
<b>show cable linecard carrier-id-mapping</b>	Displays the QAM blocks and QAM carriers mapped on a line card.

## cable downstream symbol rate

To set the symbol rate on the line card, use the **cable downstream symbol rate** command in RF profile configuration mode. To disable the symbol rate, use the **no** form of this command.

**cable downstream symbol rate** *symbols*

**no cable downstream symbol rate**

### Syntax Description

<i>symbols</i>	Symbol rate of the line card in seconds. Valid range is from 3500000 to 7000000 symbols per second.
----------------	---

### Command Default

This command has no default behavior or values.

### Command Modes

RF profile configuration (config-rf-profile)

### Command History

Release	Modification
Cisco IOS-XE Release 3.2.0SQ	This command was introduced.

### Usage Guidelines

The **cable downstream symbol-rate** command sets the symbol rate for the Cisco RFGW-10 DS-384 line card.



#### Note

Symbol rate is set only for Annex A mode carriers. The symbol rate specified at the RF profile configuration is ignored for Annex B carriers.

### Examples

The following example shows the symbol rate configured on the Cisco RFGW-10 DS-384 line card:

```
Router(config)# cable downstream rf-profile 1
Router(config-rf-prof)# cable downstream annex A
Router(config-rf-prof)# cable downstream modulation 256
Router(config-rf-prof)# cable downstream interleaver depth option1 I12-J17 option2 I12-J17
Router(config-rf-prof)# cable downstream symbol-rate 3500000
Router(config-rf-prof)# exit
Router(config)#
```

**Related Commands**

Command	Description
<b>cable downstream rf-profile</b>	Creates the RF profile configuration at the RFGW-10 chassis level, and enters the RF profile configuration mode

## cable downstream tsid

To configure the Transport Stream Identifier (TSID) value on the QAM subinterface, use the **cable downstream tsid** command in QAM subinterface configuration mode. To reset the TSID to 0, use the **no** form of this command.



### Note

Effective with Cisco IOS-XE Release 3.4.0SQ, the **onid** keyword is removed from the **cable downstream tsid** command and replaced with the **cable downstream onid** command.

**cable downstream tsid** *id* [**onid** *onid-id*]

**no cable downstream tsid**

### Cisco IOS-XE Release 3.4.0SQ and Later

**cable downstream tsid** *id*

**no cable downstream tsid**

### Syntax Description

<i>id</i>	TSID value for the QAM subinterface. Valid TSID values are from 0-65535.
<b>onid</b>	(Optional) Sets the original downstream network ID for a video transport stream.
<i>onid-id</i>	Specifies the downstream original network id (ONID). The valid range is from 1 to 65535. The default value is 0.

### Command Default

The TSID and ONID values are set to 0 on all QAM interfaces.

Effective with Cisco IOS-XE Release 3.4.0SQ, the TSID value is set to 0xFFFFFFFF by default.

### Command Modes

QAM subinterface configuration (config-subif)

### Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.
Cisco IOS-XE Release 3.3.0SQ	This command was modified to include <b>onid</b> keyword.
Cisco IOS-XE Release 3.4.0SQ	This command was modified to remove the <b>onid</b> keyword (this keyword is replaced with the <b>cable downstream onid</b> command).

**Usage Guidelines**

This command ensures that each downstream QAM channel has a unique ID when there are multiple Cisco Cable Modem Termination System (CMTS) routers at a headend facility. This ID uniquely defines the QAM channel in the cable headend.

For DEPI, the TSID value is overwritten with a new value if there are no sessions established on that QAM channel. However, if a session exists with the specified QAM channel, the new TSID value being configured is rejected.

For video, the TSID value is used to uniquely identify a QAM channel by the external server for remote Edge Resource Management Interface (ERMI), DEPI, and locally encrypted video sessions. The TSID value is overwritten in a QAM channel if these sessions are not present in the QAM channel, otherwise, the configuration is rejected.

