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 Cisco cBR Series Routers

Note The hardware components 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 3.15.0S and Later Releases** Cisco cBR-8 Supervisor: • PID—CBR-CCAP-SUP-160G • PID—CBR-CCAP-SUP-60G[1] • PID—CBR-SUP-8X10G-PIC	**Cisco IOS-XE Release 3.15.0S 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 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

[1] Effective with Cisco IOS-XE Release 3.17.0S, CBR-CCAP-SUP-60G supports 8 cable line cards. The total traffic rate is limited to 60Gbps, the total number of downstream service flow is limited to 72268, and downstream unicast low-latency flow does not count against the limits.

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 1 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 5 data profiles. Profiles support one or more modulations.

Starting from Cisco IOS-XE release 3.18.1SP, user 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.

Note OFDM channel can only be used as secondary channel as part of a Wideband group. Primary channel needs to be configured as normal DOCSIS 3.0 primary RF 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 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-port 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-port 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
```

Example: 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 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*

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 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 http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note The table below lists only the software release that introduced support for a given feature in a given software release train. 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 Release 3.18.0SP	This feature was introduced on the Cisco cBR Series Converged Broadband Routers.
Full Spectrum 108-1218 MHz Support	Cisco IOS-XE Release 3.18.0SP	This feature was introduced on the Cisco cBR Series Converged Broadband Routers.
DOCSIS 3.1 Downstream OFDMA Guardband Enhancements	Cisco IOS-XE Release 3.18.1SP	This feature was introduced on the Cisco cBR Series Converged Broadband Routers.