



## Cable Commands: cable m to n

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## cable map-advance

To configure the dynamic map advance algorithm, use the **cable map-advance** command in cable interface configuration mode or MAC domain profile configuration mode. To disable this function, use the **no** form of this command.

```
cable map-advance [{dynamic [safety] | static}] [max-delay]  
no cable map-advance
```

### Syntax Description

<b>dynamic</b> <i>safety</i>	<p>Enables the dynamic MAP advance algorithm that automatically tunes lookahead time in MAPs based on the current farthest CM on a particular upstream port.</p> <ul style="list-style-type: none"> <li><i>safety</i>—Specifies a safety factor for the dynamic map advance algorithm in microseconds. This value controls the amount of extra lookahead time in MAPs to account for inaccuracies of the measurement system and internal software latencies. The range is from 300 to 1500. The default is 1000.</li> </ul> <p><b>Note</b> Using larger safety factors increases the run time lookahead in MAPs, but reduces the upstream performance.</p>
<b>static</b>	Enables the static map advance algorithm that uses a fixed lookahead time value in MAPs based on the worst-case propagation delay of 100 mile HFC cable network.
<i>max-delay</i>	Specifies the maximum round trip delay between the cable plant and furthest CM in microseconds. The range is from 100 to 2000. The default is 1800. The typical delay for a mile of coaxial cable is approximately 7 microseconds. The typical delay for a mile of fiber cable is approximately 8 microseconds.

### Command Default

Dynamic map advance with a safety factor of 1000 microseconds and a maximum round trip delay of 1800 microseconds.

### Command Modes

Interface configuration—cable interface only (config-if)

MAC domain profile configuration (config-profile-md)

### Command History

Release	Modification
12.1T	This command was introduced.
12.0 (9)SC, 12.1(2)EC1	The <b>dynamic</b> option was added.
12.1(10)EC	The <i>max-delay</i> option was added. The dynamic MAP algorithm was also enhanced so that it can quickly determine whether the furthest CM is now offline, so that the MAP advance algorithm can be updated accordingly.
12.2(8)BC1	The range for the <i>max-delay</i> option was changed to the current values of between 100 and 2000 microseconds.

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

### Usage Guidelines

The *max-delay* option, which was introduced in Cisco IOS Release 12.1(10)EC, specifies the maximum possible round-trip delay between the cable plant and furthest CM in the cable network. A CM is not allowed to exceed the maximum timing offset given by the *max-delay* value (in **static** mode) or given by the combination of the *max-delay* and *safety* values (in **dynamic** mode). If a CM reports a timing offset beyond the maximum value, the CMTS resets its offset to the maximum value and puts an exclamation point (!) next to its offset value in the **show cable modem** display.

In dynamic MAP operation, Cisco IOS 12.1(10)EC also implements a regular polling of the furthest CM, to determine if that CM is now offline. If the furthest CM has gone offline, the CMTS scans the currently online CMs to determine which CM is now the furthest offline and updates the dynamic MAP advance algorithm with the new value.

### Examples

The following example shows how to configure the dynamic map advance to 1500 microseconds:

```
router(config-if)# cable map-advance dynamic 1500
```

### Related Commands

Command	Description
<b>show cable modem</b>	Displays statistics for the connected CMs.

## cable match address

To specify that IP multicast streams be encrypted, use the **cable match address** command in cable interface configuration mode. To specify that multicast streams should not be encrypted, use the **no** form of this command.

**cable match address** *access-list*  
**no cable match address**

<b>Syntax Description</b>	<i>access-list</i>	Specifies that the IP multicast streams defined by the access list be encrypted. Access lists can be IP access list numbers or an IP access list name. Valid access list numbers are from 100 to 199.
---------------------------	--------------------	---

**Command Default** None

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

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

**Usage Guidelines** The **cable match address** command binds an access-list to a cable interface, allowing multicast encryption to be performed on traffic through that interface. To configure the access list, use the **ip access-list** command.



**Note** This command is not available for cable subinterfaces.



**Note** This command is available only on images that support Baseline Privacy Interface (BPI) and Baseline Privacy Interface Plus (BPI+) encryption.

### Examples

The following example shows how to specify that the multicast stream defined by the access list named **reno** be encrypted on cable interface 3/0:

```
Router(config)# interface c3/0
Router(config-if)# cable match address reno
```

The following example shows how to specify that the multicast stream defined by the access list number 102 be encrypted:

```
Router(config)# interface c3/0
```

```
Router(config-if)# cable match address 102
```

---

**Related Commands**

Command	Description
<b>ip access-list</b>	Defines an IP access list by name.

## cable max-hosts

To specify the maximum number of hosts that can be attached to a subscriber's CM, use the **cable max-hosts** command in cable interface configuration mode. To reset the allowable number of hosts attached to a CM to the default value of 0 hosts, use the **no** form of this command.

**cable max-hosts** *n*  
**no cable max-hosts**

### Syntax Description

<i>n</i>	Specifies the maximum number of hosts that can be attached to a CM on this interface. The range is from 0 to 255. The default is 0.
----------	---

### Command Default

The maximum number of hosts that can be attached to a CM is 0.

### Command Modes

Interface configuration—cable interface only (config-if)

### Command History

Release	Modification
12.0(4)XI	This command was introduced.
12.0(6)SC, 12.1(2)EC1	Support was added on the Cisco IOS 12.0 SC and 12.1 EC release trains.
IOS-XE 3.15.OS	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

### Usage Guidelines

The Cisco CMTS uses three commands set the maximum number of hosts for a particular CM, for all CMs on a particular cable interface, or for all CMs using the Cisco CMTS router:

- **cable modem max-hosts**—Sets the maximum number of hosts for a particular CM.
- **cable max-hosts**—Sets the maximum number of hosts for all CMs on a particular cable interface.
- **cable modem max-cpe**—Sets the maximum number of hosts for all CMs using the Cisco CMTS router.

The more specific commands override the settings of the less specific commands. For example, if you use the **cable modem max-cpe** command to set the maximum number of hosts to 2 for all CMs, you can still use the **cable modem max-hosts** command to give a particular CM a larger maximum host value.



**Note** The CMTS assigns the MAX Host value to a cable modem at the time that the cable modem registers with the CMTS. Changing any of the MAX Host commands affects only cable modems that register after the change.

### Examples

The following example shows how to set the maximum hosts for CMs on this particular cable interface to 15:

```
Router(config)# interface c6/0
Router(config-if)# cable max-hosts 15
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>cable modem access-group</b>	Specifies an access group for a CM.
<b>cable modem change-frequency</b>	Changes the downstream frequency or upstream channel ID.
<b>cable modem max-cpe</b>	Sets the maximum number of hosts for all CMs using the Cisco CMTS router.
<b>cable modem max-hosts</b>	Sets the maximum number of hosts for a particular CM.
<b>show cable modem</b>	Displays CM configuration settings.

## cable mc-link-stat ignore

To ensure that whenever the Downstream External PHY Interface (DEPI) Ethernet port goes down, the module interface or the mc-link does not go down, use the **cable mc-link-stat ignore** command in global configuration mode.

**cable mc-link-stat ignore**

---

**Syntax Description**

This command has no arguments or keywords.

---

**Command Default**

Whenever DEPI Ethernet port goes down, the module interface or the mc-link also goes down. That is, the **no cable mc-link-stat ignore** command is enabled by default.

---

**Command Modes**

Global configuration (config)

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**Command History**

Release	Modification
12.2(33)SCH	This command was introduced.

---

**Examples**

The following example shows how to ensure that the module interface does not go down whenever DEPI ethernet port goes down:

```
Router(config)# cable mc-link-stat ignore
```

## cable metering data-per-session

To view the number of cable metering data flows per session for a cable modem termination system, use the **cable metering data-per-session** command in the global configuration mode. To disable this feature, use the **no** form of this command.

**cable metering data-per-session** *data-per-session* **timer** *timer value*  
**no cable metering data-per-session** *data-per-session* **timer** *timer value*

Syntax Description		
	<i>data-per-session</i>	Specifies the number of data flows per session in KB. The range is from 3 to 30. The default is 5.
	<b>timer</b>	Displays the cable line card timer to wake up.
	<i>timer value</i>	Specifies the timer wake up interval value in milliseconds. The range is from 8 to 500. The default is 100.

**Command Default** The cable metering data flow values are not visible.

**Command Modes** Global configuration (config)

Command History	Release	Modification
	12.2(33)SCB1	This command was introduced.
	12.3(23)BC7	This command was integrated into Cisco IOS Release 12.3(23)BC7.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines** The **cable metering data-per-session** command allows users to view the number of cable metering data flows per session. The command limits or throttles the data collection between the cable line card and the route processor.

**Examples** The following example displays the number of cable metering data flows per session:

```
Router# configure terminal
Router(config)# cable metering data-per-session 8 timer 100
Router# show run | include metering
cable metering destination 2.7.36.88 6789 0 15 non-secure
cable metering data-per-session 8 timer 100
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>show cable metering-status</b>	Displays information about the most recent successful usage-based billing operation.
<b>cable metering destination</b>	Enables usage-based billing and to stream the billing records to an external collection server,

## cable metering destination

To enable usage-based billing and to stream the billing records to an external collection server, use the **cable metering destination** command in global configuration mode. To disable usage-based billing, use the **no** form of this command.

**cable metering destination** *ip-address port* [*ip-address2 port2*] *retries minutes* {**non-secure** | **secure**} [**cpe-list-suppress**] [**flow-aggregate**] [**full-records**]  
**no cable metering**

### Syntax Description

<i>ip-address port</i>	Address and TCP port number for the billing application on the external server: <ul style="list-style-type: none"> <li><i>ip-address</i>— IP address for the external collection server.</li> <li><i>port</i>— TCP port number for the billing collection application on the server. The range is from 0 to 65535, but the port should not be one of the widely-used TCP port numbers (0 to 1024).</li> </ul>
<i>ip-address2 port2</i>	(Optional) IP address and TCP port number for a billing application on a secondary external server that is used if the primary server fails to respond: <ul style="list-style-type: none"> <li><i>ip-address2</i>— IP address for the secondary external server.</li> <li><i>port2</i>— TCP port number for the billing collection application on the secondary server. The range is from 0 to 65535, but the port should not be one of the widely-used TCP port numbers (0 to 1024).</li> </ul>
<i>retries</i>	Number of retry attempts that the Cisco CMTS makes to establish a secure connection with the external server before using the secondary server (if configured) and sending an SNMP trap about the failure. The range for <i>n</i> is from 0 to 5. The default is 1 retry attempt.
<i>minutes</i>	Frequency of the billing records streamed to the external server in minutes. The range is 2 to 1440 (24 hours), with no default. <b>Note</b> We recommend a minimum interval of 30 minutes.
<b>non-secure</b>	Specifies that the Cisco CMTS should use an unencrypted TCP connection when connecting with the billing application on the external server.
<b>secure</b>	Specifies that the Cisco CMTS should use a secure socket layer (SSL) TCP connection when connecting with the billing application on the external server. <b>Note</b> This option is available only on the Cisco CMTS software images that support Baseline Privacy Interface (BPI) encryption.
<b>cpe-list-suppress</b>	(Optional) Eliminates the customer premises equipment (CPE) IP addresses from the billing records to improve performance. <b>Note</b> The default is for CPE addresses to be included in the billing record, up to a maximum of five CPE IP addresses for each cable modem.
<b>flow-aggregate</b>	(Optional) Combines all information for an individual cable modem into one record. Separate counters are maintained for upstream and downstream traffic, but those counters include all service flows in that direction.

<b>full-records</b>	(Optional) Provides information about full service flow (active and idle) records.
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**Command Default**

Usage-based billing is disabled. When enabled, CPE IP addresses (a maximum of five per cable modem) are included in the billing records by default.

**Command Modes**

Global configuration (config)

**Command History**

Release	Modification
12.3(9a)BC	This command was introduced.  <b>Note</b> In Cisco IOS Release 12.3(9a)BC, this command supports the monitoring of all service flows for DOCSIS 1.0, DOCSIS 1.1, and DOCSIS 2.0 cable modems: <ul style="list-style-type: none"> <li>• upstream and downstream</li> <li>• primary</li> <li>• secondary</li> <li>• dynamic</li> </ul>
12.2(33)SCD2	This command was modified to add the <b>full-records</b> keyword.  <b>Note</b> In Cisco IOS Release 12.2(33)SCD2 and later releases, this command is also supported on DOCSIS 3.0 cable modems.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines**

The **cable metering destination** command enables usage-based billing and configures it for streaming mode, where the Cisco CMTS creates the billing records and regularly sends them to an external server for use by the billing application.

The Cisco CMTS attempts to establish a connection with the first (primary) external server, and if this fails, the CMTS sends an SNMP trap about the failure. The Cisco CMTS retries the connection for the number of times specified in the **cable metering destination** command, and if all of those attempts fail, the Cisco CMTS switches to the secondary external server, if configured. The Cisco CMTS repeats this sequence at every interval, and always tries to connect to the primary server first before attempting to use the secondary server.



**Note** You can enable usage-based billing using either the **cable metering filesystem** or **cable metering destination** command, but not both. If you give these commands twice, the second command overwrites the first.

If the CMTS cannot transmit the billing record to the external server, and if metering traps have been enabled using the **snmp-server enable traps cable metering** command, the CMTS sends an SNMP trap to the SNMP manager describing the reason for the failure. Typically, the reason is either that a timeout occurred with the external server, or that the billing record no longer exists on the local filesystem. An SNMP trap is sent for each connection failure.

To disable usage-based billing, use the **no cable metering** command. This immediately stops the collection of billing information, except when the billing records are currently being streamed to the external server. If a billing operation is in progress when you give the **no cable metering** command, the system displays the

message “CMTS Metering in progress. Ignoring current config.” Wait until the billing operation is finished and then reenter the **no cable metering** command.



**Note** If the **show cable metering-status** command displays the status of a streaming operation as “success” but the records were not received on the billing application server, verify that the Cisco CMTS and server are configured for the same type of communications (non-secure TCP or secure SSL). If the Cisco CMTS is configured for non-secure TCP and the server is configured for secure SSL, the Cisco CMTS transmits the billing record successfully, but the server discards all of the data, because it did not arrive in a secure SSL stream.