Effective with Cisco IOS-XE Release 3.4.1SQ, you can configure non-unique TSIDs for the broadcast channels without configuring the serving area or ONID at the port. You can configure the same TSID for the QAM channels for the following sessions:

- DEPI QAM
- Video remote ERMI
- DVB local encrypt or remote GQI encrypt
- Video local or video remote GQI

The **no** form of the command resets the TSID value of the QAM channel to 0.

**Note**


---

ONID configuration is not supported on the Cisco RFGW-10 DS-48 line card.

---

**Examples**

The following example configures the downstream channel on the QAM subinterface with a TSID value of 44:

```
Router# configure terminal
Router(config)# interface qam 3/1.1
Router(config-subif)# cable downstream tsid 44
```

The following example shows how to configure the ONID on the QAM interface on the Cisco RFGW-10 DS-384 line card in Cisco IOS-XE Release 3.3.0SQ:

```
Router(config)# configure terminal
Router(config)# interface qam 7/1.1
Router(config)# cable mode video local
Router(config)# cable downstream tsid 1000 onid 65000
Router(config)# cable downstream rf-profile rfprofile_video
Router(config)# cable downstream frequency 325000000
Router(config)# no cable downstream rf-shutdown
Router(config)# cable downstream interleaver-depth I128-J1
Router(config)# exit
```

The following example shows the RF profile configuration on the Cisco RFGW-10 DS-384 line card:

```
Router(config)# show running config
cable downstream rf-profile rfprofile_video
cable downstream annex B
cable downstream modulation 256
cable downstream interleaver-depth option1 I128-J1 option2 I128-J1
```

```
cable downstream symbol-rate 5360537  
!
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

## cable downstream tsid-base

To configure the Transport Stream Identifier (TSID) value for all QAM interfaces, use the cable downstream tsid-base command in privileged EXEC mode.

**cable downstream tsid-base** *id*

### Syntax Description

<i>id</i>	Specifies the TSID value for the QAM interface. Valid range is from 0 to 65535.
-----------	---

### Command Default

The TSID value is set to 0 on all QAM interfaces.

### Command Modes

Privileged EXEC (#)

### Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.

### Usage Guidelines

This command ensures that each downstream QAM channel has a unique ID when there are multiple Cisco CMTS routers at a headend facility. This ID uniquely defines the QAM channel in the cable headend.

A QAM channel is assigned a TSID value if it is unique. The TSID value is overwritten with a new value if there are no sessions established on that QAM channel. However, if a session exists with the specified QAM channel, the new configured TSID value is rejected.

### Examples

The following example sets the TSID value of 44 on the QAM interfaces:

```
Router# cable downstream tsid-base 44
```

### Related Commands

Command	Description
<b>show controllers qam</b>	Displays cable downstream information configured on the QAM channel and port.
<b>show running-config interface qam</b>	Displays the running configuration of the QAM interface.

# cable image-upgrade disable

To disable the automatic image upgrade of the line card, use the **cable image-upgrade disable** command in global configuration mode. To enable the automatic image upgrade, use the **no** form of this command.

**cable image-upgrade disable**

**no cable image-upgrade disable**

**Command Default** The **no** form of the command is enabled by default.

**Command Modes** Global configuration (config)

Command History	Release	Modification
	15.0(2)SQA	This command was introduced.

**Usage Guidelines** Use the **cable image-upgrade disable** command to disable automatic image upgrade.

**Examples** The following example disables auto image upgrade of the line card:

```
Router(config)# cable image-upgrade disable
Router(config)#
```

The **cable image-upgrade disable** command is used to configure the following features:

- [Bundled Image Upgrade](#)

Related Commands	Command	Description
	<b>show cable-image upgrade bundle</b>	Displays the upgraded images of all the devices on the Supervisor card.
	<b>show cable-image upgrade version</b>	Displays all the upgraded image versions on the line card.

# cable image-upgrade download

To upgrade all device images on a specific line card, use the **cable image-upgrade download** command in privileged EXEC mode.

**cable image-upgrade download** *slot* [**forced**] **background**]

## Syntax Description

<i>slot</i>	Specifies the slot number of the line card. Valid slot numbers are 3 to 14.
<b>forced</b>	(Optional) Forces an upgrade of all the images on the line card.
<b>background</b>	(Optional) Upgrade to line card occurs in the background and control is immediately returned to the command prompt.

## Command Default

This command has no default behavior or values.

## Command Modes

Privileged EXEC (#)

## Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.

## Usage Guidelines

The line card must be present in the slot for an upgrade. The line card image is upgraded with the image of the Supervisor card.

The upgrade occurs in the background if the **background** keyword is specified. The control is immediately returned to the CLI prompt.

The line card resets if an image upgrade has occurred. If the latest images are present on the line card, then the line card does not reset.

## Examples

The following example upgrades the image on line card in slot 7:

