Dynamic Bonding Group for RPHY

The Dynamic Bonding Group (DBG) feature enables the system to automatically create bonding groups of different sizes based on the cable modems' capacity. It helps to manage the resources of all downstream bonding groups. When the number of available bonding groups reaches the lower limit, it reclaims the bonding groups that match the reclaim threshold set by the user. The modems used on these bonding groups are then moved to other bonding groups without primary channel change. This move makes space for new bonding group allocations. This automated way of creating and reclaiming bonding groups greatly reduces the management effort of RCC configuration. DBG also automatically accommodates primary channel and CM capacity distributions.

The load balancing feature leverages DBG to balance traffic among all channels. With DBG, the modem is assigned to the downstream bonding group without any static RCC configuration.

DBG supports the following:

- DOCSIS 3.0 and DOCSIS 3.1 channel types.
- DOCSIS 3.0 and DOCSIS 3.1 load balance.
- Interoperation with modem registration, load balancing, and high availability.
- Enhanced dynamic load balance to allow movement of modem without a change in the primary channel.
- Enhanced FPGA to allow channel utilization fairness.

This chapter describes how to configure the DBG feature on the Cisco Remote PHY Device.

Finding Feature Information

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 Cisco Remote PHY Device

Note   Unless otherwise specified, the hardware components introduced in a given Cisco Remote PHY Device Software Release are supported in all subsequent releases.

Table 1: Hardware Compatibility Matrix for the Cisco Remote PHY Device

Cisco HFC Platform	Remote PHY Device
Cisco GS7000 Super High Output Node	**Cisco 1x2 / Compact Shelf RPD Software 2.1 and Later Releases** Cisco Remote PHY Device 1x2 • PID—RPD-1X2= **Cisco 1x2 / Compact Shelf RPD Software 2.1a and Later Releases** Cisco Remote PHY Device 1x2 • PID—RPD-1X2-PKEY=
Cisco GS7000 Super High Output Intelligent Node (iNode)	**Cisco 1x2 / Compact Shelf RPD Software 4.1 and Later Releases** Cisco Intelligent Remote PHY Device 1x2 • PID—iRPD-1X2= • PID—iRPD-1X2-PKEY=

Note   The -PKEY suffix in the PID indicates units that enable the SCTE-55-2 Out-of-Band protocol support.

Configure Dynamic Bonding Group

Before configuring DBG, it is assumed that interface Mac domain and fiber node are already configured on the Cisco cbr-8 router. The recommended primary channel distribution is one primary channel for contiguous four channels, such as 0, 4, 8, 12, 16, 20, 24, 28 and so on. For more information, see DOCSIS Interface and Fiber Node Configuration in the Cisco cBR Converged Broadband Routers DOCSIS Software Configuration Guide.

Note   To know more about the commands referenced in this module, see the Cisco IOS Master Command List.

Enable Dynamic Bonding Group

DBG is disabled by default. Use **cable dynamic-bonding-group** command to enable DBG as shown in the following example:

```
ROUTER# configure terminal
ROUTER(config)# cable dynamic-bonding-group
ROUTER(config)# end
```

To configure the bonding group reclaim threshold, use **cable dynamic-bonding-group reclaim-threshold** command as shown in the following example:

```
ROUTER# configure terminal
ROUTER(config)# cable dynamic-bonding-group reclaim-threshold percent 5% modems 6
ROUTER(config)# end
```

5% is the default bonding group throughput percentage threshold, and 6 is the default cable modem count threshold. If the throughput of a bonding group is lower than 5% of all bonding groups' throughput, and this bonding group has less than 6 cable modems assigned to it, then this bonding group is reclaimed when the available bonding groups reach the lower limit (20%).

By default, cable modem registration and load balance trigger DBG creation when needed. If you want to disable the interoperation with cable modem registration and load balance, use the commands in the following example:

```
ROUTER# configure terminal
ROUTER(config)# no cable dynamic-bonding-group registration

ROUTER# configure terminal
ROUTER(config)# no cable dynamic-bonding-group load-balance
```

When DBG is enabled, we recommend you to complete the following configurations.

