DOCSIS 3.1 OFDM Channel Configuration

This document describes how to configure the OFDM channel on the Cisco cBR Series Converged Broadband Router.

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 • PID—CBR-CCAP-SUP-60G • PID—CBR-SUP-8X10G-PIC	**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 Cisco cBR-8 Downstream PHY Modules: • PID—CBR-D30-DS-MOD • PID—CBR-D31-DS-MOD Cisco cBR-8 Upstream PHY Modules: • PID—CBR-D30-US-MOD • PID—CBR-D31-US-MOD

Information about OFDM Channel Configuration

OFDM Channels

DOCSIS 3.1 introduces modes for higher throughput and higher spectral efficiency while still allowing backward compatibility to DOCSIS 3.0. OFDM Channel support includes one OFDM channel per port with channel bandwidth from 24 MHz to 192 MHz wide.

Each OFDM channel supports a control profile, an NCP profile, and up to five data profiles. Profiles support one or more modulations.

Starting from Cisco IOS-XE release 3.18.1SP, you can configure the guard band of an OFDM channel to potentially trade off some performance margin using command **guardband-override**. By default, Cisco cBR-8 router use the default guard band, which is based on the roll off and spacing in OFDM channel profile.

DOCSIS 3.1 OFDM support also allows the user to configure the RF-channels 158 to 162 under the mac-domain as primary channel.

Channel Profile

A globally configured OFDM channel profile contains channel parameters, and the modulation or modulation profile associated with the control, NCP, and data profiles.

Each OFDM channel must specify an OFDM channel profile in its configuration.

Modulation Profile

A globally configured OFDM modulation profile assigns different modulations to ranges of sub-carriers, or lists of individual sub-carriers.

A modulation profile may be assigned to a control, NCP, or data profile in a channel profile.

OFDM Channel Exclusion Band

Ranges of frequencies can be excluded from all OFDM channels on a port using the **ofdm-freq-excl-band** command.

How to Configure OFDM Channel

Configuring OFDM Modulation Profile

To configure the OFDM modulation profile, follow the steps below:

```
enable
configure terminal
cable downstream ofdm-modulation-profile id
description text
subcarrier-spacing value
width value
start-frequency value
assign {modulation-default mod_prof_id | modulation mod_prof_id {list-subcarriers
 {freq-abs | freq-offset} value | range-subcarriers {freq-abs | freq-offset}
 value width value}}
```

> **Note** Subcarrier spacing must match the subcarrier spacing of each channel profile in which it is configured.

Verifying OFDM Modulation Profile Configuration

To display the OFDM modulation profile details, use the **show cable ofdm-modulation-profiles** command as shown in the example below:

```
Router# show cable ofdm-modulation-profile 10

**** OFDM Modulation Profile Configuration ****
```

```
Prof  FFT   Width      Start-freq Modulations
ID    KHz   Hz         Hz
10    50    96000000   627000000  64   default
                                  512  freq-abs  709050000 width   12000000
                                  2048 freq-abs  629000000 width    6000000

Profile Subcarrier Modulations
  Modulation: Start-freq-abs[start-sc] - End-freq-abs[end-sc] Width-freq[num-sc]
   64  : 572600000[   0] -  626950000[1087]    54400000[1088]
   64  : 627000000[1088] -  628950000[1127]     2000000[  40]
   2048: 629000000[1128] -  634950000[1247]     6000000[ 120]
   64  : 635000000[1248] -  709000000[2728]    74050000[1481]
   512 : 709050000[2729] -  721000000[2968]    12000000[ 240]
   64  : 721050000[2969] -  722950000[3007]     1950000[  39]
   64  : 723000000[3008] -  777350000[4095]    54400000[1088]

**** OFDM Modulation Profile Assigned Channel Profiles ****

Prof  Channel
ID    Profiles
10    30
```

