OFDM Channel Power Profile

The OFDM Channel Power Profile feature helps in adjusting the power-level of 6 MHz bands in a DOCSIS 3.1 downstream OFDM channel.

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.

- Hardware Compatibility Matrix for the Cisco cBR Series Routers, on page 1
- Information About OFDM Channel Power Profile, on page 3
- How to Configure the OFDM Channel Power Profile, on page 4
- Configuration Example for OFDM Power Profile, on page 5
- Feature Information for OFDM Channel Power Profile, on page 6

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	**Cisco IOS-XE Release 16.5.1 and Later Releases** Cisco cBR-8 Supervisor: • PID—CBR-SUP-250G • PID—CBR-CCAP-SUP-160G	**Cisco IOS-XE Release 16.5.1 and Later Releases** Cisco cBR-8 CCAP Line Cards: • 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 • PID—CBR-CCAP-LC-G2-R • PID—CBR-SUP-8X10G-PIC • PID—CBR-2X100G-PIC Digital PICs: • PID—CBR-DPIC-8X10G • PID—CBR-DPIC-2X100G Cisco cBR-8 Downstream PHY Module: • PID—CBR-D31-DS-MOD Cisco cBR-8 Upstream PHY Modules: • PID—CBR-D31-US-MOD

Note Do not use DPICs (8X10G and 2x100G) to forward IP traffic, as it may cause buffer exhaustion, leading to line card reload.

The only allowed traffic on a DPIC interface is DEPI, UEPI, and GCP traffic from the Cisco cBR-8 router to Remote PHY devices. Other traffic such as DHCP, SSH, and UTSC should flow via another router, since DPICs cannot be used for normal routing.

Information About OFDM Channel Power Profile

The OFDM power profile provides a better, consistent power-level output at the cable modem, compensating the power levels at a finer granularity. It reduces the differing amounts of cable-loss over the bandwidth of OFDM channel.

This feature enables the Cisco cBR Series Converged Broadband Router to correct the transmission loss due to the cable in the plant.

The OFDM power profile (ofdm-power-profile) adjusts the transmission power level of each 6 MHz in an OFDM channel. The OFDM channel width can range from 24 MHz to 192 MHz, resulting in band-counts between 4 and 32 for the profile.

Each 6 MHz band is referenced by a band index (band-index) that is zero-based, with a maximum band range of 192 MHz OFDM channel being 0 to 31. Each band within the OFDM channel can have a unique power level setting. The OFDM power profile allows a total band adjustment range of 8 dB. Under some specific conditions, if the OFDM channel's downstream controller's base channel power is set to exceed the maximum DRFI specification power level, the OFDM power profile adjustment range can become as high as 9 dB.

In a power profile, you can set the power level (power-adjust-default) to a default value. This default value is applied to any band that is not configured through any other means.

You can configure band power levels in two methods: through the power tilt config (power-tilt-linear) or by configuring the power level for a band or range of bands (band-index). You can use both methods for configuring the band power levels simultaneously within an OFDM power profile.

The power tilt configuration applies a linear power-adjust value between the `power-adjust-default` value applied to the band index 0, and the power-tilt-linear adjust value applied to the highest band index of the profile. For example, an OFDM Power Profile of 96 MHz, with a power-tilt-linear of 4 dB, and power-adjust-default of 0 dB, has16 bands numbered 0 to 15, band index 0 is +0 dB, band index 15 is +4 dB, and bands 1 to 14 contain the linear power level setting based on the slope of the line between the band 0 and band 15 to the nearest 1/10th dB.

The band-index configuration applies a specified value to the indicated bands. The band-index configuration can specify a single band or a range of bands. A power-adjust configuration is used to specify the power level for the bands to the nearest 1/10th dB.

You can simultaneously use both power tilt and band index, where band-index is applied last. When you use both, the power-tilt-linear values can be overridden using the band-index power-adjust values.

A maximum of 64 OFDM power profiles can be configured on the Cisco cBR routers, numbered from 1 to 64. You can apply a single OFDM power profile to multiple controller OFDM channels, across line cards, as long as all validity checks pass during configuration. The router console displays an error message explaining any configuration errors or warnings.