## Examples

The following example shows how to enable usage-based billing for streaming mode, with the CMTS transmitting the billing records every 60 minutes to the server at the IP address of 10.10.10.37 and TCP port of 5215, using a secure socket layer (SSL) TCP connection. A secondary external service is also defined. The CMTS will retry the connection three times before giving up and switching to the secondary server, as well as sending an SNMPv3 trap to notify the SNMP management system of the failure:

```
U7246VXR# configure terminal
U7246VXR(config)# cable metering destination 10.10.10.37 5215 10.10.10.41 5215 3 60 secure
U7246VXR(config)#
```

The following example shows how to enable usage-based billing for streaming mode, with the CMTS transmitting the billing records every 30 minutes to the server at the IP address of 10.10.10.37 and TCP port of 8181, using an unencrypted TCP connection. No secondary server is defined. The CMTS will retry the connection only once before giving up and sending an SNMPv3 trap to notify the SNMP management system of the failure:

```
Router# configure terminal
Router(config)# cable metering destination 10.10.10.37 8181 1 30 non-secure
Router(config)#
```

The following example shows how to enable usage-based billing, using the same configuration as above, except that the billing records do not include the IP addresses for the CPE devices:

```
Router# configure terminal
Router(config)# cable metering destination 10.10.10.37 8181 1 30 non-secure cpe-list-suppress
Router(config)#
```

The following example shows how to enable usage-based billing, using an unencrypted TCP connection, including the IP addresses for the CPE devices, and enabling the **full-records** option:

```
Router# configure terminal
Router(config)# cable metering destination 10.10.10.37 11 1 222 non-secure full-records
cpe-list-suppress
Router#
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>cable metering filesystem</b>	Enables usage-based billing and writes the billing records to a file on a local file system.
<b>cable metering ipdr</b>	Enables usage-based billing using the IPDR and SP2.1 protocol.
<b>cable metering ipdr-d3</b>	Enables usage-based billing on DOCSIS 3.0 cable modems.
<b>cable metering source-interface</b>	Enables debugging of usage-based billing operations.
<b>show cable metering-status</b>	Displays information about the most recent usage-based billing operation.
<b>snmp-server enable traps cable</b>	Ensures that the Simple Network Management Protocol (SNMP) traps are sent for cable-related events.

# cable metering filesystem

To enable usage-based billing and to write the records to a file on a local file system, use the **cable metering filesystem** command in global configuration mode. To disable usage-based billing, use the **no** form of this command.

**cable metering filesystem** *filesystem* [**cpe-list-suppress**] [**flow-aggregate**] [**full-records**]  
**no cable metering**

## Syntax Description

<i>filesystem</i>	File system where the billing record file is written. The <i>filesystem</i> parameter has a maximum length of 25 characters and must specify a valid file system on the router (such as slot0, disk1, or flash).  <b>Note</b> The system writes the billing records to this file system using a file name that contains the hostname of the router followed by a timestamp when the record was written.
<b>cpe-list-suppress</b>	(Optional) Eliminates the customer premises equipment (CPE) IP addresses from the billing records to improve performance.  <b>Note</b> If this option is not selected, a maximum of five CPE IP addresses are included in the billing record for each cable modem.
<b>flow-aggregate</b>	(Optional) Combines all information for an individual cable modem into one record. Separate counters are maintained for upstream and downstream traffic, but those counters include all service flows in that direction.
<b>full-records</b>	(Optional) Provides information about full service flow (active and idle) records.

## Command Default

Usage-based billing is disabled. When usage-based billing is enabled, CPE IP addresses (a maximum of five) are included in the billing records by default.

## Command Modes

Global configuration (config)

## Command History

Release	Modification
12.3(9a)BC	This command was introduced.  <b>Note</b> In Cisco IOS Release 12.3(9a)BC, this command supports the monitoring of all service flows for DOCSIS 1.0, 1.1, and 2.0 cable modems: <ul style="list-style-type: none"> <li>• upstream and downstream</li> <li>• primary</li> <li>• secondary</li> <li>• dynamic</li> </ul>
12.2(33)SCD2	This command was modified to add the <b>full-records</b> keyword.  <b>Note</b> In Cisco IOS Release 12.2(33)SCD2 and later releases, this command is also supported on the DOCSIS 3.0 cable modems.

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

### Usage Guidelines

The **cable metering filesystem** command enables usage-based billing and configures it for file mode, where the CMTS writes the billing records to the local file system. The system writes the billing record to the filesystem specified by this command, using a file name that consists of the router's hostname followed by a timestamp for when the file was created.

When the CMTS writes a billing record, it can also optionally send an SNMPv3 trap to notify the billing application that a billing record is available for pickup. The billing application can then log into the Cisco CMTS and use the File Transfer Protocol (FTP) or Secure Copy (SCP) to pick up the file.



**Note** You can enable usage-based billing using either the **cable metering filesystem** or **cable meteringdestination** command, but not both. If you give these commands twice, the second command overwrites the first.

If the CMTS cannot write the billing record to the local filesystem, and if metering traps have been enabled using the **snmp-server enable traps cable metering** command, the CMTS sends an SNMP trap to the SNMP manager describing the reason for the failure. Typically, the reason is either that the disk is full or that an disk error occurred (such as no PCMCIA card in the slot).

To disable usage-based billing, use the **no cable metering** command. This immediately stops the collection of billing information, except when the billing records are currently being written to the local file system. If a billing operation is in progress when you give the **no cable metering** command, the system displays the message "CMTS Metering in progress. Ignoring current config." Wait until the billing operation is finished and then reenter the **no cable metering** command.

### Examples

The following example shows how to enable usage-based billing, writing the records to a file on the disk0: device.

```
U7246VXR# configure terminal
U7246VXR(config)# cable metering filesystem disk0:
U7246VXR(config)#
```



**Note** Do not use **nvr** as the file system. For example, do not use: Router(config)# **cable metering filesystem nvr**:

The following example shows how to enable usage-based billing, writing the records to files on the disk2 device on an NPE-G1 processor:

```
Router# configure terminal
Router(config)# cable metering filesystem disk2:
Router(config)#
```

The following example shows how to enable usage-based billing, writing the records to files in Flash Memory. The IP addresses for the CPE devices are not included in the billing records.

```
Router# configure terminal
```

```
Router(config)# cable metering filesystem flash: cpe-list-suppress
Router(config)#
```

The following example shows how to enable usage-based billing, writing the records to files in Flash Memory, and enabling the full-records option:

```
Router# configure terminal
Router(config)# cable metering filesystem disk2:xyz full-records
Router#
```

#### Related Commands

Command	Description
<b>cable metering destination</b>	Enables usage-based billing and streams the billing records to an external server.
<b>cable metering ipdr</b>	Enables usage-based billing using the IPDR and SP2.1 protocol.
<b>cable metering ipdr-d3</b>	Enables usage-based billing on DOCSIS 3.0 cable modems.
<b>cable metering source-interface</b>	Enables debugging of usage-based billing operations.
<b>show cable metering-status</b>	Displays information about the most recent usage-based billing operation.
<b>snmp-server enable traps cable</b>	Enables the sending of Simple Network Management Protocol (SNMP) traps for cable-related events.

## cable metering ipdr

To configure the Subscriber Account Management Interface Specification (SAMIS) and enable usage-based billing on DOCSIS 2.0 cable modems, use the **cable metering ipdr** command in global configuration mode. To disable usage-based billing, use the **no** form of this command.

```
cable metering ipdr interval session session-id [flow-aggregate] [full-records]
no cable metering
```

### Cisco cBR Series Converged Broadband Routers

```
cable metering ipdr interval session session-id {full-records}
```

#### Syntax Description

<i>interval</i>	Specifies the Metering data streaming interval in minutes. The interval is the time between the completion of one export and the beginning of another. The range is from 2 to 1440 (24 hours).
<b>session</b> <i>session id</i>	IP Detail Records (IPDR) session ID. The session ID range is from 1 to 255.
<b>flow-aggregate</b>	(Optional) Combines all information for an individual cable modem into one record. Separate counters are maintained for upstream and downstream traffic, but those counters include all service flows in that direction. (For Cisco uBR10012 Router and Cisco uBR7200 Series Routers)
<b>full-records</b>	(Optional) Provides information about full service flow (active and idle) records. (For Cisco uBR10012 Router and Cisco uBR7200 Series Routers)

#### Command Default

Usage-based billing is disabled.

#### Command Modes

Global configuration (config)

#### Command History

Release	Modification
12.2(33)SCA	This command was introduced. <b>Note</b> In Cisco IOS Release 12.2(33)SCA, this command is supported on DOCSIS 1.0, DOCSIS 1.1, and DOCSIS 2.0 cable modems.
12.2(33)SCD2	The command was modified to include the <b>full-records</b> keyword. <b>Note</b> In Cisco IOS Release 12.2(33)SCD2 and later releases, this command is also supported on DOCSIS 3.0 cable modems.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers. The <b>flow-aggregate</b> keyword was removed.

#### Usage Guidelines

The **cable metering ipdr** command configures how SAMIS data is exported. This command is used for DOCSIS 2.0 SAMIS schema.

When **flow-aggregate** is enabled, the service flows are combined into one record per cable modem:

- ServiceClassName element always returns a null value in IPDR records, even when service flows on the cable modem have a valid service class name.
- ServiceIdentifier element always returns a zero value.

## Examples

The following example shows how to enable usage-based billing for IPDR, with the billing record interval set to every 60 minutes with full-records and flow-aggregate options enabled:

```
Router# configure terminal
Router(config)# cable metering ipdr 60 session 111 full-records flow-aggregate
Router(config)#
```

## Related Commands

Command	Description
<b>cable metering destination</b>	Enables usage-based billing, and streams the billing records to an external server.
<b>cable metering filesystem</b>	Enables usage-based billing and writes the billing records to a file on a local file system.
<b>cable metering source-interface</b>	Enables debugging of usage-based billing operations.
<b>show cable metering-status</b>	Displays information about the most recent usage-based billing operation.
<b>snmp-server enable traps cable</b>	Ensure that the Simple Network Management Protocol (SNMP) traps are sent for cable-related events.

## cable metering ipdr-d3

To configure the Subscriber Account Management Interface Specification (SAMIS) and enable usage-based billing on DOCSIS 3.0 cable modems, use the **cable metering ipdr-d3** command in global configuration mode. To disable usage-based billing, use the **no** form of this command.

```
cable metering ipdr-d3 session session-id type type [flow-aggregate] [full-records]
no cable metering
```

Syntax Description	
<b>session</b> <i>session id</i>	Specifies the IPDR session ID. The range is from 1 to 255.
<b>type</b> <i>type</i>	Specifies the IPDR DOCSIS 3.0 service definition type of metering. The range is from 1 to 2.
<b>flow-aggregate</b>	(Optional) Combines all information for an individual cable modem into one record. Separate counters are maintained for upstream and downstream traffic, but those counters include all service flows in that direction. (For Cisco uBR10012 Router and Cisco uBR7200 Series Routers)
<b>full-records</b>	(Optional) Provides information about full service flow (active and idle) records. (For Cisco uBR10012 Router and Cisco uBR7200 Series Routers)

**Command Default** Usage-based billing is disabled, by default.

**Command Modes** Global configuration (config)

Command History	Release	Modification
	12.2(33)SCD2	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines** The **cable metering ipdr-d3** command configures how the SAMIS data is exported. This command is used for DOCSIS 3.0 SAMIS schema (including type 1 and type 2).

When **flow-aggregate** is enabled, the service flows are combined into one record per cable modem:

- ServiceClassName element always returns a null value in IPDR records, even when service flows on the cable modem have a valid service class name.
- ServiceIdentifier element always returns a zero value.

### Examples

The following example shows how to enable usage-based billing for IPDR DOCSIS 3.0, with full-records and flow-aggregate options enabled:

```
Router# configure terminal
Router(config)# cable metering ipdr-d3 session 111 type 2 full-records flow-aggregate
Router(config)#
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>cable metering destination</b>	Enables usage-based billing, and streams the billing records to an external server.
<b>cable metering filesystem</b>	Enables usage-based billing and writes the billing records to a file on a local file system.
<b>cable metering source-interface</b>	Enables debugging of usage-based billing operations.
<b>cable sflog max-entry</b>	Enables service flow logging and configuring the number and duration of entries in the log.
<b>show cable metering-status</b>	Displays information about the most recent usage-based billing operation.
<b>snmp-server enable traps cable metering</b>	Ensures that Simple Network Management Protocol (SNMP) traps are sent for cable-related events.

# cable metering localtime

To provide usage records with local time timestamping, use **cable metering localtime** command in global configuration mode.

## **cable metering localtime**

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

**Command Default** This command is not configured by default.

**Command Modes** Global configuration(config)

Command History	Release	Modification
	12.2(33)SCI2	This command was introduced.

**Usage Guidelines** When the **cable metering localtime** command is configured, the timestamp in metering output is local time, e.g. "2015-03-03T16:26:07", otherwise it's the UTC time, e.g. "2015-03-03T16:26:07Z" (with a "Z" indicating that the time is UTC/GMT).

**Examples** The following example configures usage records with local time timestamping:

```
Router(config)#cable metering localtime
Router(config)#
```

Related Commands	Command	Description
	<b>cable metering destination</b>	Enables usage-based billing and streams the billing external server.
	<b>cable metering ipdr</b>	Enables usage-based billing using the IPDR and SP2.1 protocol.
	<b>cable metering ipdr-d3</b>	Enables usage-based billing on DOCSIS 3.0 cable modems.
	<b>cable metering source-interface</b>	Enables debugging of usage-based billing operations.
	<b>show cable metering-status</b>	Displays information about the most recent usage-based billing operation.
	<b>cable metering file-system</b>	Enables usage-based billing and writes the billing records to a file on a local file system.

## cable metering source-interface

To enable specification of the source-interface for the billing packets, use the **cable metering source-interface** command in privileged EXEC mode. To turn off the specified source-interface, use the **no** form of this command.

**cable metering source-interface** *interface*  
**no cable metering source-interface** *interface*

### Syntax Description

<i>interface</i>	Specifies the source of the usage-based billing packets originated by the router using the <b>cable metering source-interface</b> command. This is often used to set the source-interface as the IP address of the loopback interface.
------------------	--

### Command Default

Usage billing is disabled. When enabled, CPE IP addresses (a maximum of five per cable modem) are included in the billing records by default.

### Command Modes

Global configuration (config)

### Command History

Release	Modification
12.3(21)BC	This command was introduced.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

### Usage Guidelines

The **cable metering source-interface** command enables the user to specify the source-interface of the usage-based billing packets. All billing packets are usually automatically assigned a source-interface, but users using the **cable metering source-interface** command can set the source-interface to be the IP address of the loopback interface.

If the user does not specify the source-interface configuration, SAMIS picks the highest IP address of the loopback interface as the source interface. If the loopback interface is not available, then SAMIS selects the highest IP of the physical interface for source interface.



**Note** If a loopback interface is specified, the MAC address is that of the management interface in the docID in the billing packet.



**Note** The option of specifying the source-interface for metering is available only after the metering mode is configured.

If the **cable metering source-interface** command is used when the Usage-Based Billing feature is operating in the File Mode, the CMTS IP address in the billing packets are changed to the IP address of the source-interface specified using the **cable metering source-interface** command or through setting the

**ccmtrCollectionSrcIfIndex** object. The MAC address in the billing packets' header is also changed to the MAC address of the source-interface.

If the **cable metering source-interface** command is used when the Usage-Based Billing feature is operating in the Streaming Mode, the CMTS IP address in the billing packets, as well as the source IP address of the billing packets, are changed to the IP address of the source-interface specified using the **cable metering source-interface** command or through setting the **ccmtrCollectionSrcIfIndex** object. The MAC address in the billing packets' header is also changed to the MAC address of the source-interface.

When defining the source-interface, the following possible error checks can be performed to determine if the source-interface that the user has defined is a valid source-interface for metering:

1. Verify that the interface specified is up and has an IP address.
2. Verify that the IP address is in the same subnet/majornet as that of the destination address.



**Note** Even after performing these error checks, there are no guarantees that the billing packets will be sent out since the TCP connection may not succeed due to the absence of a physical connection between the CMTS and the collection server.

## Examples

The following is an example where the source-interface specified was a loopback interface and it had a mac-address of 000C31F6F400 and an ip address of 1.100.100.100.

```
Router# configure terminal
```

```
Router(config)# cable metering source-interface loopback 1.100.100.100
<?xmlversion="1.0"encoding="UTF8"?><IPDRDocxmlns="http://www.ipdr.org/namespaces/ipdr"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="DOCSIS-3.5-A.0.xsd"
docId="C7B1B20E-0000-0000-0000-000C31F6F400" creationTime="2006-03-02T18:03:58Z"
IPDRRecorderInfo="VXR3" version="3.5-A.0"><IPDR
xsi:type="DOCSIS-Type"><IPRcreationTime="2006-03-02T18:03:58Z"/><IPRcreationTime><MSIsource>VXR3</MSIsource><MSIipAddress>1.100.100.100</MSIipAddress><MSImacAddress>000C31F6F400</MSImacAddress><MSIcount>2</MSIcount></IPDR></IPDRDoc>
Router(config)#
```

The following is an example where the source-interface specified was a loopback interface and it had a mac-address of 00027D67DC0 and an ip address of 2.90.100.100.

```
Router# configure terminal
```

```
Router(config)# cable metering source-interface loopback 2.90.100.10
Accept 2.90.100.100:42380
<?xmlversion="1.0"encoding="UTF8"?><IPDRDocxmlns="http://www.ipdr.org/namespaces/ipdr"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="DOCSIS-3.5-A.0.xsd"
docId="C7B701D1-0000-0000-0000-00027D67DC00" creationTime="2006-03-06T18:45:37Z"
IPDRRecorderInfo="ubr7246-R7427" version="3.5-A.0"><IPDR
xsi:type="DOCSIS-Type"><IPRcreationTime="2006-03-06T18:45:37Z"/><IPRcreationTime><MSIsource>ubr7246-R7427</MSIsource><MSIipAddress>2.90.100.100</MSIipAddress><MSImacAddress>00027D67DC0</MSImacAddress><MSIcount>2</MSIcount></IPDR></IPDRDoc>
Router(config)#
```

```

count="2" endTime="2006-03-06T18:45:37Z"/></IPDRDoc>
Closing socket 2.90.100.100:42380
Router(config)#

```

### Related Commands

Command	Description
<b>cable metering source-interface</b>	Enables usage-based billing and streams the billing records to an external server.
<b>cable metering filesystem</b>	Enables usage-based billing and writes the billing records to a file on a local file system.
<b>debug cable remote-query</b>	Turns on debugging to gather information from remote CMs.
<b>show cable metering-status</b>	Displays information about the most recent usage-based billing operation.
<b>snmp-server enable traps cable</b>	Enables the sending of Simple Network Management Protocol (SNMP) traps for cable-related events.