```
Router# cable image-upgrade download 7
```

The following example forces the upgrade of all images in line card in slot 3:

```
Router# cable image-upgrade download 3 forced
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>show cable-image upgrade bundle</b>	Displays the upgrade bundle on the supervisor.
<b>show cable-image upgrade status</b>	Displays the upgrade status of an image on the specified line card.
<b>show cable-image upgrade version</b>	Displays all the upgraded image versions on the line card.

## cable linecard encryption

To configure the line card encryption scrambling algorithm, use the **cable linecard encryption** command in global configuration mode. To disable the line card encryption, use the **no** form of this command.

**cable linecard *slot* encryption** {**pkey** **scrambler** [**des**| **csa**] | **clear** **scrambler** **none**| **dvb** **scrambler** **csa**| **dual-crypt** **scrambler** **csa**| **pme** **scrambler** **des**}

**no cable linecard *slot* encryption** {**pkey** **scrambler** [**des**| **csa**] | **dvb** **scrambler** **csa**| **dual-crypt** **scrambler** **csa**| **pme** **scrambler** **des**}

### Syntax Description

<i>slot</i>	Line card slot number. The valid range is from 3 to 12.
<b>pkey</b>	Specifies the encryption type is PowerKEY.
<b>scrambler</b>	Specifies the encryption scrambling algorithms.
<b>des</b>	Indicates the scrambling algorithm is Data Encryption Standard (DES).
<b>csa</b>	Indicates the scrambling algorithm is DVB-Common Scrambling Algorithm (CSA).
<b>clear</b>	Clears the encryption type.
<b>none</b>	Indicates no scrambling algorithm.
<b>dvb</b>	Specifies the encryption type is Digital Video Broadcasting (DVB).
<b>dual-crypt</b>	Specifies the encryption type is Java Conditional Access System (JCAS) which enables both PowerKey and DVB encryptions.
<b>pme</b>	Specifies the encryption type is Privacy Mode Encryption (PME).

### Command Default

None

### Command Modes

Global configuration (config)

**Command History**

Release	Modification
Cisco IOS-XE Release 3.3.0SQ	This command was introduced.
Cisco IOS-XE Release 3.4.0SQ	This command was modified to include the <b>dvb</b> and <b>csa</b> keywords.
Cisco IOS-XE Release 3.4.1SQ	This command was modified.  The optional keyword <b>csa</b> was added to the enable CSA algorithm for PowerKey encryption.  The optional keyword <b>dual-crypt</b> was added to enable JCAS Encryption.
Cisco IOS-XE Release 3.5.0SQ	This command was modified.  The optional keyword <b>pme</b> was added to enable PME.

**Usage Guidelines**

The Cisco RFGW-10 DS-384 DS-384 line card encryption capability is enforced by the software license. At line card insertion, no encryption feature license is available. The Cisco Software Licensing (CSL) and platform CSL layer validate the license present in the line card flash partitions. The line card is licensed for PowerKEY encryption scheme. For more information on Licensing, see [Software License Activation for Cisco RF Gateway 10 Line Cards](#).

Effective with Cisco IOS-XE Release 3.4.1SQ, the **dual-crypt** keyword enables JCAS Encryption. JCAS Encryption allows you to use the PowerKey and DVB encryptions simultaneously with only the CSA encryption algorithm. JCAS Encryption does not support the DES encryption algorithm.

Use the **show licenses all** command to see the status of encryption licenses on all the line cards.