Enable DS-Resiliency and Configure Resiliency Bonding Group

To make sure that the modem is still in w-online state with maximum downstream capability when several RF channels are impaired, enable the ds-resiliency feature by running the following commands:

```
Router# configure terminal
Router(config)# cable resiliency ds-bonding
Router(config)# end


Router# configure terminal
Router(config)# interface wideband-Cable 3/0/1:30
Router(config-if)# cable ds-resiliency
Wideband-Cable3/0/1:30 is set to WB resiliency bonding group.
Remove any existing bundle and rf-channel configuration.
Router(config-if)# end
```

Enable ACFE

Enable ACFE feature to make sure that modem registration is not blocked because of QoS failures:

```
Router# configure terminal
```

```
Router(config)# cable acfe enable
Router(config)# end
```

Verify Dynamic Bonding Group Configuration

This section describes how to use certain **show** commands to verify if the dynamic bonding groups are created.

Check the modem's primary wideband interface using the **show cable modem wideband channel** command as shown in this example:

```
Router# show cable modem 4800.33ee.ebee wideband channel
MAC Address        IP Address        I/F        MAC        DSxUS    Primary
                                                State               WB
4800.33ee.ebee     30.132.15.246     C3/0/1/UB  w-online   32x2     Wi3/0/1:3
```

Check the modem's downstream tuner capability using the **show cable modem verbose | in DS Tuner** command as shown in the following example:

```
Router# show cable modem 4800.33ee.ebee verbose | in DS Tuner
DS Tuner Capability : 32
```

Check the related RCC using the **show cable mac-domain rcc** command as shown in the following example:

```
Router# show cable mac-domain c3/0/1 rcc
RCC-ID   RCP               RCs MD-DS-SG  CMs  WB/RCC-TMPL      D3.0    D3.1
32       00 00 00 00 00    8   0         11   WB (Wi3/0/1:1)   Y       Y
33       00 00 00 00 00    32  0         6    WB (Wi3/0/1:3)   Y       Y
34       00 00 00 00 00    8   0         7    WB (Wi3/0/1:2)   Y       Y
35       00 00 00 00 00    8   0         7    WB (Wi3/0/1:4)   Y       Y
36       00 00 00 00 00    8   0         7    WB (Wi3/0/1:5)   Y       Y
```

Check the dynamically created bonding groups using the **show cable dynamic-bonding-group summary** command as shown in the following example:

```
Router# show cable dynamic-bonding-group summary
Dynamic bonding group: Enable
BG ID BG Name   BG Size CMs ServFlows Create Time          Create Client       BG State
RFid list
24834 Wi3/0/1:1 8       11  11        Sep 14 14:36:35.194 MODEM_ONLINE         OPERATIONAL
24832-24839
24836 Wi3/0/1:3 32      6   6         Sep 14 14:43:24.144 MODEM_ONLINE         OPERATIONAL
24832-24863
24835 Wi3/0/1:2 8       7   7         Sep 14 17:20:37.115 MODEM_ONLINE         OPERATIONAL
24840-24847
24837 Wi3/0/1:4 8       7   7         Sep 14 17:21:37.723 STATIC_LOAD_BALANCE OPERATIONAL
24856-24863
24838 Wi3/0/1:5 8       7   7         Sep 14 17:21:39.761 STATIC_LOAD_BALANCE OPERATIONAL
24848-24855
```

