



DOCSIS 3.1 Upstream Profile Selection

DOCSIS 3.1 introduces the concept of upstream profiles for OFDMA channels. This document describes how to configure the DOCSIS 3.1 Upstream Profile Selection on the Cisco cBR Series Converged Broadband Router.

Finding Feature Information

Your software release may not support all the features that are documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. The Feature Information Table at the end of this document provides information about the documented features and lists the releases in which each feature is supported.

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Hardware Compatibility Matrix for the Cisco cBR Series Routers



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

Table 1: Hardware Compatibility Matrix for the Cisco cBR Series Routers

Cisco CMTS Platform	Processor Engine	Interface Cards
Cisco cBR-8 Converged Broadband Router	<p>Cisco IOS-XE Release 16.5.1 and Later Releases</p> <p>Cisco cBR-8 Supervisor:</p> <ul style="list-style-type: none"> • PID—CBR-SUP-250G • PID—CBR-CCAP-SUP-160G • PID—CBR-CCAP-SUP-60G • PID—CBR-SUP-8X10G-PIC 	<p>Cisco IOS-XE Release 16.5.1 and Later Releases</p> <p>Cisco cBR-8 CCAP Line Cards:</p> <ul style="list-style-type: none"> • PID—CBR-LC-8D30-16U30 • PID—CBR-LC-8D31-16U30 • PID—CBR-RF-PIC • PID—CBR-RF-PROT-PIC • PID—CBR-CCAP-LC-40G • PID—CBR-CCAP-LC-40G-R <p>Cisco cBR-8 Downstream PHY Modules:</p> <ul style="list-style-type: none"> • PID—CBR-D30-DS-MOD • PID—CBR-D31-DS-MOD <p>Cisco cBR-8 Upstream PHY Modules:</p> <ul style="list-style-type: none"> • PID—CBR-D30-US-MOD • PID—CBR-D31-US-MOD

Information about Upstream Profiles

A modulation profile is a list of interval usage codes (IUCs) that are defined for an OFDMA channel. Each IUC will have a modulation order and pilot pattern. Multiple IUCs within a modulation profile allow for different modulation orders on the same OFDMA channel. The CMTS can define multiple profiles for use in an OFDMA channel, where the profiles differ in the modulation orders assigned to each minislot.

You can use the following commands to view the profiles:

- To display the profiles associated with the cable modems (CMs), use the **show cable modem** *[ip-address/ mac-address/ cable/ {slot / subslot / cable-interface-index}] phy ofdm-profile upstream* command.
- To display detailed profile management data associated with specific cable modem, use the **show cable modem** *[ip-address/ mac-address] prof-mgmt upstream* command.

The CMTS can assign different data IUCs for different groups of CMs.

A DOCSIS 3.1 CM can only have two active OFDMA Upstream Data Profile IUCs on a given channel.

Default Data IUC

Data IUC 13 is intended to be the most robust IUC and able to be used by all cable modems.

Recommended Interval Usage Code (IUC)

Based on the receive modulation error ratio (RxMER) values collected periodically during upstream probing, the CMTS finds among the existing IUCs up to two that provide the highest speed while having sufficient signal to noise ratio (SNR) margin for the CMTS to receive code words with acceptable error rates. The **show cable modem phy ofdm-profile upstream** command displays the one or two recommended IUCs for each CM.

In Cisco IOS XE Everest 16.6.1 release, data IUC 13 will be one of the IUCs assigned to the CM.

To disable the automatic profile downgrade, use **no cable upstream ofdma-prof-mgmt prof-upgrade-auto** command in global configuration mode.

How to Configure Upstream Profiles

Configuring RxMER to Bit Loading Mapping

There are many ways to map the Receive Modulation Error Ratio (RxMER) values to bit loading values. We use the following mapping recommended in DOCSIS 3.1 OSSI, as our baseline mapping:

RxMER (in ¼ DB)	QAM	Bit Loading
60	16	4
84	64	6
96	128	7
108	256	8
122	512	9
136	1024	10
148	2048	11
164	4096	12
184	8192	13
208	16384	14

- To configure a margin to adjust the RxMER to bit loading mapping, use the following command:

```
Router(config)# cable upstream ofdma-prof-mgmt mer-margin-qdb interval-in-minutes
```

This configured value (*quarter-DB*) is added to the RxMER values collected by CMTS before using the above mapping table, thus giving a user more control in selecting the recommended profiles.

- To specify the percentage of minislot average RxMER that can be ignored in the recommended profile calculation, use the following command:

```
Router(config)# cable upstream ofdma-prof-mgmt exempt-mslot-pct percent
```

This provides a way to specify the extent that the outliers can be ignored.

- To configure the RxMER poll interval, use the following command:

```
Router(config)# cable upstream ofdma-prof-mgmt rxmer-poll-interval interval-in-minutes
```

The CMTS uses upstream probing to collect RxMER data per CM. This occurs during registration and periodically thereafter. The collected RxMER data is averaged per minislot and used to compute the recommended IUCs for each CM.

Feature Information for Upstream Profile Selection

Use Cisco Feature Navigator to find information about the platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to the www.cisco.com/go/cfn link. An account on the Cisco.com page is not required.



Note The following table lists the software release in which a given feature is introduced. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 2: Feature Information for Upstream Profile Selection

Feature Name	Releases	Feature Information
DOCSIS3.1 US Profile Selection	Cisco IOS XE Fuji 16.7.1	This feature was integrated into Cisco IOS XE Fuji 16.7.1 on the Cisco cBR Series Converged Broadband Routers.