**Examples**

This example shows how to configure PowerKEY encryption on the line card:

```
Router# configure terminal
Router(config)# cable linecard 6 encryption pkey scrambler des
```

The following example shows how to configure DVB encryption on the line card in slot 3:

```
Router# configure terminal
Router(config)# cable linecard 3 encryption dvb scrambler csa
```

The following example shows how to clear the encryption on the line card in slot 3:

```
Router# configure terminal
Router(config)# cable linecard 3 encryption clear scrambler none
```

Effective with Cisco IOS-XE Release 3.4.1SQ, this example shows how to configure CSA algorithm in the PowerKEY encryption on the line card:

```
Router# configure terminal
Router(config)# cable linecard 6 encryption pkey scrambler csa
```

Effective with Cisco IOS-XE Release 3.4.1SQ, this example shows how to configure JCAS Encryption on the line card:

```
Router# configure terminal  
Router(config)# cable linecard 6 encryption dual-crypt scrambler csa
```

Effective with Cisco IOS-XE Release 3.5.0SQ, this example shows how to configure PME on the line card:

```
Router# configure terminal  
Router(config)# cable linecard 3 encryption pme scrambler des
```

### Related Commands

Command	Description
<b>show cable licenses</b>	Displays the licenses configured on the Cisco RFGW-10 line card.

## cable linecard license max-carriers

To activate the QAM carrier density on the line card, use the **cable linecard license max carriers** command in global configuration mode. To deactivate the QAM carrier density on the line card, use the **no** form of this command.

**cable linecard** *lc-slot* **license max-carriers** *carrier\_density*

**no cable linecard** *lc-slot* **license max-carriers**

### Syntax Description

<i>lc_slot</i>	Slot of the line card in the QAM interface. Line card redundancy configured interfaces appear as QAM-red. Valid range is from 3 to 12.
<i>carrier_density</i>	Maximum carrier density per line card. The carrier densities for the Cisco RFGW-10 DS-384 line card are 48, 96, 192, and 384. The default carrier density is 96.

### Command Default

Enabled during line card bootup, provided that a valid QAM carrier license exists on the Cisco RFGW-10 DS-384 line card.

### Command Modes

Global configuration (config)

### Command History

Release	Modification
15.0(2)SQ	This command was introduced.

### Usage Guidelines

The **cable linecard license max-carriers** command sets the QAM carrier density of the line card. Valid configurable licenses are required for the maximum carriers densities per line card. The density specifications are validated by the license on the Supervisor when the max-carriers ports are created.

This command defines the maximum carrier density for a downstream QAM line card. The maximum carriers supported on the Cisco RFGW10-DS-48 line card are 48, and the maximum carriers supported on the Cisco RFGW-10 DS-384 line card are 384.



### Note

This command is applicable on the Cisco RFGW-10 DS-384 line card. This command is auto-generated, and cannot be modified for the Cisco RFGW-10 DS-48 line card.

**Examples**

The following example sets the QAM carrier density for the line card in slot 3.

```
Router(config)# cable linecard 3 license max-carriers 96
```

**Related Commands**

Command	Description
<b>cable downstream max-carriers</b>	Creates QAM carriers per RF port on the Cisco RFGW-10.

# cable linecard reset

To partially reset the line card, use the **cable linecard reset** command in privileged EXEC configuration mode.

**cable linecard** *slot* reset

## Syntax Description

<i>slot</i>	Specifies the line card slot. Valid slot numbers are 3 to 12.
-------------	---

## Command Default

This command has no default behavior or values.

## Command Modes

Privileged EXEC (#)

## Command History

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.

## Usage Guidelines

This command partially resets the line card and the CPU. The front panel SFP (small form-factor pluggable) module continues to process the data.

## Examples

The following example shows a partial reset of the line card in slot 3:

```
Router#cable linecard 3 reset
```

## Related Commands

Command	Description
<b>hw-module slot reset</b>	Resets the line card on the chassis.

## cable midplane ping

To enable the midplane failure detection between the line card and the Supervisor on the Cisco RFGW-10, use the **cable midplane ping** command in global configuration mode. To disable the midplane failure detection, use the **no** form of this command.