## cable modem access-group

To configure the access-group for a CM, use the **cable modem access-group** command in privileged EXEC mode. To disable the specification, use the **no access-group** form of this command.

```
cable modem {mac-addrip-addr} access-group [{access-listaccess-name}]
cable modem {mac-addrip-addr} no access-group
```



**Note** The **cable modem access-group** command is not supported on the Cisco uBR10012 universal broadband router.

Syntax Description		
	<i>ip-addr</i>	Specifies the IP address for the CM.
	<i>mac-address</i>	Specifies the MAC address for the CM.
	<i>access-list</i>	Specifies the IP access list (standard or extended). The range is from 1 to 199.
	<i>access-name</i>	Specifies the access-list name.

**Command Default** None

**Command Modes** Privileged EXEC (#)

Command History	Release	Modification
	11.3(8) NA	This command was introduced.
	12.2(4)BC1	The functionality of this command was made identical to that of the <b>cable host access-group</b> command, but both commands were retained for backwards compatibility.
	IOS-XE 3.15.OS	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

### Examples

The following example shows the **cable modem access-group** command assigning access-list 1 to the CM with the MAC address of **abcd.ef01.2345**:

```
Router# cable modem abcd.ef01.2345 access-group 1
Router#
```

Related Commands	Command	Description
	<b>cable host access-group</b>	Configures the access list for a host.
	<b>cable modem change-frequency</b>	Changes the downstream frequency or upstream channel ID.

<b>Command</b>	<b>Description</b>
<b>cable modem max-hosts</b>	Specifies the maximum hosts for a CM.
<b>cable modem qos profile</b>	Specifies the QoS profile for a CM.
<b>show cable modem</b>	Displays CM configuration settings.

# cable modem change-frequency

To override the frequency used by a CM, use the **cable modem change-frequency** command in privileged EXEC mode.

**cable modem** {*mac-addr*|*ip-addr*} **change-frequency** {*ds-frequency-hz* [*us-channel-id*]*us-channel-id*}

Syntax Description		
	<i>ip-addr</i>	Specifies the IP address for the CM.
	<i>mac-address</i>	Specifies the MAC address for the CM.
	<i>ds-frequency-hz</i>	Specifies the downstream frequency for the CM (in Hertz).
	<i>us-channel-id</i>	Specifies the upstream channel ID.

**Command Default** None

**Command Modes** Privileged EXEC (#)

Command History	Release	Modification
	12.0(4)XI	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines** This command allows the CMTS administrator to change the downstream frequency for a CM, overriding the DOCSIS configuration file setting. This command is not applicable on Cisco IOS Release 12.1(3a)EC.

**Examples** The following example shows how to change the downstream frequency of the CM having IP address 172.172.172.12 to 570 MHz:

```
Router# cable modem 172.172.172.12 change-freq 57000000
Router#
```

Related Commands	Command	Description
	<b>cable modem access-group</b>	Specifies an access group for a CM.
	<b>cable modem max-hosts</b>	Specifies the maximum hosts for a CM.
	<b>cable modem qos profile</b>	Specifies the QoS profile for a CM.
	<b>show cable modem</b>	Displays CM configuration settings.

## cable modem max-cpe

To specify a maximum number of permitted hosts per modem (overriding the max-cpe value in the CM configuration file), use the **cable modem max-cpe** command in global configuration mode.

**cable modem max-cpe** [*n* | **unlimited**]

Syntax Description		
	<i>n</i>	Specifies the configuration file value. The range is from 1 to 255.
	<b>unlimited</b>	Specifies the maximum CPE value to be unlimited.

**Command Default** The **max-cpe** value provided in the configuration file is used by the CMTS to limit the number of hosts connected to a single CM (**no cable modem max-cpe**).

**Command Modes** Global configuration (config)

Command History	Release	Modification
	12.0(10)SC, 12.1(2)EC	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines** The CMTS enables up to *n* number of hosts for a modem. When set to **unlimited**, or *n* is greater than the **max-cpe** value in the configuration file of a CM, the **max-cpe** value in the configuration file of the CM is used.



**Note** When the the maximum number of CPEs, set by the **cable modem max-cpe** command in the Cisco CMTS, is smaller than the maximum number of CPEs set in the configuration file of the CMs, the number set by the **cable modem max-cpe** command overrides the number set in the configuration file of the CMs.



**Note** When setting to **unlimited** or *n* is greater than the **max-cpe** value in the configuration file of a CM, the CM must control the maximum number of hosts, and the DHCP server must control the number of IP addresses assigned to hosts behind a single CM.



**Caution** Use of this command might open a security hole in the system by enabling denial of service attacks. Specifically, it might enable a user to obtain a large number of IP addresses, thereby taking down the entire network, after all the available IP addresses have been reserved by this single user. Cisco recommends that, if this command is enabled, the number of IP addresses assigned to hosts behind a single modem be strictly controlled by the DHCP server.

The Cisco CMTS uses three commands to set the maximum number of hosts for a particular CM, for all CMs on a particular cable interface, or for all CMs using the Cisco CMTS router:

- **cable modem max-hosts**—Sets the maximum number of hosts for a particular CM.
- **cable max-hosts**—Sets the maximum number of hosts for all CMs on a particular cable interface.
- **cable modem max-cpe**—Sets the maximum number of hosts for all CMs using the Cisco CMTS router.

The more specific commands override the settings of the less specific commands. For example, if you use the **cable modem max-cpe** command to set the maximum number of hosts to 2 for all CMs, you can still use the **cable modem max-hosts** command to give a particular CM a larger maximum host value.



**Note** The CMTS assigns the MAX Host value to a cable modem at the time that the cable modem registers with the CMTS. Changing any of the MAX Host commands affects only cable modems that register after the change.



**Note** The “Number of CPEs” field in the **show cable modem** command shows the maximum CPE value for the CM, not the value for the CMTS that is set by the **cable modem max-cpe** command.

## Examples

The following example shows how to override the **max-cpe** setting in a CM configuration file:

```
Router(config)# cable modem max-cpe unlimited
```

## Related Commands

Command	Description
<b>cable max-hosts</b>	Sets the maximum number of hosts for all CMs on a particular cable interface.
<b>cable modem access-group</b>	Specifies an access group for a CM.
<b>cable modem change-frequency</b>	Changes the downstream frequency or upstream channel ID.
<b>cable modem max-hosts</b>	Sets the maximum number of hosts for a particular CM.
<b>cable modem qos profile</b>	Specifies the QoS profile for a CM.
<b>show cable modem</b>	Displays CM configuration settings.

## cable modem max-hosts

To specify the maximum number of customer premises equipment (CPE) devices (hosts) that can be supported by a specific CM, use the **cable modem max-hosts** command in privileged EXEC mode.

**cable modem** {*mac-addr*|*ip-addr*} **max-hosts** {*n* | **default**}

Syntax Description		
	<i>ip-addr</i>	Specifies the IP address for the CM.
	<i>mac-address</i>	Specifies the MAC address for the CM.
	<b>max-hosts</b> { <i>n</i>   <b>default</b> }	Specifies either the maximum number of hosts supported by the CM (from 0 to 255), or specifies the default value of 0.

**Command Default** 0

### Command Modes

Privileged EXEC (#)

### Command History

Release	Modification
12.0(4)XI	This command was introduced.
IOS-XE 3.15.OS	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

### Usage Guidelines

The Cisco CMTS uses three commands to set the maximum number of hosts for a particular CM, for all CMs on a particular cable interface, or for all CMs using the Cisco CMTS router:

- **cable modem max-hosts**—Sets the maximum number of hosts for a particular CM.
- **cable max-hosts**—Sets the maximum number of hosts for all CMs on a particular cable interface.
- **cable modem max-cpe**—Sets the maximum number of hosts for all CMs using the Cisco CMTS router.

The more specific commands override the settings of the less specific commands. For example, if you use the **cable modem max-cpe** command to set the maximum number of hosts to 2 for all CMs, you can still use the **cable modem max-hosts** command to give a particular CM a larger maximum host value.



**Note** The CMTS assigns the MAX Host value to a cable modem at the time that the cable modem registers with the CMTS. Changing any of the MAX Host commands affects only cable modems that register after the change.

### Examples

The following example shows sets the CM with the IP address of 172.172.172.12 to a maximum of 40 attached CPE devices:

```
Router# cable modem 172.172.172.12 max-hosts 40
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>cable modem access-group</b>	Specifies an access group for a CM.
<b>cable modem change-frequency</b>	Changes the downstream frequency or upstream channel ID.
<b>cable max-hosts</b>	Sets the maximum number of hosts for all CMs on a particular cable interface.
<b>cable modem max-cpe</b>	Sets the maximum number of hosts for all CMs using the Cisco CMTS router.
<b>cable modem qos profile</b>	Specifies the QoS profile for a CM.
<b>show cable modem</b>	Displays CM configuration settings.

# cable modem opt0

To collect Receive Modulation Error Ratio (RxMER) data from the cable modem on-demand, use the **cable modem opt0** command in privileged EXEC mode.

**cable modem** {*mac-addr*|*ip-addr*} **opt0**

## Syntax Description

<i>ip-addr</i>	IP address for the CM.
<i>mac-address</i>	address for the CM.

## Command Default

None

## Command Modes

Privileged EXEC (#)

## Command History

Release	Modification
IOS-XE 3.18.1SP	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

## Usage Guidelines

Use the **cable modem opt0** command to collect RxMER data from the CM. Based on the RxMER values collected from a modem, the CMTS finds among the existing profiles the one that may provide the highest speed, and yet at the same time may have sufficient Signal to Noise Ratio (SNR) margin for the modem to receive code words with acceptable error.

## Examples

The following example shows how to collect RxMER data from the CM:

```
Router# cable modem fc52.8d5e.84e1 opt0
```

```
Router#
```

## cable modem qos profile

To force a DOCSIS 1.0 CM to use a specific quality-of-service (QoS) profile, use the **cable modem qos profile** command in privileged EXEC mode.

**cable modem** {*mac-addrip-addr*} **qos profile** *qos-profile-index* [**no-persistence**]

Syntax Description		
	<i>ip-addr</i>	IP address for the CM.
	<i>mac-address</i>	address for the CM.
	<i>qos-profile-index</i>	QoS profile index values.  The range is from 1 to 255, with no default. In Cisco IOS Release 12.2(15)BC1 and later releases, this profile must be created on the Cisco CMTS using the <b>cable qos profile</b> command. In addition, this profile should specify a maximum upstream bandwidth equal to or less than the current bandwidth. If the new profile specifies a higher bandwidth, it is ignored, and the cable modem continues to use the bandwidth that was specified at registration time.  The range is from 1 to 1023 on the Cisco cBR series routers.
	<b>no-persistence</b>	(Optional) Specifies that the QoS profile should not remain in force when a cable modem reboots. Instead, when a cable modem reboots, it uses the QoS profile specified in its DOCSIS configuration file.  The default is without this option, so that the QoS profile remains in force for cable modems across reboots.

**Command Default** None

**Command Modes** Privileged EXEC (#)

Command History	Release	Modification
	12.0(4)XI	This command was introduced.
	12.1(11)EC	This command was supported on Cisco IOS Release 12.1 EC.
	12.2(8)BC1	This command was enhanced to allow a DOCSIS 1.1 CMTS to temporarily change the QoS profile for DOCSIS 1.0 and 1.0+ CMs.
	12.2(15)BC1	This command was changed so that it does not have any effect unless both the QoS profile specified by this command and the QoS profile specified for the CM in its DOCSIS configuration file are already created on the Cisco CMTS. This restriction did not exist in previous releases.
	12.2(15)BC2	The <b>no-persistence</b> option was added. Also, the restriction on changing CM-created profiles that was implemented in Cisco IOS Release 12.2(15)BC1 was removed, so that this command can again be used to change the profile of a CM that is using a CM-created profile, as was the case in earlier releases.

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

### Usage Guidelines

On a Cisco CMTS running DOCSIS 1.0 software, the **cable modem qos profile** command forces a CM to use a specific QoS profile.

On a Cisco CMTS running DOCSIS 1.1 software, the **cable modem qos profile** command temporarily forces a DOCSIS 1.0 or DOCSIS 1.0+ CM to use a specific QoS profile, without forcing the CM to first go off-line and re-register. For DOCSIS 1.0+ CMs, this command affects only the primary SID on the CM.



**Note** In Cisco IOS Release 12.2(15)BC1, this command has an effect only when the profile that it specifies and the original QoS profile on the CM have been created already on the Cisco CMTS, using the **cable qos profile** command. In Cisco IOS Release 12.2(15)BC2 and later releases, this restriction is removed and this command can also be used to change the profile for a CM even when it is using a CM-created QoS profile.

This command does not affect DOCSIS 1.1 CMs, which support dynamic service change messages that allow the QoS profile to be changed dynamically.



**Note** This command acts as a toggle. Give the **cable modem qos profile** command once to enforce a QoS profile. Give the same command again with the same parameters to cancel the enforcement of that profile (the CM will return to using its registered profile.)

When the **no-persistence** option is specified, the QoS profile is not applied when a cable modem reboots. Instead, the Cisco CMTS allows the cable modem to use the QoS profile that is specified in its DOCSIS configuration file.

The **no-persistence** option can be used when initially when identifying potential problem applications and users. When repeat offenders are identified, the service provider can remove the **no-persistence** option, so that these users continue to use the specified QoS profile even if they reboot their cable modems.

### Examples

The following example shows how to specify a QoS profile index to a CM:

