



## DOCSIS 3.1 OFDM Channel Configuration

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

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## Hardware Compatibility Matrix for the Cisco cBR Series Routers



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

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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><b>Cisco IOS-XE Release 16.5.1 and Later Releases</b></p> <p>Cisco cBR-8 Supervisor:</p> <ul style="list-style-type: none"> <li>• PID—CBR-SUP-250G</li> <li>• PID—CBR-CCAP-SUP-160G</li> </ul>	<p><b>Cisco IOS-XE Release 16.5.1 and Later Releases</b></p> <p>Cisco cBR-8 CCAP Line Cards:</p> <ul style="list-style-type: none"> <li>• PID—CBR-LC-8D30-16U30</li> <li>• PID—CBR-LC-8D31-16U30</li> <li>• PID—CBR-RF-PIC</li> <li>• PID—CBR-RF-PROT-PIC</li> <li>• PID—CBR-CCAP-LC-40G</li> <li>• PID—CBR-CCAP-LC-40G-R</li> <li>• PID—CBR-CCAP-LC-G2-R</li> <li>• PID—CBR-SUP-8X10G-PIC</li> <li>• PID—CBR-2X100G-PIC</li> </ul> <p>Digital PICs:</p> <ul style="list-style-type: none"> <li>• PID—CBR-DPIC-8X10G</li> <li>• PID—CBR-DPIC-2X100G</li> </ul> <p>Cisco cBR-8 Downstream PHY Module:</p> <ul style="list-style-type: none"> <li>• PID—CBR-D31-DS-MOD</li> </ul> <p>Cisco cBR-8 Upstream PHY Modules:</p> <ul style="list-style-type: none"> <li>• PID—CBR-D31-US-MOD</li> </ul>

## 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. The OFDM Channel support includes two OFDM channel per port with channel bandwidth from 24 MHz to 192 MHz wide.

From the Cisco IOS XE Gibraltar 16.10.1d release, the Cisco cBR router supports two OFDM channels per service group for an RPD downstream channel. You can configure the channels using the **cable downstream controller-profile** configuration.

The number of SC-QAMs supported is 158 for a single OFDM channel, and 128 SC-QAMs for two OFDM channels. The max-carrier attribute is automatically set to 158 by default. However, you should set the max-carrier to a value of 128 or below to configure the second OFDM channel. The Cisco cBR router does not support any value above 128 if you are configuring two OFDM channels.

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

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
8     50   192000000  NA          2048 default      (Limited to 20)
```

```

          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
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 20

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

Prof  Cycl  Roll  FFT  Intr  Pilot  Modulation (D-Default, P-Profile)
ID    Prfx  Off   KHz  Depth Scale  Cntrl  NCP    Data Profiles
                                     1      2      3      4      5

20    1024  128   50   16    48    D:1024 D:16   NA     NA     NA     NA     NA
**** 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

```

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  FFT  Intr  Pilot  Modulation (D-Default, P-Profile)
Description
ID   Prfx  Off  KHz  Depth  Scale  Cntrl  NCP  Data Profiles
(Limited to 20)
                1      2      3      4      5

0     192  128  50   16    48    D:256  D:16  D:1024 NA    NA    NA    NA
  System Profile 0
1     192  128  50   16    48    D:256  D:16  D:1024 D:2048 D:512 NA    NA
  System Profile 1
20    1024 128  50   16    48    D:1024 D:16  NA    NA    NA    NA    NA
30    1024 128  50   16    48    P:10   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 or Controller and Channel

To configure the port/controller and channel, use the following commands:

```

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]

```

## Verifying Port/Controller and Channel Configuration

```

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 Phyl 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	<a href="http://www.cisco.com/c/en/us/td/docs/cable/cbr/configuration/guide/b_cbr_layer2_docsis30.html">http://www.cisco.com/c/en/us/td/docs/cable/cbr/configuration/guide/b_cbr_layer2_docsis30.html</a>

### 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: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

### Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>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.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	<a href="http://www.cisco.com/support">http://www.cisco.com/support</a>

## 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 <https://cfmg.cisco.com/> 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 Routers.
Full Spectrum 108-1218 MHz Support	Cisco IOS XE Fuji 16.7.1	This feature was integrated on the Cisco cBR Series Converged Broadband Routers.
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 Routers.
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 Routers.
Hitless OFDM Profile Changes	Cisco IOS XE Everest 16.12.1x	This feature was integrated on the Cisco cBR Series Converged Broadband Routers.
Ephemeral Profile to Cable Modem Assignment	Cisco IOS XE Everest 16.12.1x	This feature was integrated on the Cisco cBR Series Converged Broadband Routers.
Profile Management Application Scaling	Cisco IOS XE Everest 16.12.1z	This feature was integrated on the Cisco cBR Series Converged Broadband Routers.