This example shows the DBG with D31 modems:

```
Router# show cable mac-domain c1/0/4 rcc
RCC-ID   RCP               RCs MD-DS-SG CMs  WB/RCC-TMPL      D3.0 D3.1
7        00 00 00 00 00    33  0        51   WB (Wi1/0/4:2)   N    Y
8        00 00 00 00 00    8   0        2    WB (Wi1/0/4:3)   Y    Y
9        00 00 00 00 00    8   0        1    WB (Wi1/0/4:4)   Y    Y


Router# show cable dynamic-bonding-group summary
Dynamic bonding group: Enable
```

```
BG ID BG Name     BG Size  CMs  ServFlows Create Time         Create Client      BG
State         RFid list
9219  Wi1/0/4:2   33       51   51        Sep 26 13:56:00.337  MODEM_ONLINE
OPERATIONAL        9216-9247, 9375
9220  Wi1/0/4:3   8        2    2         Sep 26 13:56:19.011  MODEM_ONLINE
OPERATIONAL        9216-9223
9221  Wi1/0/4:4   8        1    1         Sep 26 13:56:36.090  MODEM_ONLINE
OPERATIONAL        9240-9247
```

Table 2: Dynamic Bonding Group States

DBG State	Description
CREATE_WAITING_SUP	Line card sends a request to create DBG and waits for SUP to create the bonding group.
HOLD	DBG is created from SUP, or bonding group reverts from reclaim to ready-for-use state.
OPERATIONAL	If a modem is used on the bonding group after the HOLD state times out, the DBG state changes to OPERATIONAL.
RECLAIM_HOLD	Ready for reclaim. If no modem is used on the bonding group or match the reclaim in two minutes, the bonding group is reclaimed. The DBG state changes to RECLAIM_HOLD.
RECLAIM_MODEM_MOVING	Ready for reclaim. The modem is moved out of the bonding group.
RECLAIM_WAITING_SUP	Line card sends a DBG reclaim request and waits for SUP to reclaim the BG.

To display the detailed channel list information of dynamic bonding group, use the **show derived-config interface wideband** command as shown in the following example:

```
Router# show derived-config interface wideband-Cable 3/0/1:1
Building configuration...
Derived configuration: 113 bytes
!
interface Wideband-Cable3/0/1:1
  cable bundle 255
  cable rf-channels channel-list 0-7 bandwidth-percent 1
end
```

Check the usage of bonding group resource using the **show cable dynamic-bonding-group quota** command.

```
Router# show cable dynamic-bonding-group quota controller 3/0/1
slot/subslot/ctrlr: 3/0/1
Total BG number: 128
Used BG number (static/dynamic): 6(1/5) Available BG number: 122
Available BG list port: 0, 6-29, 31-127
```

Check the reclaimed bonding group using the **show cable dynamic-bonding-group reclaim-history summary** command:

```
Router# show cable dynamic-bonding-group reclaim-history summary
BG ID BG Name   BG Size Create Time    Create Client Reclaim Time    Reclaim Client RFid
list
24835 Wi3/0/1:2 16      Sep 14 14:40:27 MODEM_ONLINE  Sep 14 14:44:27 DBG_INTERNAL
24832-2484
```

Configure Load Balancing with Dynamic Bonding Group Enabled

If you want to use load balancing with the DBG enabled, we recommend that you configure the load balancing as shown here.

Enable Load Balancing for DOCSIS 3.0 and DOCSIS 3.1

To enable DOCSIS load balancing, run the following commands:

```
Router# config terminal
Router(config)# cable load-balance docsis-enable
Router(config)# end
```

When DOCSIS load balancing is enabled, run the following commands to enable load balancing for DOCSIS 3.0 and DOCSIS 3.1.

```
Router# config terminal
Router(config)# cable load-balance docsis30-enable
Router(config)# end
```

Enable DOCSIS 3.0 and DOCSIS 3.1 Static Load Balance

To balance the load of primary channels, enable static load balance using the following commands:

```
Router# configure terminal
Router(config)# cable load-balance docsis30-enable static
Router(config)# end
```

Enable DOCSIS 3.0 and DOCSIS 3.1 General Load Balance Group

To enable general load balance group, use cable load-balance docsis-group command as shown here:

```
Router# configure terminal
Router(config)# cable load-balance docsis-group fn 1 md c3/0/1
Router(config-lb-group)# no disable
Router(config-lb-group)# end
```

