Downstream Power Tilt

The Downstream Power tilt feature is used to correct cable loss in the head-end to produce a flat power spectrum for all channels in the controller port.

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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	**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 Downstream Power Tilt

The downstream power tilt feature is used to correct cable loss in the head-end to produce a flat power spectrum for all channels on the controller port.

Note There may be noise floor degradation on the failover path (following linecard switchover) with this feature enabled.

Restrictions for Configuring Downstream Power Profile

The downstream power tilt feature and OFDM power profile feature are mutually exclusive. They cannot be configured at the same time.

How to Configure the Downstream Power Tilt

Configuring Downstream Power Tilt

Downstream power tilt applies to all the SCQAM or OFDM channels on the downstream. To configure downstream power tilt for a controller port, use the power-tilt configuration command under the downstream controller port.

enable
configure terminal
controller Integrated-Cable *slot/subslot/port*
max-ofdm-spectrum *value*
max-carrier *value*
base-channel-power *value*
power-tilt *mode loss* **max-frequency** *freq-max*
rf-chan *start_id* [*end_id*]
type *value*
rf-output *value*
power-adjust *value*
qam-profile*id*
docsis-channel-id*id*
ofdm channel-profile *id* **start-frequency** *value* **width** *value* [**plc** *value*]

Below is an example:

```
controller Integrated-Cable 3/0/0
  max-ofdm-spectrum 192000000
  max-carrier 32
  base-channel-power 34
  power-tilt linear 4.0 max-frequency 696000000
  rf-chan 0 31
    type DOCSIS
    frequency 261000000
    rf-output NORMAL
```

```
    power-adjust -2.0
    qam-profile 1
    docsis-channel-id 1
  rf-chan 158
    power-adjust 0
    docsis-channel-id 159
    ofdm channel-profile 20 start-frequency 600000000 width 96000000 plc 645000000
```

In the above configuration steps, there is a command **power-tilt** *mode loss* **max-frequency** *freq-max*, where the *mode* represent a formula that calculates the loss of a coax cable at a frequency F, given the loss at *freq-max* is known. It provides two options to select:

- linear: $loss_F = loss_{freq\text{-}max} * (F / freq\text{-}max)$
- cable-loss-approx: $loss_F = loss_{freq\text{-}max} * SQRT((freq\text{-}max - F) / freq\text{-}max)$

loss is the measured cable loss at *freq-max*, specified in 1/10 dB.

Verifying Downstream Power Tilt Configuration

To display the downstream power tilt details, use the **show cable controller integrated-cable** command as given in the following example. This command will display the actual SCQAM and OFDM channel power levels as set by the DS Power Tilt command. For OFDM channels, the power level displayed represents the center frequency 6-MHz band power level.

```
Router# show controller Integrated-Cable 1/0/1 rf-chan 0-162
Chan State Admin Frequency Type   Annex Mod srate Interleaver dcid power output
0    UP    UP    261000000 DOCSIS B     256 5361  I32-J4      1    29.9  NORMAL
1    UP    UP    267000000 DOCSIS B     256 5361  I32-J4      2    30.0  NORMAL
2    UP    UP    273000000 DOCSIS B     256 5361  I32-J4      3    30.0  NORMAL
3    UP    UP    279000000 DOCSIS B     256 5361  I32-J4      4    30.0  NORMAL
4    UP    UP    285000000 DOCSIS B     256 5361  I32-J4      5    30.1  NORMAL
5    UP    UP    291000000 DOCSIS B     256 5361  I32-J4      6    30.1  NORMAL
6    UP    UP    297000000 DOCSIS B     256 5361  I32-J4      7    30.2  NORMAL
7    UP    UP    303000000 DOCSIS B     256 5361  I32-J4      8    30.2  NORMAL
8    UP    UP    309000000 DOCSIS B     256 5361  I32-J4      9    30.2  NORMAL
9    UP    UP    315000000 DOCSIS B     256 5361  I32-J4      10   30.3  NORMAL
10   UP    UP    321000000 DOCSIS B     256 5361  I32-J4      11   30.3  NORMAL
11   UP    UP    327000000 DOCSIS B     256 5361  I32-J4      12   30.3  NORMAL
12   UP    UP    333000000 DOCSIS B     256 5361  I32-J4      13   30.4  NORMAL
13   UP    UP    339000000 DOCSIS B     256 5361  I32-J4      14   30.4  NORMAL
14   UP    UP    345000000 DOCSIS B     256 5361  I32-J4      15   30.4  NORMAL
15   UP    UP    351000000 DOCSIS B     256 5361  I32-J4      16   30.5  NORMAL
16   UP    UP    357000000 DOCSIS B     256 5361  I32-J4      17   30.5  NORMAL
17   UP    UP    363000000 DOCSIS B     256 5361  I32-J4      18   30.5  NORMAL
18   UP    UP    369000000 DOCSIS B     256 5361  I32-J4      19   30.6  NORMAL
19   UP    UP    375000000 DOCSIS B     256 5361  I32-J4      20   30.6  NORMAL
20   UP    UP    381000000 DOCSIS B     256 5361  I32-J4      21   30.6  NORMAL
21   UP    UP    387000000 DOCSIS B     256 5361  I32-J4      22   30.7  NORMAL
22   UP    UP    393000000 DOCSIS B     256 5361  I32-J4      23   30.7  NORMAL
23   UP    UP    399000000 DOCSIS B     256 5361  I32-J4      24   30.7  NORMAL
24   UP    UP    405000000 DOCSIS B     256 5361  I32-J4      25   30.8  NORMAL
25   UP    UP    411000000 DOCSIS B     256 5361  I32-J4      26   30.8  NORMAL
26   UP    UP    417000000 DOCSIS B     256 5361  I32-J4      27   30.8  NORMAL
27   UP    UP    423000000 DOCSIS B     256 5361  I32-J4      28   30.9  NORMAL
28   UP    UP    429000000 DOCSIS B     256 5361  I32-J4      29   30.9  NORMAL
29   UP    UP    435000000 DOCSIS B     256 5361  I32-J4      30   30.9  NORMAL
30   UP    UP    441000000 DOCSIS B     256 5361  I32-J4      31   30.9  NORMAL
31   UP    UP    447000000 DOCSIS B     256 5361  I32-J4      32   31.0  NORMAL
```

```
Chan State Admin Mod-Type Start     Width    PLC       Profile-ID dcid power output Frequency

158  UP    UP    OFDM     600000000 96000000 645000000 22         159  33.9         NORMAL
```

Feature Information for Downstream Power Tilt

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 Downstream Power Tilt

Feature Name	Releases	Feature Information
Downstream Power Tilt	Cisco IOS XE Fuji 16.7.1	This feature was introduced on Cisco IOS XE Fuji 16.7.1 on the Cisco cBR Series Converged Broadband Routers.