```
Router# cable modem qos profile 255
```

```
Router#
```

### Related Commands

Command	Description
<b>cable modem access-group</b>	Specifies an access group for a CM.
<b>cable modem change-frequency</b>	Changes the downstream frequency or upstream channel ID.
<b>cable modem max-hosts</b>	Specifies the maximum hosts for a CM.
<b>show cable modem</b>	Displays CM configuration settings.

## cable modem remote-query

To enable and configure the remote query feature to gather cable modem performance statistics on the Cisco CMTS router, use the **cable modem remote-query** command in global configuration mode. To disable the gathering of cable modem statistics, use the **no** form of this command.

**cable modem remote-query** [*polling-interval community-string*] [**src-ip** *ip-address*]  
**no cable modem remote-query** [**src-ip** *ip-address*]

Syntax Description	
<i>polling-interval</i>	(Optional) The delay between each poll that the Cisco CMTS router makes to collect cable modem statistics, in seconds. When the Cisco CMTS router completes one remote query poll, the router waits this time period before beginning another poll. The range is from 1 to 86,400. The recommended default value is 30.
<i>community-string</i>	(Optional) The Simple Network Management Protocol (SNMP) community string.  <b>Note</b> If resetting a configured SNMP community string value, first disable the remote query feature with the <b>no</b> form of this command, then set the new community string using the <b>cable modem remote-query</b> command when the polling delays is timed out.
<b>src-ip</b> <i>ip-address</i>	(Optional) Specifies the source IP address for SNMP requests.  <b>Note</b> You should enable the remote query feature before configuring <b>src-ip</b> option.

**Command Default** None

**Command Modes** Global configuration (config)

Command History	Release	Modification
	12.0(7)XR, 12.1(2)T	This command was introduced.
	12.1(2)EC1	Support for this command was added to the 12.1 EC train.  <b>Note</b> This command is not supported on Cisco IOS Release 12.1(3a)EC1 but is supported on Cisco IOS Release 12.1(4)EC and later 12.1 EC releases.
	12.2(4)BC1b	Support for this command was added to the 12.2 BC train.
	12.2(15)BC1, 12.2(15)CX	The sysDescr field is now obtained for each cable modem when the remote query feature is enabled. (This value can be displayed using the <b>verbose</b> option of the <b>show cable modem</b> command.)
	12.3(23)BC	Support for the <b>scr-ip</b> option was added to this release.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

## Usage Guidelines

To use the remote query feature, you must configure the cable modem and Cisco CMTS as follows:

- Configure a read-only SNMP community string on the cable modem for use with the remote query feature. This should be a separate community string from the read-write string used to remotely monitor and configure the cable modem.
- Configure a matching community string on the Cisco CMTS using the **snmp-server community** *community-string* and **snmp-server manager** commands.
- Enable the remote query feature on the Cisco CMTS with the **cable modem remote-query** command. The *polling-interval* should be chosen so that the statistics can be obtained in a timely manner without seriously impacting system performance. Cisco recommends initially setting the *polling-interval* to 30 seconds and adjusting that time period as needed.



**Note** If the remote query feature is enabled, the Cisco CMTS router consumes extra memory per cable modem and takes additional CPU time. We recommend that you do not configure this feature on routers that have lower free memory or a large number of cable modems.

The *polling-interval* time period determines only how long the Cisco CMTS router waits after completing one polling cycle before beginning a new polling cycle. It does not indicate how long the router spends in each polling cycle, which depends on the number of cable modems being polled. To calculate the approximate time for a polling cycle, assume 4 to 5 CMs per second (100 to 200 milliseconds per CM). Also take into account the possibility that one or more cable modems might not respond, with an approximate timeout period of 90 seconds.

You must specify matching community strings for the cable modem, the **snmp-server community** *community-string* command, and the **cable modem remote-query** command.

You can reissue the **cable modem remote-query** command to change the polling interval at any time, and the change becomes effective immediately. However, to change the SNMP community string, you must first disable remote polling with the **no snmp manager** and **no cable modem remote-query** commands. Then reconfigure the new community string with the **snmp-server community** *community-string*, **snmp-server manager**, and **cable modem remote-query** commands.

You must configure the remote query feature before configuring the **scr-ip** option.



**Tip** After enabling the remote query feature, you can display the collected statistics with the **show cable modem remote-query** command. You can also display these statistics by querying the attributes in the [CISCO-DOCS-REMOTE-QUERY-MIB](#).

## Resetting the Community String for Cable Modem Remote Query

In Cisco IOS Release 12.3BC and later releases, if you wish to reconfigure the SNMP *community string* for the cable modem remote query feature, perform these brief steps.

1. Disable the remote query feature with the **no** form of this command.
2. Reset the timers on the Cisco CMTS router with short timeout values for the polling interval, so that timeout commences quickly. Use the **cable modem remote-query** command in privileged EXEC mode, using a very low value for the *polling interval* value.
3. Once time-outs are applied, reset the *community string* value with the **cable modem remote-query** command.

4. Change the *polling interval* timers on the Cisco CMTS router back to preferred levels using the **cable modem remote-query** command in privileged EXEC mode.

### Examples

The following example illustrates how to set the polling interval to 5 seconds and the SNMP community string to **private**:

```
Router# configure terminal
Router(config)# cable modem remote-query 5 private
Router(config)# snmp-server community private
Router(config)# snmp-server manager
```

The following example demonstrates how to change the remote query configuration, by first deleting the existing configuration and then giving the new configuration:

```
Router# configure terminal
Router(config)# no cable modem remote-query
Router(config)# no snmp-server manager
Router(config)# cable modem remote-query 10 public
Router(config)# snmp-server community public
Router(config)# snmp-server manager
```

### Related Commands

Command	Description
<b>debug cable remote-query</b>	Turns on debugging to gather information from remote CMs.
<b>show cable modem</b>	Displays information for the registered and unregistered CMs.
<b>show cable modem phy</b>	Displays DOCSIS PHY layer information for one or more CMs.
<b>show cable modem remote-query</b>	Displays the statistics accumulated by the remote query feature.
<b>snmp-server enable traps cable</b>	Enables traps that are sent when the remote polling of CMs has been completed.

# cable modem service-class-name

To change a QoS service class for a particular cable modem (CM), use the **cable modem service-class-name** command in privileged EXEC mode.

**cable modem** {*ip-address**mac-address*} **service-class-name** *name*

## Syntax Description

<i>ip-address</i>	Specifies the IP address of the CM to be assigned the named service class.
<i>mac-address</i>	Specifies the MAC address of the CM to be assigned the named service class.
<i>name</i>	Specifies the name of the QoS service class.

## Command Default

None

## Command Modes

Privileged EXEC (#)

## Command History

Release	Modification
12.3(23)BC2	This command was introduced.
12.2(33)SCB	This command was integrated into Cisco IOS Release 12.2(33)SCB. Support for the Cisco uBR7225VXR router was added.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.
IOS-XE 3.17.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

## Usage Guidelines

This command has the following restrictions:

- The **no** form of the command is not supported, as the CMTS does not cache the service class parameters of the modem.
- The command is supported only on DOCSIS 1.1 CMs primary service flows.
- You can specify this command only after the CM has been online for at least 200 seconds.
- The parameters defined by the named service class should be a subset of the admitted qos parameters. Normally, the admitted and the active parameters have the same QoS parameters. However, it is better to ensure that the following parameters are a subset of the original or registered set of parameters: **priority**, **max-rate**, **max-burst**, **min-rate**, **max-latency**, **min-packet-size**, **act\_timeout**, or **adm\_timeout**. Also, ensure that the values of **required\_mask**, **forbidden\_mask**, and **aggregate\_mask** are the same.

## Examples

The following example changes the QoS parameter set for the CM with MAC address aaaa.bbbb.cccc to the service class named “test”:

```
Router# cable modem aaaa.bbbb.cccc service-class-name test
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>cable service class</b>	Sets parameters for a DOCSIS 1.1 cable service class.
<b>service-class (enforce-rule)</b>	Identifies a particular service class for cable modem monitoring in an enforce-rule.

# cable modem v6-max-cpe-prefix

To specify the maximum number of IPv6 addresses per modem, use the **cable modem v6-max-cpe-prefix** command in global configuration mode. To set the default value of the command, use the **no** form of this command.

**cable modem v6-max-cpe-prefix** [*n*]  
**no cable modem v6-max-cpe-prefix** [*n*]

## Syntax Description

<i>n</i>	Specifies the maximum number of IPv6 addresses per modem. The range is from 0 to 1023. The default is 16.
----------	---

## Command Default

The default number of IPv6 addresses per modem is 16.

## Command Modes

Global configuration (config)

## Command History

Release	Modification
12.2(33)SCH1	This command was introduced.
IOS-XE 3.15.0S	This command was replaced by the <b>cable submgmt default max-ipv6-cpe</b> command on the Cisco cBR Series Converged Broadband Routers.

## Usage Guidelines

This command is used to check the IPv6 Global Unicast Address (GUA), link-local address (LLA) and IPv6 Prefix Delegation (PD) of the CPE.

## Examples

The following example shows how to specify the maximum number of the IPv6 addresses per modem:

```
Router> enable
Router# configure terminal
Router(config)# cable modem v6-max-cpe-prefix 10
Router(config)# cable submgmt default active
Router(config)# exit
```

## Related Commands

Command	Description
<b>show cable modem</b>	Displays information for the registered and unregistered cable modems.

## cable modem vendor

To associate the name of a vendor with its Organizational Unique Identifier (OUI), use the **cable modem vendor** command in global configuration mode. To remove the association of the vendor name with its OUI, use the **no** form of this command.

```
cable modem vendor OUI [vendor-name]
no cable modem vendor OUI [vendor-name]
```

Syntax Description	OUI	Specifies the Organizational Unique Identifier (OUI). An OUI is the first 3 octets (3 bytes, 6 hexadecimal digits) of the CM MAC address and typically indicates the vendor for the CM. The octets can be specified as one string (for example, 000102), or each octet can be separated by a hyphen, period, or colon (for example, 00-01-02 or 00:01:02 or 00.01.02).
	<b>Note</b>	You can use either a period or colon as the separator between octets when manually entering this command, but the command that is written to the running and startup configuration files always uses a period.
	vendor-name	(Optional) Specifies an arbitrary string identifying the vendor for this OUI.

**Command Default** A default database contains approximately 300 OUIs associated with approximately 60 vendor names.

**Command Modes** Global configuration (config)

Command History	Release	Modification
	12.2(8)BC2	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines** The **cable modem vendor** command allows you to associate an arbitrary string with an OUI to identify the vendor of the associated CM. The vendor name is then displayed as part of the **show cable modem vendor** command.

The **show cable modem vendor** command uses a default database of approximately 300 OUIs. If the OUI and vendor are not in that database, the **show cable modem vendor** command displays the OUI as the vendor name, but you can use the **cable modem vendor** command to associate a vendor name with the new OUI.

If you specify an OUI with the **cable modem vendor** command that already exists in the OUI database, the previous value is overwritten with the new value. You can use the **default** prefix to restore the original value for an OUI in the default database.

You can also use the **no cable modem vendor** command to remove the association between an OUI and a vendor name. The **show cable modem vendor** command then displays only the OUI as the vendor name.



**Tip** The Institute of Electrical and Electronics Engineers (IEEE) is the official issuer of OUI values. The IEEE OUI web site is at <http://standards.ieee.org/regauth/oui/index.shtml>.

## Examples

The following shows several examples of the **cable modem vendor** command using Cisco OUIs:

```
Router(config)# cable modem vendor 00:01:42 Cisco
Router(config)# cable modem vendor 00:01:43 Cisco
Router(config)# cable modem vendor 00:01:63 Cisco
Router(config)# cable modem vendor 00:01:64 Cisco
Router(config)# cable modem vendor 00:0A:41 Cisco
Router(config)# cable modem vendor 00:0A:42 Cisco

Router(config)#
```

The following shows an example of the **default cable modem vendor** command being used to restore the original association between Cisco and its company OUI of 00:00:0C. Any previous user-defined vendor name is deleted from the OUI database.

```
Router(config)# default cable modem vendor 00000C
```

The following shows an example of the **no cable modem vendor** command being used to remove the association between Cisco and an OUI of 00:0A:42. If any CMs exist with that OUI, the **show cable modem vendor** command displays the OUI (“00:0A:42”) as the vendor name.

```
Router(config)# no
cable modem vendor 00:0A:42 Router(config)#
```

## Related Commands

Command	Description
<b>show cable modem vendor</b>	Displays the vendor name or Organizational Unique Identifier (OUI) for the CMs on each cable interface.

# cable modulation-profile

To define a modulation profile for use on the router, use the **cable modulation-profile** command in global configuration mode. To remove the entire modulation profile or to reset a default profile to its default values, use the **no** form of this command.

## DOCSIS 1.0 and 1.1 Mixed Mode:

```
cable modulation-profile profile {mix | qam-16 | qpsk | robust-mix}
no cable modulation-profile profile {iuc | mix | qam-16 | qpsk | robust-mix}
cable modulation-profile profile iuc fec-tbytes fec-len burst-len guard-t mod scrambler seed diff
pre-len last-cw uw-len
```

## DOCSIS 1.x/2.0 Mixed Mode:

```
cable modulation-profile profile {mix-high | mix-low | mix-mid | mix-qam | qam-16 | qpsk |
robust-mix-high | robust-mix-mid | robust-mix-qam}
no cable modulation-profile profile {iuc | mix-high | mix-low | mix-mid | mix-qam | qam-16 | qpsk |
robust-mix-high | robust-mix-mid | robust-mix-qam}
cable modulation-profile profile iuc fec-tbytes fec-len burst-len guard-t mod scrambler seed diff
pre-len last-cw uw-len
```

## DOCSIS 2.0 A-TDMA Mode:

```
cable modulation-profile profile {mix-high | mix-low | mix-mid | mix-qam | qam-8 | qam-16 | qam-32 |
qam-64 | qpsk | robust-mix-high | robust-mix-low | robust-mix-mid}
no cable modulation-profile profile {iuc | mix-high | mix-low | mix-mid | mix-qam | qam-8 | qam-16 |
qam-32 | qam-64 | qpsk | robust-mix-high | robust-mix-low | robust-mix-mid}
cable modulation-profile profile iuc fec-tbytes fec-len burst-len guard-t mod scrambler seed diff
pre-len last-cw uw-len
```

## Cisco IOS Release 12.2(33)SCC and Later

### DOCSIS 2.0 A-TDMA Mode and DOCSIS 2.0 S-CDMA Mode:

```
cable modulation-profile profile {mix-high | mix-low | mix-mid | mix-qam | qam-16 | qpsk |
robust-mix-high | robust-mix-low | robust-mix-mid}
no cable modulation-profile profile {iuc | mix-high | mix-low | mix-mid | mix-qam | qam-16 | qpsk |
robust-mix-high | robust-mix-low | robust-mix-mid}
cable modulation-profile profile iuc fec-tbytes fec-len burst-len guard-t mod scrambler seed diff
pre-len last-cw uw-len
```

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### DOCSIS 1.x TDMA Mode:

```
cable modulation-profile profile tdma {mix | qam-16 | qpsk | robust-mix}
no cable modulation-profile profile tdma {iuc | mix | qam-16 | qpsk | robust-mix}
cable modulation-profile profile tdma iuc fec-tbytes fec-len burst-len guard-t mod scrambler seed
diff pre-len last-cw uw-len
```

### DOCSIS 1.x/2.0 TDMA-ATDMA Mixed Mode:

```
cable modulation-profile profile mixed {mix-high | mix-low | mix-mid | mix-qam | qam-16 | qpsk |
robust-mix-high | robust-mix-mid | robust-mix-qam}
```

```
no cable modulation-profile profile mixed {iuc | mix-high | mix-low | mix-mid | mix-qam | qam-16 |
qpsk | robust-mix-high | robust-mix-mid | robust-mix-qam}
cable modulation-profile profile mixed iuc fec-bytes fec-len burst-len guard-t mod scrambler
seed diff pre-len last-cw uw-len
```

**DOCSIS 2.0 A-TDMA Mode:**

```
cable modulation-profile profile atdma {mix-high | mix-low | mix-mid | mix-qam | qam-8 | qam-16 |
qam-32 | qam-64 | qpsk | robust-mix-high | robust-mix-low | robust-mix-mid}
no cable modulation-profile profile atdma {iuc | mix-high | mix-low | mix-mid | mix-qam | qam-8 |
qam-16 | qam-32 | qam-64 | qpsk | robust-mix-high | robust-mix-low | robust-mix-mid}
cable modulation-profile profile atdma iuc fec-bytes fec-len burst-len guard-t mod scrambler
seed diff pre-len last-cw uw-len
```

**Syntax Description**

<i>profile</i>	Specifies the modulation profile number. The valid values for the profile number depend on the cable interface being used and the upstream's mode of operation.  The range is 1 to 400 on the Cisco cBR series routers.  In Cisco IOS Release 12.2(15)CX and later releases, you can create a maximum of 10 profiles for each mode of operation, for a total of 30 profiles on the Cisco uBR10012 and Cisco uBR7200 series routers. In earlier software releases, you can create a maximum of 8 profiles only for DOCSIS 1.0 and DOCSIS 1.1 mode.
<b>mix</b>	(DOCSIS 1.0 and DOCSIS 1.1 mode only) Creates a default QPSK/16-QAM mix modulation profile where short and long grant bursts are sent using 16-QAM, while request, initial ranging, and station maintenance bursts are sent using QPSK). The burst parameters are set to their default values for each burst type.
<b>mix-high</b>	(DOCSIS 1.x/2.0 mixed and DOCSIS 2.0 modes only) Creates a default QPSK/64-QAM modulation profile.
<b>mix-low</b>	(DOCSIS 1.x/2.0 mixed and DOCSIS 2.0 modes only) Creates a default QPSK/16-QAM modulation profile.
<b>mix-mid</b>	(DOCSIS 1.x/2.0 mixed and DOCSIS 2.0 A-TDMA modes only) Creates a default QPSK/32-QAM modulation profile.
<b>mix-qam</b>	(DOCSIS 1.x/2.0 mixed and DOCSIS 2.0 A-TDMA modes only) Creates a default 16-QAM/64-QAM modulation profile.
<b>qam-8</b>	(DOCSIS 2.0 A-TDMA mode only) Creates a default 8-QAM modulation profile.  This modulation profile is available in hidden and internal mode only from Cisco IOS Release 12.2(33)SCC and Cisco IOS-XE Release 3.15.0S onwards.
<b>qam-16</b>	Creates a default 16-QAM modulation profile.
<b>qam-32</b>	(DOCSIS 2.0 A-TDMA mode only) Creates a default 32-QAM modulation profile.  This modulation profile is available in hidden and internal mode only from Cisco IOS Release 12.2(33)SCC and Cisco IOS-XE Release 3.15.0S onwards.