To display the associations between OFDM modulation profiles and OFDM channel profiles, use the **show cable ofdm-modulation-profile** command with **channel-profiles** option as shown in the example below:

```
Router# show cable ofdm-modulation-profile channel-profiles

**** OFDM Modulation Profile Assigned Channel Profiles ****

Prof  Channel
ID    Profiles
8     None
9     28
10    30
192   192
```

To display the OFDM modulation profile configurations, use the **show cable ofdm-modulation-profile** command with **configuration** option as shown in the example below:

```
Router# show cable ofdm-modulation-profile configuration

**** OFDM Modulation Profile Configuration ****

Prof  FFT   Width      Start-freq Modulations                Description
ID    KHz   Hz         Hz                                    (Limited to 20)
8     50    192000000  NA         2048 default
                                  512  freq-off   48000000
                                       width      24000000
9     50    96000000   627000000  512  default               512-1k-4k
                                  1024 freq-abs  635000000
                                       width      74050000
                                  4096 freq-abs  629000000
                                       width       6000000
10    50    96000000   627000000  64   default
                                  512  freq-abs  709050000
                                       width      12000000
                                  2048 freq-abs  629000000
                                       width       6000000
```

Configuring OFDM Channel Profile

To configure the OFDM channel profile, follow the steps below:

```
enable
configure terminal
cable downstream ofdm-chan-profile id
description text
cyclic-prefix value
guardband-override value
interleaver-depth value
pilot-scaling value
roll-off value
subcarrier-spacing value
profile-ncp modulation-default mod_prof_id
profile-control {modulation-default mod_prof_id | modulation-profile mod_prof_id}
profile-data channel_data_prof_id {modulation-default mod_prof_id |
modulation-profile mod_prof_id}
```

Verifying OFDM Channel Profile Configuration

To display the OFDM channel profile details, use the **show cable ofdm-chan-profiles** command as shown in the example below:

```
Router# show cable ofdm-chan-profile 21
**** OFDM Channel Profile Configuration ****

Prof  Cycl  Roll  Guardband  FFT  Intr   Pilot  Modulation (D-Default, P-Profile)

ID    Prfx  Off   Override   KHz  Depth  Scale  Cntrl   NCP    Data Profiles (count = 0)
                                                               1     2     3     4
         5
21    1024  128   2400000    50   16     48     D:1024  D:16   NA    NA    NA    NA
         NA

**** OFDM Channel Profile Assigned Channels ****

Prof  Admin  Controller:channels
ID
21    Up     6/0/4:158
```

To display the associations between OFDM channel profiles and OFDM channels, use the **show cable ofdm-chan-profiles** command with **channels** option as shown in the example below:

```
Router# show cable ofdm-chan-profile channels

**** OFDM Channel Profile Assigned Channels ****

Prof  Admin  Controller:channels
ID
20    Up     3/0/1:158          3/0/2:158          3/0/3:158          3/0/5:158

             3/0/6:158          3/0/7:158
30    Up     3/0/4:158
101   Up     3/0/0:158
```

To display the OFDM channel profile configurations, use the **show cable ofdm-chan-profiles** command with **configuration** option as shown in the example below:

```
Router# show cable ofdm-chan-profile configuration

**** OFDM Channel Profile Configuration ****

Prof  Cycl Roll  Guardband  FFT  Intr  Pilot  Modulation (D-Default, P-Profile)

ID    Prfx Off   Override   KHz  Depth Scale  Cntrl   NCP    Data Profiles
                 (Limited to 20)
                                                              1      2      3      4
      5
0     1024 128   NA         50   16    48     D:256   D:16   D:1024 NA     NA     NA
      NA
1     1024 128   NA         50   16    48     D:256   D:16   D:2048 D:1024 NA     NA
      NA
2     1024 128   NA         50   16    48     D:256   D:16   D:4096 D:2048 D:1024 NA
      NA
3     1024 128   NA         50   16    48     D:256   D:16   P:0    D:4096 D:2048
D:1024  NA
4     1024 128   NA         50   16    48     D:256   D:16   D:512  P:0    D:4096
D:2048  D:1024
5     1024 128   NA         25   16    48     D:256   D:16   D:1024 NA     NA     NA
      NA
6     1024 128   NA         25   16    48     D:256   D:16   D:2048 D:1024 NA     NA
      NA
7     1024 128   NA         25   16    48     D:256   D:16   D:4096 D:2048 D:1024 NA
      NA
8     1024 128   NA         25   16    48     D:256   D:16   P:1    D:4096 D:2048
D:1024  NA
9     1024 128   NA         25   16    48     D:256   D:16   D:512  P:1    D:4096
D:2048  D:1024
20    1024 128   NA         50   16    48     D:1024  D:16   NA     NA     NA     NA
      NA
21    1024 128   1000000    50   16    48     D:1024  D:16   NA     NA     NA     NA
      NA
```