Restrictions for Configuring OFDM Power Profile

The following restrictions are applicable for configuring an OFDM power profile:

- OFDM power profile can be configured only on DOCSIS 3.1 system
- The power profile can be applied only to downstream controller OFDM channels (RF-channels 158 to 162)

How to Configure the OFDM Channel Power Profile

Configuring OFDM Power Profile Using Band-index

Use the following commands along with the band-index configuration to configure OFDM Power Profile, where the band-index values act as an override.

```
enable
configure terminal
cable downstream ofdm-power-profile <profile_id>
  power-adjust-default -2.1
  band-index 0 7
    power-adjust -1.0
  band-index 8 15
    power-adjust -0.5
  band-index 16 23
    power-adjust 0.5
  band-index 24 31
    power-adjust 1.5

controller Integrated-Cable {slot}/{subslot}/{port}
rf-channel {158 - 162 }
power-profile {ofdm-power-profile-id}
```

Verifying the Power Profile Configuration

To display the power profile configuration details, use the **show cable ofdm-power-profile** command as given in the following example. This command also displays the actual power-band power levels as set by the profile.

```
Router> show cable ofdm-power-profile 3
OFDM Power Profile 3

Power-Adjust-Default(*): -2.1

Power-Band:
[00-07]   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0
[08-15]   -0.5   -0.5   -0.5   -0.5   -0.5   -0.5   -0.5   -0.5
[16-23]    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5
[24-31]    1.5    1.5    1.5    1.5    1.5    1.5    1.5    1.5

  +4 .0 |
        |
  +3 .0 |
        |
  +2 .0 |                                                 * * * * * * * *
        |
  +1 .0 |                                   * * * * * * * *
        |
  +0 .0 | ------------------------------------------------------------------
        |                  * * * * * * * *
  -1 .0 | * * * * * * * * *
        |
  -2 .0 |
        |
  -3 .0 |
        |
  (dB)    0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 3 3
```

```
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
                        band-index
```

Configuring OFDM Power Profile with Linear Power-tilt

Use the following commands to configure the OFDM power profile with a linear power-tilt and the band-index override.

```
enable
configure terminal
cable downstream ofdm-power-profile <profile_id>
  power-adjust-default 0.0
  power-tilt-linear 3.5
  band-index 0
  power-adjust 4.0
```

Verifying the Power Profile Using show controller Command

Use the **show controller** command to display the absolute power-band levels as set by the power profile. When the power-profile is applied to the controller, the power level displayed is the actual transmit power level in dBmV.

```
Router>show controller Integrated-Cable 3/0/0 rf-channel 158 verbose
Chan State Admin Mod-Type  Start  Width     PLC        Profile-ID    dcid  power  output
                           Frequency
 158   UP   UP   OFDM      849000000   96000000  856000000       20       159   33.0
NORMAL
 Resource status:   OK
 License: granted <09:23:14 EDT Aug 1 2016>
 OFDM channel license spectrum width: 92200000
 OFDM config state: Configured

 OFDM Power Profile: 3
Power-Band:
[00-07]   32.0   32.0   32.0   32.0   32.0   32.0   32.0   32.0
[08-15]   32.5   32.5   32.5   32.5   32.5   32.5   32.5   32.5
[16-23]   33.5   33.5   33.5   33.5   33.5   33.5   33.5   33.5
[24-31]   34.5   34.5   34.5   34.5   34.5   34.5   34.5   34.5

OFDM channel details: [3/0/0:158]
-----------------------------------------
```

Configuration Example for OFDM Power Profile

This section provides example for the OFDM Power Profile configuration.

Example: OFDM Power Profile with Linear Power-tilt Configuration

```
enable
configure terminal
cable downstream ofdm-power-profile 3
  power-adjust-default 0.0
  power-tilt-linear 3.5
  band-index 0
  power-adjust 4.0
```

Feature Information for OFDM Channel Power Profile

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 OFDM Channel Power Profile

Feature Name	Releases	Feature Information
OFDM Channel Power Profile	Cisco IOS XE Fuji 16.7.1	This feature was integrated into the Cisco cBR Series Converged Broadband Routers.