**cable midplane ping interval** *ping-interval* **retries** *retry\_num* **wait** *wait-interval* **action** {*log*|*none*}

**no cable midplane ping interval** *ping-interval* **retries** *retry\_num* **wait** *wait-interval* **action** {*log*|*none*}

### Syntax Description

<b>interval</b>	Specifies the frequency of pings sent by the line card.
<i>ping-interval</i>	Length of ping interval, in milliseconds. The valid range is from 10000 to 600000.
<b>retries</b>	Specifies the number of times the line card retries before sending the error message.
<i>retry_num</i>	Number of midplane ping retries. The range is from 10 to 100.
<b>wait</b>	Specifies the time the line card should wait to restart sending the pings after a ping failure has occurred.
<i>wait-interval</i>	Waiting time period, in milliseconds. The range is from 10000 to 600000.
<b>action</b>	Specifies the action taken when ping failure occurs.
<i>log</i>	Messages are written to a system log on ping failure.
<i>none</i>	Action is not taken; pings are disabled.

### Command Default

The midplane failure detection is not configured.

### Command Modes

Global configuration (config)

### Command History

Release	Modification
12.2(50)SQ4	This command was introduced.

**Usage Guidelines**

Use the **cable midplane ping** command to enable midplane pings between the line card and the Supervisor. When this command is enabled, the line card periodically sends ping packets to the Supervisor, and receives responses. However, if no responses are received by the line card, an error message is sent to the Supervisor, and the pings are disabled.

The minimum ping interval is 10000 milliseconds with 10 retries. If a ping fails after the number of retries, the line card waits before restarting the pings. This delay interval is configured as the wait parameter.

**Examples**

The following example shows how to configure the midplane ping interval for 10000 milliseconds with 10 retry attempts, followed by a wait interval of 10000 milliseconds, and an action to log a message on failure:

```
Router(config)# cable midplane ping interval 10000 retries 10 wait 10000 action log
```

**Related Commands**

Command	Description
<b>clear cable midplane ping statistics</b>	Clears the midplane ping statistics on the Cisco RFGW-10.
<b>show cable midplane ping statistics</b>	Displays the midplane ping statistics between the line card and the Supervisor on the Cisco RFGW-10.

## cable mode

To set the mode of the QAM channel, use the **cable mode** command in QAM interface and subinterface configuration mode. To remove this setting, use the **no** form of this command.

**cable mode** {**depi** {**local lbg** *lbg-interface*| **remote** [**learn**]}} **video** {**local**| **remote**} **encrypt**}

**no cable mode** {**depi**| **video**} {**local**| **remote**}

### Syntax Description

<b>depi</b>	Specifies the DEPI mode of the QAM channel.
<b>video</b>	Specifies the video mode of the QAM channel.
<b>local</b>	Specifies that the QAM channel is manually configured.
<b>lbg</b>	Specifies the load balancing group. The QAM block or the Ten Gigabit Ethernet is assigned to the QAM-based local DEPI session. <b>Note</b> 192 carriers are supported on a load balancing group.
<i>lbg-interface</i>	Load balancing group interface. Valid values are 1 and 2.
<b>remote</b>	Specifies that the QAM channel is remotely configured.
<b>learn</b>	(Optional) Specifies that the QAM channel is in learn mode and the RFGW-10 can learn the channel configuration from the M-CMTS. All QAM channels on a single port must be in learn mode for this configuration to work.
<b>encrypt</b>	Sets the mode for encryption based local or remote video sessions. Maximum number of video sessions per line card is 3840. Maximum number of video sessions per chassis is 38400. Maximum number of encrypted video sessions per line card is 1920. Number of video QAM carriers per line card is 256 for Annex-B, 192 for Annex-A or mixed.