<b>qam-64</b>	(DOCSIS 2.0 A-TDMA mode only) Creates a default 64-QAM modulation profile. This modulation profile is available in hidden and internal mode only from Cisco IOS Release 12.2(33)SCC and Cisco IOS-XE Release 3.15.0S onwards.
<b>qpsk</b>	Creates a default QPSK modulation profile.
<b>robust-mix</b>	(DOCSIS 1.0 and DOCSIS 1.1 mode only) Creates a default QPSK/16-QAM modulation profile with a longer preamble that is more robust and more able to deal with noise on the upstream better than the <b>mix</b> profile.
<b>robust-mix-high</b>	(DOCSIS 1.x/2.0 mixed and DOCSIS 2.0 A-TDMA modes only) Creates a default QPSK/64-QAM mixed modulation profile with a longer preamble that is more robust and more able to deal with noise on the upstream better than the <b>mix-high</b> profile.
<b>robust-mix-low</b>	(DOCSIS 2.0 A-TDMA mode only) Creates a default QPSK/16-QAM modulation profile with a longer preamble that is more robust and better able to deal with noise on the upstream than the <b>mix-low</b> profile.
<b>robust-mix-mid</b>	(DOCSIS 1.x/2.0 mixed and DOCSIS 2.0 A-TDMA modes only) Creates a default QPSK/32-QAM modulation profile with a longer preamble that is more robust and better able to deal with noise on the upstream than the <b>mix-mid</b> profile.
<b>robust-mix-qam</b>	(DOCSIS 1.x/2.0 mixed mode only) Creates a default 16-QAM/64-QAM mixed modulation profile with a longer preamble that is more robust and better able to deal with noise on the upstream than the <b>mix-qam</b> profile.
<i>iuc</i>	Interval usage code. Valid entries depend on the mode of operation: <ul style="list-style-type: none"> <li>• If the upstream is configured for DOCSIS 1.0 and DOCSIS 1.1 modulation profiles, the valid values are <b>initial</b>, <b>long</b>, <b>request</b>, <b>reqdata</b>, <b>short</b>, or <b>station</b>.</li> <li>• If the upstream is configured for DOCSIS 1.x and DOCSIS 2.0 mixed modulation profiles, the valid values are <b>a-long</b>, <b>a-short</b>, <b>a-ugs</b>, <b>initial</b>, <b>long</b>, <b>request</b>, <b>reqdata</b>, <b>short</b>, or <b>station</b>.</li> <li>• If the upstream is configured for DOCSIS 2.0 A-TDMA modulation profiles, the valid values are <b>a-long</b>, <b>a-short</b>, <b>a-ugs</b>, <b>initial</b>, <b>long</b>, <b>request</b>, <b>reqdata</b>, <b>short</b>, or <b>station</b>.</li> </ul> <p>The <b>reqdata</b> burst type is included as a placeholder for scripts that might reference it, but the DOCSIS MAC scheduler on the Cisco CMTS does not use this type of burst.</p> <p>When you are using the <b>initial</b> and <b>station</b> bursts for DOCSIS 2.0 A-TDMA mode, <b>qam-8</b>, <b>qam-32</b>, and <b>qam-64</b> modulation profiles are available in hidden mode only.</p>
<i>preamble</i>	(DOCSIS 1.x/2.0 mixed and DOCSIS 2.0 A-TDMA modes only, for <b>a-long</b> and <b>a-short</b> options) Specifies the preamble format. Valid values are <b>qpsk0</b> and <b>qpsk1</b> .
<i>rs-interleave-depth</i>	(DOCSIS 1.x/2.0 mixed and DOCSIS 2.0 A-TDMA modes only, for <b>a-long</b> and <b>a-short</b> options) Specifies the RS interleave depth. The valid range is from 0 to 114.
<i>rs-interleave-block</i>	(DOCSIS 1.x/2.0 mixed and DOCSIS 2.0 A-TDMA modes only, for <b>a-long</b> and <b>a-short</b> options) Specifies the RS interleave block size. The valid range is from 18 to 2048.

<i>fec-bytes</i>	The number of bytes that can be corrected per FEC code word. For DOCSIS 1.0 and DOCSIS 1.1 mode, valid values are from 0 to 10 (decimal), where 0 means no FEC. For DOCSIS 2.0 A-TDMA mode, the valid values are from 0 to 16 (decimal), where 0 means no FEC.
<i>fec-len</i>	FEC code-word length. Valid values are from 16 to 253.
<i>burst-len</i>	Maximum burst length in minislots. Valid values are from 0 to 255, where 0 means no limit.
<i>guard-t</i>	Guard time in symbols. The time between successive bursts, with a range from 22 to 255. (In Cisco IOS Release 12.2(15)BC2 and earlier releases, the minimum guard time was 0 symbols, but we do not recommend using a guard time smaller than 22 symbols.)
<i>mod</i>	Modulation. Valid entries are <b>16qam</b> and <b>qpsk</b> for DOCSIS 1.0 and DOCSIS 1.1 upstreams. Valid entries are <b>8qam</b> , <b>16qam</b> , <b>32qam</b> , <b>64qam</b> , and <b>qpsk</b> for DOCSIS 2.0 upstreams.  The <b>qam-8</b> , <b>qam-32</b> , and <b>qam-64</b> modulation profiles are available in hidden and internal modes only from Cisco IOS Release 12.2(33)SCC and Cisco IOS-XE Release 3.15.0S onwards.
<i>scrambler</i>	Enable or disable scrambler. Valid entries are <b>scrambler</b> and <b>no-scrambler</b> .
<i>seed</i>	(Required if <b>scrambler</b> option used) Scrambler seed in hexadecimal format. Valid values are from 0x0 to 0x7FFF.
<i>diff</i>	Enable or disable differential encoding. Valid entries are <b>diff</b> and <b>no-diff</b> .  In DOCSIS 2.0 mode, differential encoding cannot be enabled for the 8-QAM, 32-QAM, and 64-QAM modulations.  The <b>qam-8</b> , <b>qam-32</b> , and <b>qam-64</b> modulation profiles are available in hidden and internal modes only from Cisco IOS Release 12.2(33)SCC and Cisco IOS-XE Release 3.15.0S onwards.
<i>pre-len</i>	Preamble length in bits. Valid values are from 2 to 256.
<i>last-cw</i>	Handling of FEC for last code word. Valid entries are <b>fixed</b> for fixed code-word length and <b>shortened</b> for shortened last code word.
<i>uw-len</i>	Upstream unique word length. Enter <b>uw8</b> for 8-bit unique code words or <b>uw16</b> for 16-bit unique code words.

**Command Default**

Modulation profile 1 is defined as a **qpsk** Time Division Multiple Access (TDMA) profile.

In Cisco IOS Release 12.2(15)CX, Release 12.2(15)BC2 and later releases, additional modulation profiles are defined as the default mixed TDMA/A-TDMA profile and the default Advanced TDMA (A-TDMA) profile.

**Command Modes**

Global configuration (config)

Command History	Release	Modification
	11.3 NA	This command was introduced.
	12.0(7)XR2	This command was supported.
	12.0(6)SC and 12.1(3a)EC1	The <b>mix</b> , <b>qpsk</b> , and <b>qam-16</b> options were added.
	12.2(8)BC2	Support was added for the Cisco uBR10012 router.
	12.2(11)CY	Support was added for the Cisco uBR-MC5X20S cable interface line card. This includes creating default modulation profile 21 for the card.
	12.2(15)CX	Support was added for the Cisco uBR-MC16U/X and Cisco uBR-MC28U/X cable interface line card, including support for DOCSIS 2.0 A-TDMA and mixed modulation profiles on this card.  The <b>robust</b> predefined modulation profiles were also added for all modes of operation. The robust profiles use a longer preamble to provide better handling of noise on the upstream, but they also consume more bandwidth at the PHY layer than the other profiles.
	12.2(15)BC2	Support was added for the Cisco uBR10-MC5X20S/U cable interface line cards, including support for DOCSIS 2.0 A-TDMA and mixed modulation profiles. Support for the IUC-11 burst profile (Advanced UGS, <b>a-ugs</b> ) was also added for mixed TDMA/A-TDMA modulation profiles.
	12.3BC	This command was integrated into Cisco IOS Release 12.3BC. Support was added for the Cisco uBR10-MC5X20H cable interface line card.
	12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
	12.2(33)SCC	This command was modified. Moved <b>qam-8</b> , <b>qam-32</b> , and <b>qam-64</b> options to hidden and internal mode only. Support was added for Synchronous Code Division Multiple Access (S-CDMA) modulation profiles.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

### Usage Guidelines

A modulation profile is a collection of at least six burst profiles that are sent out in an upstream channel descriptor (UCD) message to configure a modem's transmit parameters.

You can use the **no cable modulation-profile** command to remove all modulation profiles except the default modulation profiles (1, 21, 41, 101, 121, 201, 221, 241, and 321, depending on the cable interface line cards being used). In the case of the default modulation profiles, the **no cable modulation-profile** command resets the default profile to its default values.

We recommend that you use the predefined profiles instead of manually specifying the individual bursts for a modulation profile. The predefined profiles are optimized for the default of 32 symbols per minislot for each particular modulation scheme. The **robust** predefined profiles use a longer preamble for better handling of noise on the upstream, but at the cost of consuming more PHY layer bandwidth than the other non-robust profiles.

If you want to manually specify the individual bursts, enter a line with all parameters for each upstream burst type. Then repeat this command for each burst type, which also must be fully specified. A profile with incomplete or missing bursts can cause unreliable operation or loss of modem connectivity.



**Caution** Changes to modulation profiles causes changes to the physical layer. Because changing physical layer characteristics affects router performance and function, this task should be reserved for expert users who have a thorough understanding of DOCSIS systems and how each parameter affects the network.



**Note** The **reqdata** burst type is included as a placeholder for SNMP scripts that might reference it, but it has no effect. You can use this command (and SNMP commands) to specify the **reqdata** types, but the DOCSIS MAC scheduler on the Cisco CMTS does not use this type of burst.

From Cisco IOS Release 12.2(33)SCC and Cisco IOS-XE Release 3.15.0S onwards, the **qam-8**, **qam-32**, and **qam-64** modulation profiles are available in hidden and internal modes only. When you are using the **initial** and **station** bursts for DOCSIS 2.0 A-TDMA mode, **qam-8**, **qam-32**, and **qam-64** modulation profiles are available in hidden mode only. However, these modulation profiles are available for **a-long**, **a-short**, **a-ugs**, **long**, **request**, **reqdata**, and **short**.

### Modulation Profile Ranges

The valid range for modulation profiles depends on the cable interface being used and the type of modulation profile being created. The table below lists the valid ranges according to cable interface and modulation type.

**Table 1: Allowable Ranges for Modulation Profiles**

Cable Interface	DOCSIS 1.X (TDMA)	Mixed DOCSIS 1.X/2.0	DOCSIS 2.0 (A-TDMA)	DOCSIS 2.0 (S-CDMA)
Cisco uBR7100 series	1 to 10 <sup>1</sup> , default=1	N/A	N/A	N/A
Cisco uBR-MC16C	1 to 10, default=1	N/A	N/A	N/A
Cisco uBR-MC16S	1 to 10, default=1	N/A	N/A	N/A
Cisco uBR-MC28C	1 to 10, default=1	N/A	N/A	N/A
Cisco uBR-MC5X20S, Cisco uBR-MC5X20U, Cisco uBR-MC5X20H	21 to 30, default=21	121 to 130, default=121	221 to 230, default=221	321 to 330 (default is 321)
Cisco uBR-MC16U/X, Cisco uBR-MC28U/X	41 to 50, default=41	141 to 150, default=141	241 to 250, default=241	N/A
Cisco cBR-8 CCAP	1 to 400, default=21	1 to 400, default=121	1 to 400, default=221	N/A

<sup>1</sup> Only 8 modulation profiles are supported in Cisco IOS software releases before 12.2(15)BC1, so in these releases the valid range is from 1 to 8.

### DOCSIS 1.0 and DOCSIS 1.1 Support

For DOCSIS 1.0 and 1.1 cable modems, the following burst types are required: request, request data, initial maintenance, station maintenance, short grant, and long grant. You must issue the **cable modulation-profile** command six times for each individual burst type to correctly create a new modulation profile.

The three default profiles can be used to quickly create modulation profiles, without having to specify the parameters for each individual burst: **mix**, **qpsk**, and **qam-16**. The burst parameters for the request, initial, station maintenance, short, and long bursts are set to their default values for each burst type. (The **reqdata** burst type is not created when using the default modulation profiles because it is not used by the MAC scheduler.)

The default profiles allow basic profiles to be implemented for initial network connectivity. As the characteristics of a cable plant become better known, the profiles can then be adjusted accordingly.



**Note** Do not use the **qam-16** mode unless you have verified that your cable plant can support that modulation profile. Most cable plants should instead use the **qpsk** or **mix** modulation profile for the primary profile.



**Caution** Turning the scrambler off can cause packet loss and is used only in lab testing environments.

Errors or incompatible configurations in the burst profiles cause cable modems to drop connectivity, to drop short or long data packets, or to fail to connect to the network. It is possible to build a burst profile set for which no implementation of a DOCSIS receiver is capable of receiving the modem's transmission.

Data rates of 160 Ksymbol/sec and 2560 Ksymbol/sec are highly sensitive to unique word length, preamble length, and FEC sizing. Incorrect choices for these values can cause poor, or no, connectivity at these symbol rates.

### DOCSIS 2.0 Support

Cisco IOS Release 12.2(11)CY, 12.2(15)BC1, 12.3BC, 12.2(33)SCA, 12.2(33)SCC, and later releases support 10 modulation profiles for each of the three DOCSIS modes (DOCSIS 1.X, DOCSIS 2.0, and mixed mode) on the Cisco uBR10012 and Cisco uBR7200 series routers, for a total maximum of 30 modulation profiles. In addition, the router also creates several default modulation profiles (1, 21, 41, 101, 121, 141, 201, 221, 241, and 321, depending on the cable interface line cards that are installed).