Enable Dynamic Load Balance and Fixed-Primary Channel Movement

To balance the load of all downstream channels based on utilization, enable dynamic load balance by running the following commands:

```
Router# configure terminal
```

```
Router(config)# cable load-balance docsis30-enable dynamic downstream
Router(config)# end
```

Fixed primary channel movement is disabled by default. With dynamic load balancing enabled, we recommend that you enable fixed primary channel movement to reduce service outage by running the following commands:

```
Router# configure terminal
Router(config)# cable load-balance fixed-primary-channel
Router(config)# end
```

Verify Static Load Balancing Configuration

This section describes how to use **show** commands to verify the configuration of the static load balancing.

Check the load of all primary channels using the **show cable load-balance docsis-group load** command as shown here:

```
Router# show cable load-balance docsis-group fn 1 md c3/0/1 load | in In
Interface          State   Group       Utilization Rsvd NBCM WB/UB Weight
In3/0/1:0(573 MHz)  initial 2147557888 0%(0%/0%)    0%   0    17    37
In3/0/1:4(597 MHz)  initial 2147557888 0%(0%/0%)    0%   0    17    37
In3/0/1:8(621 MHz)  initial 2147557888 0%(0%/0%)    0%   0    13    37
In3/0/1:12(645 MHz) initial 2147557888 0%(0%/0%)    0%   0    13    37
In3/0/1:16(669 MHz) initial 2147557888 0%(0%/0%)    0%   0    13    37
In3/0/1:20(693 MHz) initial 2147557888 0%(0%/0%)    0%   0    13    37
In3/0/1:24(717 MHz) initial 2147557888 0%(0%/0%)    0%   0    13    37
In3/0/1:28(741 MHz) initial 2147557888 0%(0%/0%)    0%   0    13    37
```

This command output lists all primary channels and shows the number of cable modems used with these channels. NBCM is the number of narrowband modems used with a channel while WBCM (WB/UB) is the number of wideband modems used with a channel. The total number of WBCMs must be balanced among all channels.

The difference between the total number of WBCMs used with any two channels is smaller or equal to the minimum threshold load. The default value of the minimum threshold load is 5.

This example shows the load in DOCSIS 3.1 static load balancing configuration:

```
Router# show cable load-balance docsis-group fn 33 md c3/0/0 load | i In
Interface          State   Group        Utilization Rsvd NBCM WB/UB Weight
In3/0/0:0(453 MHz)  initial 2147557408 1%(0%/1%)    0%   0    16    37
In3/0/0:8(501 MHz)  initial 2147557408 1%(0%/1%)    0%   0    16    37
In3/0/0:30(633 MHz) initial 2147557408 1%(0%/1%)    0%   0    12    37
In3/0/0:40(693 MHz) initial 2147557408 1%(0%/1%)    0%   0    15    37
In3/0/0:55(783 MHz) initial 2147557408 1%(0%/1%)    0%   0    12    37
In3/0/0:158(258 MHz initial 2147557408 1%(0%/1%)    0%   0    21    224

   - Above example, the modem count balanced with a configured threshold of 5

   - Count based load balancing is done only on sc-qam channels of equal weight. OFDM channel
 is of much higher weight and is excluded from the modem count calculations.
```

Check the load of all RF channels using the **show cable load-balance docsis-group rfch-util** command as shown in this example:

```
Router# show cable load-balance docsis-group fn 1 md c3/0/1 rfch-util
Interface   Pstate Pending-In Pending-Out Throughput(Kbps) Util NBCM WBCM
In3/0/1:0   up     No         No          0                0%   0    17
In3/0/1:1   NA     No         No          0                0%   0    17
In3/0/1:2   NA     No         No          0                0%   0    17
```

```
In3/0/1:3   NA    No    No    0          0%    0    17
In3/0/1:4   up    No    No    0          0%    0    17
In3/0/1:5   NA    No    No    0          0%    0    17
In3/0/1:6   NA    No    No    0          0%    0    17
In3/0/1:7   NA    No    No    0          0%    0    17
In3/0/1:8   up    No    No    0          0%    0    13
In3/0/1:9   NA    No    No    0          0%    0    13
In3/0/1:10  NA    No    No    0          0%    0    13
In3/0/1:11  NA    No    No    0          0%    0    13
In3/0/1:12  up    No    No    0          0%    0    13
In3/0/1:13  NA    No    No    0          0%    0    13
In3/0/1:14  NA    No    No    0          0%    0    13
In3/0/1:15  NA    No    No    0          0%    0    13
......
Average: 0.0
Variance: 0.0
```