Configuring OFDM Channel as Primary Channel

To configure an RF-channel in the mac-domain as an OFDM primary channel, use the following commands.

```
enable
configure terminal
interface cable <slot/subslot/port> downstream Integrated-Cable <slot/subslot/port>
rf-channel <ofdm-channel-number: 158-162>
end
```

Verifying OFDM Primary Channel Configuration

To display the OFDM channel configuration details, where the OFDM channel is the primary channel, use the command as shown in the following example:

```
Router#sh run int c3/0/3
Building configuration...

Current configuration : 539 bytes
!
interface Cable3/0/3
```

```
    load-interval 30
    downstream Integrated-Cable 3/0/3 rf-channel 0
    downstream Integrated-Cable 3/0/3 rf-channel 158
    upstream 0 Upstream-Cable 3/0/6 us-channel 0
    upstream 1 Upstream-Cable 3/0/6 us-channel 1
    upstream 2 Upstream-Cable 3/0/6 us-channel 2
    upstream 3 Upstream-Cable 3/0/6 us-channel 3
    cable upstream bonding-group 1
     upstream 0
     upstream 1
     upstream 2
     upstream 3
     attributes 80000000
    cable bundle 1
    cable cm-status enable 3 6-11 16-18 20-27
    cable privacy accept-self-signed-certificate
   end
```

You can also use the following command to display the OFDM primary channel configuration details as shown in this example.

```
Router#sh cable mac-domain c3/0/3 cgd-associations
CGD Host   Resource   DS Channels              Upstreams   (ALLUS)   Active DS
Ca3/0/3    3/0/3      0                        0-3         Yes       0
                      158                      0-3         Yes       158
```

The **show cable mac-domain Cable <slot>/<subslot>/<port> mdd** command also displays the OFDM primary channel configuration details as shown in the example.

```
...
Downstream Active Channel List
        Channel ID:             159
        Frequency:              836000000Hz
        Primary Capable:        Primary-Capable
        CM-STATUS Event Bitmask:0x36
                                MDD Timeout
                                QAM FEC failure
                                MDD Recovery
                                QAM FEC recovery
        MAP/UCD Transport Indicator:  Can carry MAPs and UCDs
        OFDM PLC Params Bitmask:
            Tukey raised cosine window: 0.625
            Cyclic Prefix: 5.0
            Sub carrier spacing: 50
```

RF channels use a zero-based numbering scheme, whereas the downstream channel IDs are numbered starting from one. Thus RF channel 158 is equivalent to channel ID 159. The Channel ID in this example is 159. The `MAP/UCD Transport Indicator` shows that MAPs and UCDs are sent only on Primary Channels.

Configuring Port/Controller and Channel

To configure the port/controller and channel, follow the steps below:

enable
configure terminal
controller integrated-cable *slot/subslot/port*
max-ofdm-spectrum *value*
ofdm-freq-excl-band start-frequency *value* **width** *value*
rf-chan *start_id* [*end_id*]
ofdm channel-profile *id* **start-frequency** *value* **width** *value* [**plc** *value*]

✎

Note   The range of *start_id* is 158 to 162 in the OFDM channel configuration.