### Examples

The following example shows how to create a mixed modulation profile, using 16-QAM for the short and long grant bursts and QPSK for the request, initial ranging, and station maintenance bursts on a Cisco uBR10012 router. The burst parameters are set to their default values for each burst type.

```
Router(config)# cable modulation-profile 8 mix
Router(config)# exit
```

```
Router# show cable modulation-profile 8
```

Mod	IUC	Type	Preamb length	Diff enco	FEC T	FEC CW	Scrambl seed	Max B	Guard time	Last CW	Scrambl	Preamb offset
					BYTES	size		size	size	short		
8	request	qpsk	64	no	0x0	0x10	0x152	0	8	no	yes	0
8	initial	qpsk	128	no	0x5	0x22	0x152	0	48	no	yes	0
8	station	qpsk	128	no	0x5	0x22	0x152	0	48	no	yes	0
8	short	qam	144	no	0x6	0x4B	0x152	6	8	yes	yes	0
8	long	qam	160	no	0x8	0xDC	0x152	0	8	yes	yes	0

```
Router#
```



**Note** The above example shows the default values for the burst parameters. The main differences in the default values between 16-QAM and QPSK bursts are in the Type and Preamble Length fields.

The following example shows how to define the burst parameters for profile 2 with the following parameters: 0 fec-tbytes, 16 kbytes fec-len, a burst-len of 1, a guard time of 8, a mod value of **qpsk**, scrambler enabled with a seed value of 152, differential encoding disabled, a preamble length of 64 bits, a fixed code-word length, and 8-bit unique words for upstream unique word length a Cisco uBR10012 router.

```
Router(config)# cable modulation-profile 2 request 0 16 1 8 qpsk scrambler 152 no-diff 64
fixed uw8
Router(config)# cable modulation-profile 2 reqdata 0 16 1 8 qpsk scrambler 152 no-diff 64
fixed uw8
Router(config)# cable modulation-profile 2 initial 5 34 0 48 qpsk scrambler 152 no-diff 128
fixed uw16
Router(config)# cable modulation-profile 2 station 5 34 0 48 qpsk scrambler 152 no-diff 128
fixed uw16
Router(config)# cable modulation-profile 2 short 6 75 6 8 16qam scrambler 152 no-diff 144
fixed uw8
Router(config)# cable modulation-profile 2 long 8 220 0 8 16qam scrambler 152 no-diff 160
fixed uw8
```



**Note** You must create all of the bursts (request, initial, station, short and long) for this modulation profile, using the **cable modulation-profile** command. The **reqdata** burst is optional.

The following example shows an example of a DOCSIS 1.X/DOCSIS 2.0 mixed modulation profile a Cisco uBR10012 router:

```
Router# configure terminal

Router(config)# cable modulation-profile 142 request 0 16 0 8 qpsk scrambler 152 no-diff
64 fixed uw8

Router(config)# cable modulation-profile 142 initial 5 34 0 48 qpsk scrambler 152 no-diff
32 fixed uw16

Router(config)# cable modulation-profile 142 station 5 34 0 48 qpsk scrambler 152 no-diff
32 fixed uw16

Router(config)# cable modulation-profile 142 short 5 75 6 8 qpsk scrambler 152 no-diff 72
shortened uw8

Router(config)# cable modulation-profile 142 long 8 220 0 8 qpsk scrambler 152 no-diff 80
shortened uw8

Router(config)# cable modulation-profile 142 a-short qpsk0 0 18 5 99 10 8 64qam scrambler
152 no-diff 128 shortened uw8

Router(config)# cable modulation-profile 142 a-long qpsk0 0 18 15 200 0 8 64qam scrambler
152 no-diff 128 shortened uw8

Router(config)#
```

The following example shows an example of a DOCSIS 2.0 A-TDMA modulation profile a Cisco uBR10012 router:

```
Router# configure terminal
Router(config)# cable modulation-profile 242 request qpsk0 0 0 0 16 0 8 qpsk scrambler 152
no-diff 64 fixed uw8
Router(config)# cable modulation-profile 242 initial qpsk0 0 0 5 34 0 48 qpsk scrambler 152
no-diff 32 fixed uw16
Router(config)# cable modulation-profile 242 station qpsk0 0 0 5 34 0 48 qpsk scrambler 152
no-diff 32 fixed uw16
Router(config)# cable modulation-profile 242 short qpsk0 0 0 5 75 6 8 qpsk scrambler 152
no-diff 72 shortened uw8
Router(config)# cable modulation-profile 242 long qpsk0 0 0 8 220 0 8 qpsk scrambler 152
no-diff 80 shortened uw8
Router(config)# cable modulation-profile 242 a-short qpsk0 0 18 5 99 10 8 64qam scrambler
152 no-diff 128 shortened uw8
Router(config)# cable modulation-profile 242 a-long qpsk0 0 18 15 200 0 8 64qam scrambler
152 no-diff 128 shortened uw8
Router(config)#
```

The following example shows an example of a DOCSIS 2.0 S-CDMA modulation profile:

```
Router# configure terminal
Router(config)# cable modulation-profile 324 request 0 16 10 16qam scrambler 152 no-diff
64 fixed qpsk0 spreader 12 12 no-tcm
Router(config)# cable modulation-profile 324 initial 0 16 10 16qam scrambler 152 no-diff
64 fixed qpsk0 off-spreader 12 12 no-tcm
Router(config)# cable modulation-profile 324 station 0 16 10 16qam scrambler 152 no-diff
64 fixed qpsk0 off-spreader 12 12 no-tcm
Router(config)# cable modulation-profile 324 a-short 0 16 10 16qam scrambler 152 no-diff
64 fixed qpsk0 off-spreader 12 12 no-tcm
Router(config)# cable modulation-profile 324 a-long 16 10 16qam scrambler 152 no-diff 64
fixed qpsk0 off-spreader 12 12 no-tcm
Router(config)# cable modulation-profile 324 a-ugs 16 10 16qam scrambler 152 no-diff 64
fixed qpsk0 off-spreader 12 12 no-tcm
Router(config)#
```

The following example shows how to create TDMA modulation profiles on a Cisco cBR series router:

```
Router# configure terminal
Router(config)# cable modulation-profile 24 tdma qam-16
Router(config)# cable modulation-profile 25 tdma qpsk
Router(config)# cable modulation-profile 26 tdma request 0 16 0 8 qpsk scrambler 152 no-diff
68 fixed
```

The following example shows how to create TDMA/A-TDMA mixed modulation profiles on a Cisco cBR series router:

```
Router# configure terminal
Router(config)# cable modulation-profile 125 mixed qam-16
```

```
Router(config)# cable modulation-profile 127 mixed request 0 16 0 8 qpsk scrambler 152
no-diff 68 fixed
Router(config)# cable modulation-profile 127 mixed initial 5 34 0 48 qpsk scrambler 152
no-diff 128 fixed
```

The following example shows how to create A-TDMA mixed modulation profiles on a Cisco cBR series router:

```
Router# configure terminal
Router(config)# cable modulation-profile 225 atdma qam-64
Router(config)# cable modulation-profile 227 atdma request 0 16 0 8 qpsk scrambler 152
no-diff 68 fixed qpsk0 1 2048
Router(config)# cable modulation-profile 227 atdma initial 0 16 0 0 qpsk no-scrambler no-diff
2 fixed qpsk1 0 18
```

See the **show cable modulation-profile** command for a description of the output display fields.

#### Related Commands

Command	Description
<b>cable upstream modulation-profile</b>	Assigns a modulation profile to an interface.
<b>show cable modulation-profile</b>	Displays a modulation profile group's information.

# cable modulation-profile global-scheme

To define a global modulation profile for use on the router, use the **cable modulation-profile global-scheme** command in global configuration mode. To remove the newly created modulation profile or to reset to the legacy profile mode, use the **no** form of this command.

**cable modulation-profile global-scheme** *profile*  
**no cable modulation-profile global-scheme**

## Syntax Description

<i>profile</i>	Modulation profile number. The profile number range is from 1 to 400.
----------------	---

## Command Default

The global modulation profile scheme is disabled by default.

## Command Modes

Global configuration (config)

## Command History

Release	Modification
12.2(33)SCC	This command was introduced.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

## Usage Guidelines

Using the global modulation profile scheme, you can assign any number between 1 to 400 to any modulation profiles. It eliminates the number space restriction and increases the number of modulation profiles that can be created per DOCSIS mode. The global modulation profile mode allows you to create and configure DOCSIS 3.0 channel type 4SR (scdma-d3). When an upstream DOCSIS mode is changed to scdma-d3, it is initially assigned to the system created default modulation profile.



**Note** Though you can assign any number between 1 to 400 to any modulation profile, the default modulation profile number assigned to an upstream channel for a given channel type will remain the same. That is, modulation profile numbers 21, 121, 221, 321, and 381 will be applicable for TDMA, mixed, A-TDMA, S-CDMA, and DOCSIS 3.0 S-CDMA channel types.

All the existing and previously defined modulation profiles are converted to the new format. However, all the newly created modulation profiles, which are outside of the legacy number space range, are lost when you revert to the legacy modulation profile.



**Note** The default profiles cannot be deleted. Using the **no cable modulation global** command on the default profiles resets them to their original, default values.

## Modulation Profile Ranges

The valid range for modulation profiles depends on the cable interface being used and the type of modulation profile being created.

The table below lists the valid ranges according to cable interface and modulation type:

*Table 2: Allowable Ranges for Modulation Profiles*

Cable Interface	DOCSIS 2.0 (S-CDMA)	DOCSIS 3.0 (S-CDMA)
Cisco UBR-MC20X20V	321 to 330 (default is 321)	1 to 400 (default is 381)

**Examples**

The following example shows how to create a global modulation profile scheme:

```
Router(config)# cable modulation-profile global-scheme
```

**Related Commands**

Command	Description
<b>cable upstream modulation-profile</b>	Assigns a modulation profile to an interface.
<b>show cable modulation-profile</b>	Displays modulation profile information of a group.

# cable mod-profile-ofdma

To define the OFDMA modulation profile for OFDMA channels, **cable mod-profile-ofdma** command in the global configuration mode.

**cable mod-profile-ofdma** *id*

Syntax Description		
<b>data-iuc</b>		Configures the data IUC (Interval Usage Codes) profile.
<b>fine-rng-subcarrier</b>		Configures the number of subcarriers for fine ranging.
<b>initial-rng-preamble</b>		Configures the number of symbols per subcarrier for initial ranging preamble.
<b>initial-rng-subcarrier</b>		Configures the number of subcarriers for initial ranging.
<b>subcarrier-spacing</b>		Defines the subcarrier spacing.
<b>ofdma-prof-mgmt downgrade rxmer min-iuc</b> <i>value</i>		Defines the data IUC below which the OFDMA channel will be downgraded to partial mode.

**Command Default** The default OFDMA modulation profile for subcarrier spacing 25KHz is 421. The default OFDMA modulation profile for subcarrier spacing 50KHz is 461. In these two modulation profiles, the default IUC is IUC 13.

**Command Modes** Global configuration (config)

Command History	Release	Modification
	Cisco IOS XE Everest 16.6.1	This command was introduced on the Cisco cBR Series Converged Broadband Routers.
	Cisco IOS XE Amsterdam 17.3.1w	This command was updated. <b>ofdma-prof-mgmt downgrade rxmer min-iuc</b> option was added.

**Usage Guidelines** Use this command to define the OFDMA modulation profile that can be applied to OFDMA channels. The OFDMA modulation profile is used to configure initial ranging, fine ranging, and data IUC parameters.

## Configuring OFDMA Modulation Profile

The following example shows how to configure OFDMA modulation profile.

```
Router# enable
Router# configure terminal
Router(config)# cable mod-profile-ofdma 466
Router(config-ofdma-mod-profile)# subcarrier-spacing 50KHz
Router(config-ofdma-mod-profile)# initial-rng-subcarrier 64
Router(config-ofdma-mod-profile)# fine-rng-subcarrier 128
Router(config-ofdma-mod-profile)# data-iuc 13 modulation 1024-QAM pilot-pattern 2
Router(config-ofdma-mod-profile)# exit
Router(config)# cable mod-profile-ofdma 423
Router(config-ofdma-mod-profile)# subcarrier-spacing 25KHz
Router(config-ofdma-mod-profile)# initial-rng-subcarrier 64
```

```
Router(config-ofdma-mod-profile)# fine-rng-subcarrier 128
Router(config-ofdma-mod-profile)# data-iuc 6 modulation 1024-QAM pilot-pattern 8
Router(config-ofdma-mod-profile)# data-iuc 9 modulation 1024-QAM pilot-pattern 8
Router(config-ofdma-mod-profile)# data-iuc 10 modulation 512-QAM pilot-pattern 8
Router(config-ofdma-mod-profile)# data-iuc 11 modulation 256-QAM pilot-pattern 8
Router(config-ofdma-mod-profile)# data-iuc 12 modulation 128-QAM pilot-pattern 9
Router(config-ofdma-mod-profile)# data-iuc 13 modulation 64-QAM pilot-pattern 9
```

## cable monitor

To enable the forwarding of selected packets on the cable interface to an external LAN analyzer, use the **cable monitor** command in cable interface configuration mode. To disable this function, use the **no** form of this command.

```
cable monitor [{incoming | outbound}] [timestamp] interface interface {slot / {subslot | bay} / port}
[ {access-list {name | number} | mac-address address | sid sid-number | upstream number | packet-type
{data docsis | data ethernet | mac [type type]} } ]
```

```
cable monitor outbound downstream {modular-cable | Integrated-cable | wideband-cable}
slot / {subslot | bay} / controller : channel
```

```
no cable monitor
```

Syntax Description	
<b>incoming</b>	Forwards only packets being received on the upstream.
<b>outbound</b>	Forwards only packets being transmitted on the downstream.
<b>timestamp</b>	Enables packet time-stamping by appending a four-byte value to the forwarded packets. The timestamp value is in hundredths of a second.
<b>interface</b> <i>interface</i>	Specifies the WAN interface to which an external LAN analyzer is attached, and to which packets should be forwarded.  <i>interface</i> —Specifies the interfaces such as Ethernet, Fast Ethernet, Gigabit Ethernet, or Ten Gigabit Ethernet interface.
<i>slot</i>	Slot where the line card resides.  <ul style="list-style-type: none"> <li>• Cisco uBR7246VXR router—The range is from 3 to 6.</li> <li>• Cisco uBR7225VXR router—The range is from 1 to 2.</li> <li>• Cisco uBR7100 series router—The value is 1.</li> </ul>
subslot   bay	(Cisco uBR10012 only) Secondary subslot of the cable interface line card or bay of the SPA. The subslot values are 0 or 1 for the cable line card. The values for bay are from 0 to 3.
port	<i>Specifies the WAN interface number.</i>
<b>access-list</b> <i>name</i>   <i>number</i>	(Optional) Specifies the IP access list name or number (1 to 2699).
<b>mac-address</b> <i>address</i>	(Optional) Specifies the MAC address of the device being monitored.
<b>sid</b> <i>sid-number</i>	(Optional) Specifies the service ID for the packets that should be forwarded (1 to 16384).  <b>Note</b> This option is supported only in Cisco IOS releases that support DOCSIS 1.1 operations.
<b>upstream</b> <i>number</i>	(Optional) Specifies the upstream interface. Valid values for the Cisco uBR-MC20X20V and Cisco uBR-MC5X20 line cards range from 0 to 3

<b>packet-type</b>	(Optional) Specifies whether data or MAC packets are forwarded.
<b>data docsis</b>	Specifies that complete DOCSIS packets (both the DOCSIS header and the complete Ethernet frame) should be forwarded.  <b>Note</b> Enabling this option can result in %LINK-4-TOOBIG messages being generated if the original Ethernet frame is at or near the maximum Ethernet size of 1500 bytes. This is because this option adds additional bytes (the DOCSIS header) to the Ethernet frame, which can result in a total frame size that exceeds the maximum size that is allowed for standard Ethernet frames.
<b>data ethernet</b>	Specifies that the DOCSIS header should be stripped from the packet and that only the Ethernet frame should be forwarded.
<b>mac</b> [ <i>type type</i> ]	Specifies that only DOCSIS MAC-layer packets should be forwarded. If you are using the <b>sid</b> option, you can also optionally specify the <b>type</b> option with one of the following keywords to indicate that only the specific type of MAC-layer traffic should be forwarded: <ul style="list-style-type: none"> <li>• <b>dsa</b>—Dynamic service addition</li> <li>• <b>dsc</b>—Dynamic service change</li> <li>• <b>dsd</b>—Dynamic service deletion</li> <li>• <b>map-grant</b>—Grants</li> <li>• <b>map-req</b>—Requests</li> </ul>
<b>outbound downstream</b>	Enables cable monitor on the specified downstream interface.
<i>controller: channel</i>	Identifies the controller. <ul style="list-style-type: none"> <li>• Valid range for Cisco uBR-MC3GX60V line card is from 0 to 2. <ul style="list-style-type: none"> <li>• RF channel—The range is from 0 to 23.</li> <li>• Bonding group—The range is from 0 to 31.</li> </ul> </li> <li>• Valid range for Cisco UBR-MC20X20 line card is 0 to 4. <ul style="list-style-type: none"> <li>• RF channel—The range is from 0 to 3.</li> <li>• Bonding group—The range is from 0 to 5.</li> </ul> </li> <li>• Valid value for Cisco Wideband SPA is 0. <ul style="list-style-type: none"> <li>• RF channel—The range is from 0 to 23.</li> <li>• Bonding group—The range is from 0 to 31.</li> </ul> </li> </ul>

**Command Default**Both upstream (**incoming**) and downstream (**outbound**) traffic is forwarded.**Command Modes**

Interface configuration—cable interface only (config-if)

**Command History**

Release	Modification
12.1(3a)EC	This command was introduced.