**Command Default** No cable mode is set on the QAM channel.

**Command Modes** QAM interface and subinterface configuration (config-if and config-subif)

Release	Modification
12.2(44)SQ	This command was introduced on the Cisco RF Gateway 10.
12.2(50)SQ	This command was modified to add remote and learn keywords.
Cisco IOS-XE Release 3.2.0SQ	This command was modified to include the <b>lbg</b> keyword for local DEPI sessions, and <b>24-qam-map</b> for local video sessions.  The <b>cable mode depi remote learn</b> command is configurable at the QAM interface level.
Cisco IOS-XE Release 3.3.0SQ	This command was modified to include the <b>encrypt</b> keyword for encryption based remote video sessions and remove <b>24-qam-map</b> keyword for the Cisco DS-384 line card.
Cisco IOS-XE Release 3.4.0SQ	This command was modified to include the <b>encrypt</b> keyword for encryption based local video sessions.

**Usage Guidelines** QAM channels on the Cisco RFGW-10 are characterized based on their usage mode and ownership. QAM channels within a QAM port are configured in DEPI and video mode.



**Note** QAM channels cannot be configured within a QAM port in DEPI or Video mode on the Cisco RF Gateway-10 DS48 line card.



**Note** Ensure that you configure the same mode on all channels of a port.

Each QAM channel is configured locally via CLI or remotely through a signaling protocol, such as Modular Cable Modem Termination System (M-CMTS) Downstream External PHY Interface (DEPI), Data Network Control Station (DNCS), Generic QAM Interface (GQI), or Edge Resource Manager Interface (ERMI). The DNCS, GQI and ERMI protocols are used for video only. If a QAM channel is used for remote setup, it cannot be configured locally.



**Note** If other QAM channels on a single port are set to a different mode, the configuration of a QAM channel may fail.

**Tip**

Before changing the existing cable mode of a channel on a port, the **no cable mode** command should be executed.

In Cisco IOS Release Cisco IOS-XE Release 3.2.0SQ, load balancing groups are assigned to QAM channels while configuring local DEPI sessions. Two load balancing groups exist per line card. The QAM channels are equally divided between the two load balancing groups on any line card. Each load balancing group supports 192 carriers or 9.1Gbps.

Effective with Cisco IOS-XE Release 3.3.0SQ, the **24-qam-map** keyword is not supported on the Cisco DS-384 line card.

**Examples**

The following example shows the configuration of QAM subinterface 7/1.1 using DEPI mode locally on a Cisco RFGW-10. Load balancing interface 1 is assigned to the QAM channel:

```
Router(config)# interface qam-red7/1.1
Router(config-subif)# cable mode depi local lbg 1
```

The following is an example at the QAM interface 3/1 level with DEPI in **remote** learn mode on a Cisco RFGW-10:

```
Router(config)# interface qam 3/1
Router(config-if)# cable mode depi remote learn
```

The following is an example at the QAM subinterface 6/4.1 level with DEPI in learn mode on a Cisco RFGW-10:

```
Router(config)# interface qam 6/4.1
Router(config-subif)# cable mode depi remote learn
```

The following is an example at the QAM interface 3/2 level using video mode locally on the Cisco RFGW-10 for Cisco IOS-XE Release 3.4.0SQ:

```
Router(config)# interface qam 3/2
Router(config-if)# cable mode video local encrypt
```

The following is a sample output to show the total number of video sessions:

```
Router# show cable video session slot 3
```

Session ID	QAM Port	Stream Type	Sess Type	IP Address	UDP Port	Out Pgm	Input Bitrate	Input State	Output State	PSI Rdy	Ctrl State
201459584	3/1.2	Remap	SSM	-	-	1	2500412	ACTIVE	OFF	NO	-
201459585	3/1.2	Remap	SSM	-	-	2	2500415	ACTIVE	OFF	NO	-
201459586	3/1.2	Remap	SSM	-	-	3	2500420	ACTIVE	OFF	NO	-
201459587	3/1.2	Remap	SSM	-	-	4	2500427	ACTIVE	OFF	NO	-
201459588	3/1.2	Remap	SSM	-	-	5	2500427	ACTIVE	OFF	NO	-
201459589	3/1.2	Remap	SSM	-	-	6	2500427	ACTIVE	OFF	NO	-
201459590	3/1.2	Remap	SSM	-	-	7	2500427	ACTIVE	OFF	NO	-
201459591	3/1.2	Remap	SSM	-	-	8	2500433	ACTIVE	OFF	NO	-

```
201459592 3/1.2 Remap SSM - - 9 2500436 ACTIVE OFF NO -
```

```
RFGW-10#show cable video session slot 3 | inc Total
Total Sessions = 1920
```