The maximum OFDM spectrum is assigned to OFDM channels, which is used by the the CMTS to calculate default port base power.

Ranges of frequencies can be excluded from all OFDM channels using the **ofdm-freq-excl-band** command.

Verifying Port/Controller and Channel Configuration

To display the RF port details, use the **show controller integrated-cable** command with **rf-port** option as shown in the example below:

```
Router# show controller integrated-cable 3/0/0 rf-port

Admin:  UP  MaxCarrier: 128  BasePower: 33 dBmV  Mode: normal
  Rf Module 0: UP
  Free freq block list has 3 blocks:
    45000000  - 107999999
    624000000 - 644999999
    837000000 - 1217999999
  Rf Port Status: UP
  MaxOfdmSpectrum:  192000000   Equivalent 6MHz channels: 32
  UsedOfdmSpectrum: 192000000   AvailOfdmSpectrum:        0
  DefaultBasePower: 33 dBmV     Equivalent 6MHz channels: 160
  OFDM frequency exclusion bands: None
```

To display the summary information on OFDM channel, use the **show controller integrated-cable** command with **rf-channel** option as shown in the example below:

```
Router# show controller integrated-cable 3/0/0 rf-channel 158

Chan State Admin Mod-Type Start      Width     PLC        Profile-ID   dcid  power
output
                          Frequency
 158  UP   UP   OFDM      627000000  96000000  663000000      20       159   34
NORMAL
```