This command lists the load information of the primary and secondary channels. WBCM is the number of wideband modems used with a channel.

Check the cable modem's internal state in load balancing using the **show cable load-balance docsis-group modem-list wideband** command as shown in this example:

```
Router# show cable load-balance docsis-group fn 1 md c3/0/1 modem-list wideband
Codes: M - Multicast, U - UGS, P - PCMM, F - Max-Failures, X - eXcluded
       L - L2vpn, R - RSVP, S - DS-Resiliency
Primary WB     MAC Address     Primary DS   RCC-ID Priority MUPFXLRS State
Wi3/0/1:0      (3)
               c8fb.2631.0e56  In3/0/1:20   41     0        ------   LB_CM_HOLD_EXPIRE_IN 36
               c8fb.26a6.c3dc  In3/0/1:16   41     0        ------   LB_CM_HOLD_EXPIRE_IN 37
               c8fb.2631.0d7e  In3/0/1:16   41     0        ------   LB_CM_HOLD_EXPIRE_IN 43
Wi3/0/1:1      (9)
               c8fb.2631.0c80  In3/0/1:0    32     0        ------   LB_CM_STATIC_MOVING
               c8fb.2631.0cae  In3/0/1:0    32     0        ------   LB_CM_STATIC_READY
               c8fb.2631.0db0  In3/0/1:24   42     0        ------   LB_CM_STATIC_MOVING
               c8fb.2631.0c10  In3/0/1:28   42     0        ------   LB_CM_STATIC_MOVING
               c8fb.2631.0d80  In3/0/1:16   41     0        ------   LB_CM_STATIC_MOVING
               c8fb.2631.0d26  In3/0/1:24   41     0        ------   LB_CM_STATIC_MOVING
               a4a2.4a2d.b4aa  In3/0/1:20   41     0        ------   LB_CM_STATIC_MOVING
               c8fb.2631.0e5c  In3/0/1:0    32     0        ------   LB_CM_STATIC_MOVING
               c8fb.2631.0cb0  In3/0/1:0    32     0        ------   LB_CM_STATIC_MOVING
Wi3/0/1:2      (3)
               c8fb.2631.0d2a  In3/0/1:12   34     0        ------   LB_CM_HOLD_EXPIRE_IN 27
               c8fb.2631.0e5a  In3/0/1:12   34     0        ------   LB_CM_STATIC_MOVING
               c8fb.2631.0bfe  In3/0/1:8    34     0        ------   LB_CM_STATIC_MOVING
Wi3/0/1:3      (2)
               4800.33ea.54be  In3/0/1:28   33     0        ------   LB_CM_DYNAMIC_READY
               4800.33ee.ebe6  In3/0/1:20   33     0        ------   LB_CM_HOLD_EXPIRE_IN 1
Wi3/0/1:4      (2)
               c8fb.2631.0e44  In3/0/1:24   42     0        ------   LB_CM_HOLD_EXPIRE_IN 40
               c8fb.2631.0a44  In3/0/1:28   42     0        ------   LB_CM_HOLD_EXPIRE_IN 42
```

Table 3: Cable Modem States

CM State	Description
LB_CM_STATIC_READY	Modem is ready for static load balance movement.
LB_CM_STATIC_MOVING	Modem is in movement triggered by static load balance.