The following example shows the output expected while trying to create the 193rd encrypted video session:

```
interface Qam-red3/4.48
 cable carrier-id 192
 cable mode video remote encrypt
 cable downstream lqam-group 27
 cable downstream rf-profile default-rf-profile
 cable downstream frequency 597000000
 no cable downstream rf-shutdown
 cable partition 2 external-channel 192
Router(config-subif)# cable mode video remote encrypt
```

```
Error: Max encrypted carriers on linecard 3 reached, limit is 192
%ERROR: Failed to enable encryption for Qam3/5.1 - max encrypted carriers reached, only 192
allowed
```

### Related Commands

Command	Description
<b>show depi tunnel</b>	Displays all active control connections.
<b>show depi session</b>	Displays established DEPI data sessions.
<b>show cable linecard load-balancing-group</b>	Displays the load balancing groups on the Cisco RFGW-10.
<b>show controllers qam</b>	Displays information about downstream configuration on a line card.
<b>show running-config interface qam</b>	Displays the downstream configuration of a QAM channel.

# cable partition

To manage and assign QAM channels to a QAM partition, use the **cable partition** command in QAM subinterface configuration mode. To disable, use the **no** form of this command.

**cable partition** *partition-id* **external-channel** *channel\_number*

**no cable partition** *partition-id* **external-channel** *channel\_number*

## Syntax Description

<i>partition-id</i>	QAM partition ID. The valid range is from 1 to 50.
<b>external-channel</b>	Specifies the output port number used in ERM to represent a QAM channel.
<i>channel_number</i>	External output port number for GQI protocol QAM partition. The valid range is from 1-2147483647.

## Command Default

This command is disabled by default.

## Command Modes

QAM subinterface configuration (config-subif)

## Command History

Release	Modification
Cisco IOS-XE Release 3.3.0SQ	This command was introduced.

## Usage Guidelines

Use the **cable partition** command to assign QAM channels to QAM partitions. Ensure that the QAM channel is configured for **cable mode video remote encrypt** and the QAM partition is created before assigning the QAM partition to the QAM channel.



### Note

External channel is applicable to GQI protocol configured QAM partitions.

## Examples

This example shows how to assign the QAM partition 3 to the QAM channel:

```
Router# configure terminal
Router(config)# interface qam-red 3/1.1
Router(config)# cable mode video remote encrypt
Router(config-subif)# cable partition 3 external-channel 200
Router(config-subif)#
```

**Related Commands**

Command	Description
<b>cable qam-partition</b>	Creates a QAM partition for video server on the Cisco RFGW-10 DS-384 line card.

## cable video mpeg-compliance disable

To disable the MPEG compliance parameters of the output transport stream (TS) such as frequency offset and **drift rate**, use the **cable video mpeg-compliance disable** command in global configuration mode (**config**). To enable the MPEG compliance, use the **no** form of this command.

**cable video mpeg-compliance disable**

**no cable video mpeg-compliance disable**

**Command Default** The **no** form of the command is enabled by default.

**Command Modes** Global configuration (**config**).

### Command History

Release	Modification
Cisco IOS-XE Release 3.5.4SQ	This command was introduced.

### Usage Guidelines

Use the **cable video mpeg-compliance disable** command to disable the MPEG compliance of the output TS. Use this command when you have a bad source clock so that the RF-Gateway 10 is in sync with the input source clock. The maximum frequency drift allowed according to the MPEG guidelines is  $\pm 30$  ppm. In some cases, for example, for a 4K video, the maximum frequency drift restriction does not apply.

### Examples

The following example shows how to the disable MPEG compliance on Cisco RF-GW10:

```
Router#configure terminal
Router(config)#cable video mpeg-compliance disable
```