To display detailed information on OFDM channel, use the **show controller integrated-cable** command with **rf-channel** and **verbose** options as shown in the example below:

```
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      627000000  96000000  663000000      30       159   32
NORMAL
 Resource status:   OK
 License: granted <17:02:35 EDT May 18 2016>
 OFDM channel license spectrum width: 92200000
 OFDM modulation license (spectrum width): 2K (6000000)
 OFDM config state: Configured

 OFDM channel details: [3/0/4:158]
 --------------------------------------
 OFDM channel frequency/subcarrier range    : 627000000[1088] - 722999999[3007]
 OFDM spectrum frequency/subcarrier range    : 572600000[   0] - 777399999[4095]
```

```
Active spectrum frequency/subcarrier range : 628900000[1126] - 721049999[2969]
OFDM channel center frequency/subcarrier   : 675000000[2048]
PLC spectrum start frequency/subcarrier    : 663000000[1808]
PLC frequency/subcarrier                   : 665800000[1864]
Channel width                              : 96000000
Active Channel width                       : 92200000
OFDM Spectrum width                        : 204800000
Chan prof id                               : 30
Cyclic Prefix                              : 1024
Roll off                                   : 128
Interleave depth                           : 16
Spacing                                    : 50KHZ
Pilot Scaling                              : 48
Control modulation profile                 : 10
NCP modulation default                     : 16
Data modulation default                    : None
Data modulation profile                    : None
Lower guardband width in freq/subcarriers  : 1900000[38]
Upper guardband width in freq/subcarriers  : 1900000[38]
Licensed 4K modulation spectrum width      : 0
Licensed 2K modulation spectrum width      : 6000000


PLC spectrum frequencies [subcarriers]              :
 663000000[1808] - 668999999[1927]


PLC channel frequencies [subcarriers]                  :
 665800000[1864] - 666199999[1871]   Size: 8 subcarriers


Excluded frequencies [subcarriers]                  :
 572600000[   0] - 628899999[1125]    721100000[2970] - 777399999[4095]
 Count: 2252


Pilot frequencies [subcarriers]                     :
 *:PLC pilots
 630700000[1162]    634300000[1234]    637900000[1306]    641500000[1378]
 645100000[1450]    648700000[1522]    652300000[1594]    655900000[1666]
 659500000[1738]    663450000[1817]*   664050000[1829]*   664600000[1840]*
 665050000[1849]*   666900000[1886]*   667350000[1895]*   667900000[1906]*
 668500000[1918]*   669100000[1930]    672700000[2002]    676300000[2074]
 679900000[2146]    683500000[2218]    687100000[2290]    690700000[2362]
 694300000[2434]    697900000[2506]    701500000[2578]    705100000[2650]
 708700000[2722]    712300000[2794]    715900000[2866]    719500000[2938]
 Count: 32


Active frequencies [subcarriers]                    :
 628900000[1126] - 721099999[2969]
 Count: 1844


Data frequencies [subcarriers]                         :
 628900000[1126] - 630699999[1161]    630750000[1163] - 634299999[1233]
 634350000[1235] - 637899999[1305]    637950000[1307] - 641499999[1377]
 641550000[1379] - 645099999[1449]    645150000[1451] - 648699999[1521]
 648750000[1523] - 652299999[1593]    652350000[1595] - 655899999[1665]
 655950000[1667] - 659499999[1737]    659550000[1739] - 663449999[1816]
 663500000[1818] - 664049999[1828]    664100000[1830] - 664599999[1839]
 664650000[1841] - 665049999[1848]    665100000[1850] - 665799999[1863]
 666200000[1872] - 666899999[1885]    666950000[1887] - 667349999[1894]
 667400000[1896] - 667899999[1905]    667950000[1907] - 668499999[1917]
 668550000[1919] - 669099999[1929]    669150000[1931] - 672699999[2001]
 672750000[2003] - 676299999[2073]    676350000[2075] - 679899999[2145]
 679950000[2147] - 683499999[2217]    683550000[2219] - 687099999[2289]
 687150000[2291] - 690699999[2361]    690750000[2363] - 694299999[2433]
 694350000[2435] - 697899999[2505]    697950000[2507] - 701499999[2577]
 701550000[2579] - 705099999[2649]    705150000[2651] - 708699999[2721]
```

```
        708750000[2723] - 712299999[2793]    712350000[2795] - 715899999[2865]
        715950000[2867] - 719499999[2937]    719550000[2939] - 721099999[2969]
        Count: 1804

     Profiles:
      Number of profiles: 2
      CTRL profile (Profile A): rate: 461916 kbps, usable rate: 368000 kbps
      Active frequencies [subcarriers]:
      Modulation:Start-freq[start-subcarrier] - End-freq[end-subcarrier]
      ------------------------------------------------------------------
      64   :628900000[1126] - 628950000[1127]    2048 :629000000[1128] - 630650000[1161]
      2048 :630750000[1163] - 634250000[1233]    2048 :634350000[1235] - 634950000[1247]
      64   :635000000[1248] - 637850000[1305]    64   :637950000[1307] - 641450000[1377]
      64   :641550000[1379] - 645050000[1449]    64   :645150000[1451] - 648650000[1521]
      64   :648750000[1523] - 652250000[1593]    64   :652350000[1595] - 655850000[1665]