Release	Modification
12.1(4)CX	The <b>sid</b> option was added for DOCSIS 1.1 support.
12.2(4)XF	Support was added for the Cisco uBR10012 universal broadband router.
12.2(4)BC1	Support was added to the Release 12.2 BC train.
12.3(13a)BC	Supports the Cisco MC5x20U-D broadband processing engine (BPE) and the Cisco MC28U cable interface line card.
12.3(17a)BC	<ul style="list-style-type: none"> <li>• Access Control Lists are now supported on the Cisco uBR-MC5X20U/D and Cisco uBR-MC28U cable interface line cards</li> <li>• Unconditional downstream sniffing now enables downstream packets to be monitored, either for MAC or data packets. This enhancement supports both DOCSIS and Ethernet packet encapsulation.</li> </ul>
12.2(33)SCA	This command was integrated into Cisco IOS Release 12.2(33)SCA. Support for the Cisco uBR7225VXR router was added.
12.2(33)SCB	Support was added for the Ten Gigabit Ethernet interface type.
12.2(33)SCE	Support was added for the Cisco UBR-MC3XG60V line cards.
IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

### Usage Guidelines

The **cable monitor** command is used to configure the [Cable Monitor and Intercept Features on the Cisco CMTS Routers](#) feature.

The **cable monitor** command allows an external LAN packet analyzer to monitor inbound and outbound data packets for specific types of traffic between the Cisco CMTS and the CMs on a cable interface. This feature enables the CMTS administrator to analyze traffic problems with customer data exchanges.

The interface used for forwarding packets can be used only for the external LAN analyzer; and cannot be used for other purposes.

The **cable monitor outbound downstream** command can be enabled:

- only one mac-domain on a line card at a time
- for one modular-cable or intergrated-cable interface per line card at one time
- for one wideband-cable interface per line card at one time



**Tip** One possible software utility you can use for decoding the DOCSIS MAC frames is Wireshark software, which is available for Windows and Unix systems at <http://www.wireshark.org>.

### Examples

The following example shows how to configure the Cisco CMTS so that it monitors incoming MAC-layer packets for the CM with the MAC address of 0123.4567.89ab and forwards copies of the packets to the LAN analyzer on the Ethernet interface in slot 1, port 2:

```
Router(config-if)# cable monitor incoming interface e1/2 mac-address 0123.4567.89ab
packet-type mac
```

The following example shows how to configure a Cisco CMTS running DOCSIS 1.1 software so that it monitors incoming MAC-layer packets of type DSA for the CM identified by SID 173 and forwards copies of the packets to the LAN analyzer on the Ethernet interface in slot 1, port 2:

```
Router(config-if)# cable monitor incoming interface e1/2 sid 173 packet-type mac type dsa
```

The following example shows how to configure a mac domain to monitor all packets on a modular primary downstream and forward copies of the packets to a Gigabit Ethernet interface:

```
Router# configure terminal
Router(config)# interface cable 5/0/0
Router(config-if)# cable monitor outbound downstream Modular-Cable 5/1/0:21
Router(config-if)# cable monitor outbound interface GigabitEthernet3/0/0
Router(config-if)# exit
```

The following example shows how to configure a mac domain to monitor all packets on a particular downstream bonding group and forward copies of the packets to a Gigabit Ethernet interface:

```
Router# configure terminal
Router(config)# interface cable 5/0/0
Router(config-if)# cable monitor outbound downstream Wideband-Cable 5/1/2:30
Router(config-if)# cable monitor outbound interface GigabitEthernet3/0/0
Router(config-if)# exit
```

The following example shows how to configure a mac domain to monitor all packets on a particular bonding group destined to a specific modem and forward copies of the packets to a Gigabit Ethernet interface:

```
Router# configure terminal
Router(config)# interface cable 5/0/0
Router(config-if)# cable monitor outbound downstream Wideband-Cable 5/1/2:30
Router(config-if)# cable monitor outbound interface GigabitEthernet3/0/0 mac-address
0123.4567.89ab
Router(config-if)# exit
```

#### Related Commands

Command	Description
<b>cable intercept</b>	Allows the CMTS to forward all traffic to and from a particular CM to a data collection server located at particular User Datagram Protocol (UDP) port.
<b>show interface cable monitor</b>	Displays monitor flow information on the upstream port.

## cable mrc-mode

To enable Multiple Receive Channel (MRC) mode for a Media Access Control (MAC) interface during or after the cable modem (CM) registration, use the **cable mrc-mode** command in cable interface configuration mode or MAC domain profile configuration mode. To disable this configuration, use the **no** form of this command.

**cable mrc-mode**  
**no cable mrc-mode**

### Syntax Description

This command has no arguments or keywords.

### Command Default

The MRC mode is enabled by default on a downstream bonding capable cable interface line card.

### Command Modes

Interface configuration (config-if)

MAC domain profile configuration (config-profile-md)

### Command History

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

### Usage Guidelines

When you enable or disable the MRC mode, cable modems switch the operation to or from the MRC mode only after the reinitialization of cable modems. You cannot enable the MRC mode on a non-upstream bonding capable cable interface line card.

### Examples

The following example shows how to enable the MRC mode for a MAC interface:

```
Router# configure terminal
Router(config)# interface cable 7/1/0
Router(config-if)# cable mrc-mode
```

The following example shows how to enable the MRC mode for a MAC interface on a Cisco cBR-8 router:

```
Router# configure terminal
Router(config)# interface cable 3/0/1
Router(config-if)# cable mrc-mode
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>cable mtc-mode</b>	Enables or disables the Multiple Transmit Channel mode (MTC) for a MAC interface.

## cable mtc-mode

To enable Multiple Transmit Channel (MTC) mode for a Media Access Control (MAC) interface during or after the cable modem (CM) registration, use the **cable mtc-mode** command in cable interface configuration mode or MAC domain profile configuration mode. To disable this configuration, use the **no** form of this command.

```
cable mtc-mode [required-attribute]
no cable mtc-mode [required-attribute]
```

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```
cable mtc-mode[required-attribute]
no cable mtc-mode[required-attribute]
```

#### Syntax Description

<b>required-attribute</b>	(Optional) Specifies the per-CM basis MTC mode configuration.
---------------------------	---

#### Command Default

The MTC mode is enabled by default with the required attribute. With this default configuration, the Cisco CMTS router enables the MTC mode on a per-CM basis by looking at the configuration file of each cable modem.

#### Command Modes

Interface configuration (config-if)

MAC domain profile configuration (config-profile-md)

#### Command History

Release	Modification
12.2(33)SCC	This command was introduced.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers. The <b>required-attribute</b> keyword was removed.
IOS-XE 3.17.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers. The <b>required-attribute</b> keyword was added.
IOS XE Fuji 16.7.1	This command was modified to support MAC domain profile configuration on the Cisco cBR Series Converged Broadband Routers.

#### Usage Guidelines

Multiple Transmit Channel mode is a CM capability that enables CMs to send upstream traffic on multiple upstream channels. You can enable the MTC mode on a cable interface line card in two ways:

- MTC mode on a per-CM basis—By default, the MTC mode is enabled with the required attribute. With this default configuration, the Cisco CMTS router enables MTC mode on a per-CM basis by looking at each CM's configuration file. When the CM configuration file has the bonded-bit (bit-0) on in type-length-value (TLV) 43.9.3 (cable modem upstream required attribute mask), the Cisco CMTS router lets the CM come online in the MTC mode. If the CM configuration file does not have the bonded-bit on, the CM comes online in non-MTC mode.

- MTC mode for all cable modems in a MAC domain—The MTC mode for all cable modems in a MAC domain is disabled by default on an upstream bonding capable cable interface line card. You can enable the MTC mode for all cable modems in a MAC domain using the **cable mtc-mode** command in cable interface configuration mode.



**Note** You do not have to use the **required-attribute** keyword to enable the MTC mode for all cable modems in a MAC domain. You can use the **no** form of this command with the **required-attribute** keyword to disable the default per-CM basis configuration.

You cannot enable the MTC mode on a non-upstream bonding capable cable interface line card.

## Examples

The following example shows how to enable the MTC mode for all cable modems in a MAC domain:

```
Router# configure terminal
Router(config)# interface cable 7/1/0
Router(config-if)# cable mtc-mode
```

The following example shows how to enable the MTC mode for all cable modems in a MAC domain on a Cisco cBR-8 router:

```
Router# configure terminal
Router(config)# interface cable 3/0/1
Router(config-if)# cable mtc-mode
```

The following example shows how to configure the required CM attribute on USCB in a MAC domain on a Cisco cBR Series Converged Broadband Router:

```
Router# configure terminal
Router(config)# interface cable 3/0/1
Router(config-if)# cable mtc-mode required-attribute
Router(config-if)#
```

## Related Commands

Command	Description
<b>cable mrc-mode</b>	Enables the Multiple Receive Channel mode (MRC) for a MAC interface.

## cable multicast auth enable default-action

To enable cable multicast authorization profile and set the maximum sessions limit, use the **cable multicast auth enable default-action** command in global configuration mode. To disable a cable multicast authorization profile, use the **no** form of this command.

**cable multicast auth enable default-action** {*permitdeny*} **max-sessions** [*limit*]  
**no cable multicast auth enable**

Syntax Description	
<i>permit</i>	Specifies packets to forward.
<i>deny</i>	Specifies packets to reject.
<i>limit</i>	Specifies the maximum number of dynamic multicast sessions allowed per CM. No default value. Max value allowed is 65535.

**Command Default** Cable multicast authorization is disabled.

**Command Modes** Global configuration (config)

Command History	Release	Modification
	12.2(33)SCB	This command was introduced.

**Usage Guidelines** This command is used to enable cable multicast authorization profile feature and defines the default value. However, it does not define the actual authorization files.

**Examples** The following example shows how to enable the default multicast authorization profile:

```
Router(config)
)# cable multicast auth enable default-action deny max-sessions 10
```

Related Commands	Command	Description
	<b>cable multicast authorization profile-name</b>	Defines the cable multicast authorization profile.
	<b>show cable multicast authorization</b>	Displays the list of defined multicast authorization profiles and all CMs associated with corresponding profiles.

# cable multicast auth profile-name

To define a cable multicast authorization profile, and to set it as the default profile, use the **cable multicast auth profile-name** command in global configuration mode. To disable a cable multicast authorization profile, use the **no** form of this command.

**cable multicast auth profile-name** *name* [**default**]  
**no cable multicast auth profile-name** *name* [**default**]

## Syntax Description

<i>name</i>	Specifies the name of the authorization profile to be used.
<b>default</b>	(Optional) Specifies that the profile name should be treated as the default profile.

## Command Default

Cable multicast authorization is disabled.

## Command Modes

Global configuration (config)

## Command History

Release	Modification
12.2(33)SCB	This command was introduced.
12.2(33)SCC	The optional <b>default</b> keyword was added.

## Usage Guidelines

This command defines a cable multicast authorization profile, and optionally sets it as the default profile. If the **default** keyword is not used while modifying the profile, the profile is automatically converted to a non-default profile. Similarly, if the **default** keyword is added while modifying a profile, the profile is treated as a default profile.

## Examples

The following example shows how to use the selected multicast authorization profile:

```
Router(config)
)# cable multicast auth profile-name GOLD default
```

## Related Commands

Command	Description
<b>cable multicast authorization enable default-action</b>	This command enables the cable multicast authorization features. If the multicast authorization feature is disabled, all defined authorization profiles are ineffective.
<b>match rule</b>	This command configures the match rule, rule priority and related action in the selected cable multicast authorization profile

# cable multicast group-encryption

To configure a group encryption profile for a multicast group, use the **cable multicast group-encryption** command in global configuration mode. To disable a group encryption profile, use the **no** form of this command.

**cable multicast group-encryption** *number* **algorithm** **56bit-des**  
**no cable multicast group-encryption** *number* **algorithm** **56bit-des**

<b>Syntax Description</b>	<i>number</i>	Specifies the number of a specific cable multicast QoS group encryption profile. The range is from 1 to 255.
	<b>algorithm</b> <b>56bit-des</b>	Specifies that the data encryption standard (DES) is 56 bits.

**Command Default** Cable multicast group encryption is disabled.

**Command Modes** Global configuration (config)

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(33)SCA	This command was introduced.

**Usage Guidelines** To apply encryption rules to a cable multicast QoS group, you must first enable and identify an encryption group.

**Examples** The following example enables encryption, identifies encryption group 12, and applies the encryption rule to QoS group 2:

```
Router(config)# cable multicast group-encryption 12 algorithm 56bit-des
Router(config)# cable multicast qos group 2 priority 7 global
Router(config-mqos)# group-encryption 12
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>cable multicast qos group</b>	Specifies and configures a cable multicast QoS group.
	<b>show interface bundle multicast-sessions</b>	Displays multicast session information for a specific virtual cable bundle.
	<b>show interface cable multicast-sessions</b>	Displays multicast session information for a specific cable interface.

# cable multicast group-qos

To configure a QoS profile for a QoS group, use the **cable multicast group-qos** command in global configuration mode. To disable a QoS profile, use the **no** form of this command.

**cable multicast group-qos** *number scn service-class-name control* {**single** | **aggregate** [**limit** *max-sessions*]} [**override**]

**no cable multicast group-qos** *number scn service-class-name control* {**single** | **aggregate** [**limit** *max-sessions*]} [**override**]

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**cable multicast group-qos** *number scn service-class-name* {**single** | **aggregate** [**limit** *max-sessions*]} [**override**]

**no cable multicast group-qos** *number scn service-class-name* {**single** | **aggregate** [**limit** *max-sessions*]} [**override**]

### Syntax Description

<i>number</i>	Specifies the QoS profile number for the cable multicast QoS group. The range is from 1 to 255. If a multicast group does not match the group QoS classifiers, a default group-QoS option is applied to the multicast flow.
<b>scn</b> <i>service-class-name</i>	Specifies a service class name for the QoS profile.
<b>control</b>	Specifies the type of control to the service flow.
<b>single</b>	Specifies that a separate service flow is created for each session.
<b>aggregate</b>	Specifies that service flows are grouped for sessions in the same multicast QoS group.
<b>limit</b> <i>max-sessions</i>	(Optional) Specifies the Internet Group Management Protocol (IGMP) session limit for aggregate service flows. The range is from 1 to 255.
<b>override</b>	(Optional) Specifies the additional multicast session admitted and forwarded as best effort traffic, else disallows any additional multicast session once the max-sessions limit is reached.

### Command Default

The QoS profile for a QoS group is not enabled.

### Command Modes

Global configuration (config)

### Command History

Release	Modification
12.2(33)SCA	This command was introduced.
12.2(33)SCB	This command was modified with the addition of <b>override</b> keyword.
IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers. The <b>control</b> keyword was removed.

**Usage Guidelines**

If a QoS profile number is not specified, a default QoS profile is applied. The default group QoS configuration creates a default multicast service flow for each cable interface that is used when a multicast session does not match any classifiers of a GC on the interface.

**Examples**

The following example configures QoS profile 5 with a service name of name1 and a control of single to indicate that a separate service flow is created for each session. QoS profile 5 is then assigned to QoS group 2 on the Cisco uBR 10012 router:

```
Router(config)# cable multicast group-qos 5 scn name1 control single
Router(config)# cable multicast qos group 2 priority 7 global
Router(config-mqos)# cable multicast group-qos 5
Router(config)# cable multicast group-qos 1 scn mcast1 aggre lim 2 ?
override Allow sessions when limit is exceeded with Default qos sessions
Router(config)# cable multicast group-qos 1 scn mcast1 aggre lim 2
```

The following example configures QoS profile 5 with a service name of name1 and specifies that a separate service flow is created for each session. QoS profile 5 is then assigned to QoS group 2 on a Cisco cBR-8 router:

```
Router(config)# cable multicast group-qos 5 scn name1 single
Router(config)# cable multicast qos group 2 priority 7 global
Router(config-mqos)# group-qos 5
```

The following example configures QoS profile 1 with a service name of mcast1 and specifies that service flows are grouped for sessions in the same multicast QoS group on a Cisco cBR-8 router:

```
Router(config)# cable multicast group-qos 1 scn mcast1 aggregate limit 2 ?
override Allow sessions when limit is exceeded with Default qos sessions
Router(config)# cable multicast group-qos 1 scn mcast1 aggregate limit 2 override
```

**Related Commands**

Command	Description
<b>cable multicast qos group</b>	Specifies and configures a cable multicast QoS group.
<b>show interface cable multicast-sessions</b>	Displays multicast session information for a specific cable interface.

# cable multicast group-qos default

To configure the service class name of the default multicast quality of service (MQoS) for the QoS profile, use the **cable multicast group-qos default** command in global configuration mode. To disable the service class name of the default MQoS for the QoS profile, use the **no** form of this command.

**cable multicast group-qos default scn service-class-name aggregate**  
**no cable multicast group-qos default scn service-class-name aggregate**

Syntax Description	
<b>scn service-class-name</b>	Specifies a service class name for the QoS profile.
<b>aggregate</b>	Specifies that service flows are grouped for sessions in the same MQoS group.

**Command Default** The default MQoS profile is not configured.

**Command Modes** Global configuration (config)

Command History	Release	Modification
	12.2(33)SCC1	This command was introduced.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines** If you configure the service class name with the DOCSIS Setup Gateway (DSG) tunnel when no default MQoS exists, the configuration is rejected and you are prompted to configure the default MQoS.

The CMTS selects the primary downstream channel to forward the multicast traffic when the default MQoS is configured and there is no matching MQoS group configuration. Otherwise, the wideband interface is used to forward the multicast traffic.



**Note** If you configure or unconfigure the default MQoS while the CMTS is sending multicast traffic, duplicate traffic is generated for approximately 3 minutes (or 3 times the query interval).

**Examples** The following example configures the default MQoS profile with the service class name name1.

```
Router(config)# cable multicast group-qos default scn name1 aggregate
```

Related Commands	Command	Description
	<b>cable multicast group-qos</b>	Configures a QoS profile for a QoS group.
	<b>cable multicast qos group</b>	Specifies and configures a cable multicast QoS group.
	<b>show interface cable multicast-sessions</b>	Displays multicast session information for a specific cable interface.

## cable multicast mdf-disable

To disable Multicast DSID-based Forwarding (MDF) capability of all cable modems associated with a Cisco CMTS router, use the **cable multicast mdf-disable** command in global configuration mode. To enable MDF on the cable modem, use the **no** form of this command.

```
cable multicast mdf-disable [{wb-incapable-cm | dsg}]
no cable multicast mdf-disable [{wb-incapable-cm | dsg}]
```

Syntax Description	Parameter	Description
	<b>wb-incapable-cm</b>	(Optional) Disables MDF on all DOCSIS 2.0 hybrid cable modems.
	<b>dsg</b>	(Optional) Disables MDF capability of all DSG embedded cable modems, including DOCSIS 3.0 DSG and DOCSIS 2.0 DSG hybrid modems.

**Command Default** By default, MDF is not always enabled on the cable modem because it is dependent on the cable modem hardware.

**Command Modes** Global configuration (config)

Command History	Release	Modification
	12.2(33)SCD3	This command was introduced.
	12.2(33)SCE4	The <b>wb-incapable-cm</b> keyword was added.
	12.2(33)SCF2	The <b>dsg</b> keyword was added, and behavior of the <b>wb-incapable-cm</b> keyword was changed to include only non-DSG DOCSIS 2.0 hybrid cable modems.
	IOS-XE 3.15.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines** The **cable multicast mdf-disable** command is associated with the [DOCSIS 3.0 Multicast Support on the CMTS Routers](#) feature.

In Cisco IOS Release 12.2(33)SCE4, the **wb-incapable-cm** keyword was added to the **cable multicast mdf-disable** command to disable MDF on all DOCSIS 2.0 hybrid cable modems, including DOCSIS 2.0 DSG embedded cable modems. In Cisco IOS Release 12.2(33)SCF2, the **wb-incapable-cm** keyword was changed to include only non-DSG DOCSIS 2.0 hybrid cable modems.

After disabling MDF capability, you must run **clear cable modem reset** command to bring all DSG embedded cable modems online.

### Examples

The following example shows how to disable MDF capability on all cable modems:

```
Router# configure terminal
Router(config)# cable multicast mdf-disable
```

The following example shows how to disable MDF capability of all non-DSG DOCSIS 2.0 hybrid cable modems:

```
Router# configure terminal  
Router(config)# cable multicast mdf-disable wb-incapable-cm
```

The following example shows how to disable MDF capability of all DSG embedded cable modems:

```
Router# configure terminal  
Router(config)# cable multicast mdf-disable dsg
```

---

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>ip multicast-routing</b>	Enables multicast routing globally or on a particular virtual routing and forwarding (VRF) interface.
<b>ip multicast-routing distributed</b>	Enables Multicast Distributed Switching (MDS)

## cable multicast qos group

To specify and configure a cable multicast QoS group and enter multicast QoS configuration mode, use the **cable multicast qos group** command in global configuration mode. To disable a cable multicast QoS group, use the **no** form of this command.

**cable multicast qos group** *id* **priority** *value* [**global**]  
**no cable multicast qos group** *id* **priority** *value* [**global**]

Syntax Description		
	<i>id</i>	Specifies the number of the cable multicast QoS group. The range is from 1 to 255.
	<b>priority</b> <i>value</i>	Specifies the priority of the cable multicast QoS group. The range is from 1 to 255. Starting with Cisco IOS Release 12.2(33)SCC and Cisco IOS-XE Release 3.15.0S, the range is from 1 to 63 and from 192 to 255. The values from 64 to 191 are used internally by the Cisco CMTS.
	<b>global</b>	(Optional) Specifies that the multicast QoS group configuration is applied to all cable interfaces.

**Command Default** A cable multicast QoS group is not identified.

**Command Modes** Global configuration (config)  
 Interface configuration—cable interface only (config-if)  
 Wideband-interface profile configuration (config-profile-wb)

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

**Usage Guidelines** You must configure a group QoS profile using the **cable multicast group-qos** command, and a group encryption profile using the **cable multicast group-encryption** command before you configure a cable multicast QoS group.

**Examples** The following example specifies multicast QoS group 2 with a priority of 6 and global application. Application ID, group encryption, group QoS, session range, ToS, and VRF options are configured for QoS group 2.

```
Router(config)# cable multicast qos group 2 priority 6 global
Router(config-mqos)# application-id 44
Router(config-mqos)# group-encryption 4
Router(config-mqos)# group-qos 3
Router(config-mqos)# session-range 224.10.10.01 255.255.255.254
Router(config-mqos)# tos 1 6 15
Router(config-mqos)# vrf name1
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>application-id</b>	Specifies an application type to allow admission control to be applied to a group configuration.
<b>cable multicast group-encryption</b>	Configures a group encryption profile for a multicast group.
<b>cable multicast group-qos</b>	Configures a group QoS profile for a multicast QoS group.
<b>session-range</b>	Identifies the multicast QoS group session range.
<b>show interface bundle multicast-sessions</b>	Displays multicast session information for a specific virtual cable bundle.
<b>show interface cable multicast-sessions</b>	Displays multicast session information for a specific cable interface.
<b>tos</b>	Sets the type of service (ToS) low byte, high byte, and mask values within a multicast QoS group.
<b>vrf</b>	Specifies the name for a virtual routing and forwarding (VRF) instance.

## cable multicast ses-cache

To enable multicast replication session on the forwarding interface, use the **cable multicast ses-cache** command in global configuration and interface configuration mode. To disable, use the **no cable multicast ses-cache** command.

**cable multicast ses-cache** *value*  
**no cable multicast ses-cache** *value*

<b>Syntax Description</b>	<i>value</i> Sets the value for the multicast replication session cache. The valid range is from 0 to 500. The default value is 0.
---------------------------	--

**Command Default** This command is disabled by default.

**Command Modes** Global configuration (config)  
 Interface configuration—cable interface only (config-if)  
 Wideband-interface profile configuration (config-profile-wb)

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(33)SCH	This command was introduced.
	IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines** Multicast replication session cache feature helps reducing CPU utilization by reusing multicast replication sessions stored in the cache. The sessions are cached and reused later when a new IGMP join request is received.



**Note** Only IPv4 IGMP multicast replication sessions can be cached and reused.

The multicast replication session cache can be configured at a global level for all the interfaces on the Cisco uBR10012 router or at an interface level for a forwarding interface. The session cache value configured at the interface shall override the global configuration.

The **cable multicast ses-cache** command is supported on the integrated-cable, modular-cable, and wideband-cable interfaces.



**Note** Ensure that the session cache value being configured is lower than that the current value.

- Changing the multicast replication session cache value from 10 to 0 clears the current cache.

The **cable multicast ses-cache** command is used with the multicast replication session cache feature:

- [DOCSIS 3.0 Multicast Support on the CMTS Routers](#)

**Examples**

The following example sets the multicast replication session cache to 100 at the global level on the Cisco uBR10012 router:

```
Router# configure terminal
Router(config)# cable multicast ses-cache 100
Router(config)# exit
```

The following example sets the multicast replication session cache on the integrated interface to 10:

```
Router# configure terminal
Router(config)# interface Integrated-Cable 8/1/0:0
Router(config-if)# cable multicast ses-cache 10
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>clear cable multicast ses-cache</b>	Clears the cached multicast replication sessions on the interfaces on the Cisco uBR10012 router.
<b>show cable multicast ses-cache</b>	Displays the multicast replication session cache information both at the global and interface level of the forwarding interface.

## cable multicast source

To configure a multicast session range for a PacketCable Multimedia (PCMM) multicast group on a Cisco CMTS router, use the **cable multicast source pcmm** command in global configuration mode. To disable this configuration, use the **no** form of this command.

**cable multicast source pcmm**  
**no cable multicast source pcmm**

<b>Syntax Description</b>	<b>pcmm</b> Specifies the PCMM client and enters the multicast session range configuration mode.
---------------------------	--

<b>Command Default</b>	None
------------------------	------

<b>Command Modes</b>	Global configuration (config)
----------------------	-------------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(33)SCE	This command was introduced in Cisco IOS Release 12.2(33)SCE.
	IOS-XE 3.15.0S	This command is not supported on the Cisco cBR Series Converged Broadband Routers.
	IOS-XE 3.18.0S	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

### Examples

The following example shows how to configure a multicast session range for a PCMM multicast group on a Cisco CMTS router:

```
Router# configure terminal
Router(config)# cable multicast source pcmm
Router(config-msrc)# session-range 229.0.0.0 255.0.0.0
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>show packetcable gate multimedia summary</b>	Displays information about the total number of PCMM multicast gates.

# cable nd

To enable the IPv6 Neighbor Discovery (ND) Gleaning feature on the Cisco CMTS router, use the **cable nd** command in bundle interface configuration mode. To disable IPv6 ND gleaning, use the **no** form of this command.

**cable nd**  
**no cable nd**

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

**Command Default** The IPv6 ND Gleaning feature is enabled by default.

**Command Modes** Bundle interface configuration (config-if)

Release	Modification
12.2(33)SCC	This command was introduced.
IOS-XE 3.15.OS	This command was implemented on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines** The **cable nd** command is associated with the [IPv6 ND Gleaning](#) feature.

The **cable nd** command adds a CPE (host behind a cable modem) to the Cisco CMTS subscriber database. This command does not impact the IPv6 ND protocol operation on the Cisco CMTS router.

The **cable ipv6 source-verify** and **cable nd** commands are not compatible with each other in Cisco IOS Release 12.2(33)SCE and later. You must disable IPv6 ND gleaning using the **no** form of the **cable nd** command before configuring IPv6 source verification using the DHCPv6 Leasequery feature.

## Examples

The following example shows how to configure IPv6 ND gleaning on the Cisco CMTS router:

```
Router# configure terminal
Router(config)# interface bundle 1
Router(config-if)# cable nd
```

Command	Description
<b>cable ipv6 source-verify</b>	Enables source verification of IPv6 packets on the Cisco CMTS router.

## cable nd timeout

To delete corresponding IPv6 address from the subscriber database after IPv6 Neighbor Discovery (ND) timeout, use the **cable nd timeout** command in bundle interface configuration mode. To disable this feature, use the **no** form of this command.

**cable nd timeout**  
**no cable nd timeout**

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

**Command Default** The IPv6 ND Gleaning feature is enabled by default.

**Command Modes** Bundle interface configuration (config-if)

Command History	Release	Modification
	IOS-XE 3.15.OS	This command was introduced on the Cisco cBR Series Converged Broadband Routers.

**Usage Guidelines** By default, the **cable nd timeout** command is configured. When configured, if the ND cache of an CPE IPv6 address is timed out, the corresponding IPv6 address will be removed from CMTS subscriber DB. In the **no cable nd timeout** configuration, the ND cache timeout will not cause the removal of CPE IPv6 address from the subscriber DB.

**Examples** The following example shows how to configure IPv6 ND timeout on the Cisco cBR Series Converged Broadband Routers:

```
Router# configure terminal
Router(config)# interface bundle 1
Router(config-if)# cable nd timeout
```

Related Commands	Command	Description
	<b>cable nd</b>	Enables the IPv6 Neighbor Discovery (ND) Gleaning feature on the Cisco CMTS routers.

# cable nd validate

To enable validation checks of neighbor discovery messages (both NA and NS) to ensure that the messages will be processed, use the **cable nd validate** command in bundle interface configuration mode. To disable this feature, use the **no** form of this command.

**cable nd validate**  
**no cable nd validate**

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

**Command Default** None.

**Command Modes** Bundle interface configuration (config-if)

## Command History

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

## Examples

The following example shows how to configure IPv6 ND validate on the Cisco cBR Series Converged Broadband Routers:

```
Router# configure terminal
Router(config)# interface bundle 1
Router(config-if)# cable nd validate
```

## Related Commands

Command	Description
<b>cable nd</b>	Enables the IPv6 Neighbor Discovery (ND) Gleaning feature on the Cisco CMTS routers.