      64   :655950000[1667] - 659450000[1737]    64   :659550000[1739] - 663400000[1816]
      64   :663500000[1818] - 664000000[1828]    64   :664100000[1830] - 664550000[1839]
      64   :664650000[1841] - 665000000[1848]    64   :665100000[1850] - 665750000[1863]
      64   :666200000[1872] - 666850000[1885]    64   :666950000[1887] - 667300000[1894]
      64   :667400000[1896] - 667850000[1905]    64   :667950000[1907] - 668450000[1917]
      64   :668550000[1919] - 669050000[1929]    64   :669150000[1931] - 672650000[2001]
      64   :672750000[2003] - 676250000[2073]    64   :676350000[2075] - 679850000[2145]
      64   :679950000[2147] - 683450000[2217]    64   :683550000[2219] - 687050000[2289]
      64   :687150000[2291] - 690650000[2361]    64   :690750000[2363] - 694250000[2433]
      64   :694350000[2435] - 697850000[2505]    64   :697950000[2507] - 701450000[2577]
      64   :701550000[2579] - 705050000[2649]    64   :705150000[2651] - 708650000[2721]
      64   :708750000[2723] - 709000000[2728]    512  :709050000[2729] - 712250000[2793]
      512  :712350000[2795] - 715850000[2865]    512  :715950000[2867] - 719450000[2937]
      512  :719550000[2939] - 721000000[2968]    64   :721050000[2969] - 721050000[2969]
      Active subcarrier count: 1804, ZBL count: 0
      Discontinuity time [days:hours:mins:secs]: 00:00:54:32 [16:15:02 EDT May 18 2016]

     NCP profile:
      Active frequencies [subcarriers]:
      Modulation:Start-freq[start-subcarrier] - End-freq[end-subcarrier]
      ------------------------------------------------------------------
      16   :628900000[1126] - 630650000[1161]    16   :630750000[1163] - 634250000[1233]
      16   :634350000[1235] - 637850000[1305]    16   :637950000[1307] - 641450000[1377]
      16   :641550000[1379] - 645050000[1449]    16   :645150000[1451] - 648650000[1521]
      16   :648750000[1523] - 652250000[1593]    16   :652350000[1595] - 655850000[1665]
      16   :655950000[1667] - 659450000[1737]    16   :659550000[1739] - 663400000[1816]
      16   :663500000[1818] - 664000000[1828]    16   :664100000[1830] - 664550000[1839]
      16   :664650000[1841] - 665000000[1848]    16   :665100000[1850] - 665750000[1863]
      16   :666200000[1872] - 666850000[1885]    16   :666950000[1887] - 667300000[1894]
      16   :667400000[1896] - 667850000[1905]    16   :667950000[1907] - 668450000[1917]
      16   :668550000[1919] - 669050000[1929]    16   :669150000[1931] - 672650000[2001]
      16   :672750000[2003] - 676250000[2073]    16   :676350000[2075] - 679850000[2145]
      16   :679950000[2147] - 683450000[2217]    16   :683550000[2219] - 687050000[2289]
      16   :687150000[2291] - 690650000[2361]    16   :690750000[2363] - 694250000[2433]
      16   :694350000[2435] - 697850000[2505]    16   :697950000[2507] - 701450000[2577]
      16   :701550000[2579] - 705050000[2649]    16   :705150000[2651] - 708650000[2721]
      16   :708750000[2723] - 712250000[2793]    16   :712350000[2795] - 715850000[2865]
      16   :715950000[2867] - 719450000[2937]    16   :719550000[2939] - 721050000[2969]
      Active subcarrier count: 1804, ZBL count: 0

     CCCs:
       OCD CCC: 2
       DPD CCCs:
         Control profile  (Profile A) CCC: 2
             NCP profile  CCC: 2
      Resource config time taken: 2286 msecs


     JIB channel number: 776
```

```
Chan Pr EnqQ  Pipe  RAF    SyncTmr DqQ ChEn   RAF Pipe Phy0 Phy1 Tun# SessId 0[TkbRt MaxP]
    1[TkbRt MaxP]
776  0  384    1   725       0 384 0100 13032   1   0   1   2    0 479610000 4485120
383688000 4485120
776  1  384    1  4786       0 384 0100  2190   1   0   1   2    0 479610000 4485120
383688000 4485120
776  2  384    1  4786       0 384 0100  2190   1   0   1   2    0 479610000 4485120
383688000 4485120
776  3  384    1  4786       0 384 0100  2190   1   0   1   2    0 479610000 4485120
383688000 4485120
776  4  384    1  4786       0 384 0100  2190   1   0   1   2    0 479610000 4485120
383688000 4485120
776  5  384    1  4786       0 384 0100  2190   1   0   1   2    0 479610000 4485120
383688000 4485120
776  6  384    1  4786       0 384 0100  2190   1   0   1   2    0 479610000 4485120
383688000 4485120
776  7  384    1     0       0 384 0100     0   1   0   1   2    0 479610000 4485120
383688000 4485120

Chan   Qos-Hi   Qos-Lo   Med-Hi   Med-Lo   Low-Hi   Low-Lo
776    368640   245760   368640   245760   614400   368640
Chan  Med Low TB-neg Qos_Exc  Med_Xof  Low_Xof  Qdrops(H-M-L)  Pos   Qlen(Hi-Med-lo) Fl
Tgl_cnt Rdy_sts
 776   0   0     0       0        0        0    0   0   0  Y     0       0      0  0
     0 ff
Chan       Rate   Neg   Pos    LastTS   CurrCr   Pos  [PLC Rate Neg Pos]
776    10485750 65535 65535 116199669 268431360   Y [MM 86 128 1114][EM 87 128 6204][TR 2
9 3102]
DSPHY Info:
 Local rf port 0 , rf chan 158 pic loss 123
 non short CWs: = 235681130, shorts = 0, stuff bytes = 235639172 bch 235681130
 NCP msgs: = 453809753, PLC encodings = 16902476
 flow0 rcv 70203 flow1 rcv 3 flow0 drops 0 flow1 drops 0
```

Configuration Examples

This section provides examples for configuring the OFDM channel.

Example1: Configuring OFDM Channel

Note   The OFDM modulation profile must be configured before the OFDM channel profile which references it.

The following example shows how to configure the OFDM channel:

```
enable
configure terminal
cable downstream ofdm-modulation-profile 9
description 512-1k-4k
subcarrier-spacing 50KHz
width 96000000
start-frequency 627000000
assign modulation-default 512-QAM
assign modulation 1024-QAM range-subcarriers freq-abs 635000000 width 74050000
assign modulation 4096-QAM range-subcarriers freq-abs 629000000 width 6000000
```

```
exit
configure terminal
cable downstream ofdm-chan-profile 20
description Data profiles: 2 single mod, 1 mixed mod
cyclic-prefix 192
interleaver-depth 16
pilot-scaling 48
roll-off 128
subcarrier-spacing 50KHz
profile-ncp modulation-default 16-QAM
profile-control modulation-default 256-QAM
profile-data 1 modulation-default 1024-QAM
profile-data 2 modulation-default 2048-QAM
profile-data 3 modulation-profile 9
exit
configure terminal
controller integrated-cable 3/0/0
max-ofdm-spectrum 96000000
ofdm-freq-excl-band start-frequency 683000000 width 10000000
rf-chan 158
power-adjust 0
docsis-channel-id 159
ofdm channel-profile 20 start-frequency 627000000 width 96000000 plc 663000000
```

Example 2: Configuring OFDM Primary Channel in the MAC Domain

```
enable
configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
interface cable 3/0/0
downstream Integrated-Cable 3/0/3 rf-channel 158
end
```

Additional References

Related Document

Document Title	Link
Cisco cBR Converged Broadband Routers Layer 2 and DOCSIS 3.0 Configuration Guide	http://www.cisco.com/c/en/us/td/docs/cable/cbr/configuration/guide/b_cbr_layer2_docsis30.html

MIBs

MIBs	MIBs Link
DOCS-IF31-MIB	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/ support

Feature Information for DOCSIS 3.1 OFDM Channel Configuration

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 DOCSIS 3.1 OFDM Channel Configuration

Feature Name	Releases	Feature Information
DOCSIS 3.1 OFDM Channel Support	Cisco IOS XE Fuji 16.7.1	This feature was integrated on the Cisco cBR Series Converged Broadband Router s.
Full Spectrum 108-1218 MHz Support	Cisco IOS XE Fuji 16.7.1	This feature was integrated on the Cisco cBR Series Converged Broadband Router s.
DOCSIS 3.1 OFDM Primary Channel Support	Cisco IOS XE Fuji 16.7.1	This feature was integrated on the Cisco cBR Series Converged Broadband Router s.
Enhanced support for subcarrier spacing, exclusion band, and LCPR	Cisco IOS XE Fuji 16.7.1	This feature was integrated on the Cisco cBR Series Converged Broadband Router s.