CM State	Description
LB_CM_HOLD_EXPIRE_IN	Modem is in hold for the next movement. The default hold time, in seconds, is 600.
LB_CM_DYANMIC_READY	Modem is ready for dynamic load balance movement.
LB_CM_DYANMIC_MOVING	Modem is in movement triggered by dynamic load balance.
LB_CM_DISABLED	Modem is not ready for movement. If the modem failure movement count reaches maximum failure threshold, then set the modem in LB_CM_DISABLED to avoid further movement.

Verify Dynamic Load Balancing Configuration

This section describes how to use the **show** commands to verify the configuration of the dynamic load balancing.

Check the utilization of all RF channels using **show cable load-balance docsis-group rfch-util** command as shown in this example:

```
Router# show cable load-balance docsis-group fn 320 md c3/0/0 rfch-util
Interface   Pstate Pending-In Pending-Out Throughput(Kbps) Util NBCM WBCM
Do3/0/0:0   up     No         No          11754            31%  0    308
Do3/0/0:1   up     No         No          11754            31%  0    296
Do3/0/0:2   up     No         No          11754            31%  0    333
Do3/0/0:3   up     No         No          11754            31%  0    296
Do3/0/0:4   up     No         No          11754            31%  0    297
Do3/0/0:5   up     No         No          11754            31%  0    331
Do3/0/0:6   up     No         No          11754            31%  0    299
Do3/0/0:7   up     No         No          11753            31%  0    268
Do3/0/0:8   up     No         No          11754            31%  0    302
Do3/0/0:9   up     No         No          11754            31%  0    331
Do3/0/0:10  up     No         No          11753            31%  0    308
Do3/0/0:11  up     No         No          11754            31%  0    305
Do3/0/0:12  NA     No         No          12862            34%  0    258
Do3/0/0:13  NA     No         No          12862            34%  0    258
Do3/0/0:14  NA     No         No          12862            34%  0    258
......
Average: 30.416
Variance: 1.701
```

The traffic among all RF channels is considered balanced when the difference between any two RF channel utilization is under the threshold load. The default percentage of threshold load is 10%.

To check the potential target bonding group for each of the source bonding group, use the **show cable load-balance docsis-group target dbg** and the **show cable load-balance docsis-group target wide** commands as shown in this example:

```
Router# show cable load-balance docsis-group fn 320 md c3/0/0 target dbg
Interface      Bg-Id      Size      Group           Target
Wi3/0/0:0      24577      4         2147557695
Wi3/0/0:3      24580      4         2147557695
Wi3/0/0:4      24581      8         2147557695
Wi3/0/0:5      24582      8         2147557695
Wi3/0/0:6      24583      24        2147557695      33% [24576, 24584-24587, 24589-24607]
```

```
Wi3/0/0:7        24584      16      2147557695       30% [24576, 24586-24587, 24595-24607]
Wi3/0/0:8        24585      16      2147557695
Wi3/0/0:9        24586      32      2147557695
Wi3/0/0:10       24587      24      2147557695       33% [24576, 24584-24587, 24589-24607]
Wi3/0/0:11       24588      8       2147557695
Wi3/0/0:12       24589      8       2147557695       27% [24596-24603]
Wi3/0/0:13       24590      8       2147557695
Wi3/0/0:14       24591      4       2147557695


Router# show cable load-balance docsis-group fn 5 md c1/0/4 target wide
Interface     Bg-Id      State    Group          Target
Wi1/0/4:2     9219       up       2147510276     Wi1/0/4:4
Wi1/0/4:3     9220       up       2147510276
Wi1/0/4:4     9221       up       2147510276
```

If there is no target bonding group in the output, it means that no bonding groups are created to balance traffic among RF channels.

A sample output for DOCSIS 3.1 modems with a configured threshold of 14% is shown. For utilization based load balancing to start on DOCSIS 3.1 modems, the OFDM channel must be utilized 100% and SC-QAM must have traffic. The utilization-based load balancing balances the traffic on the SC-QAM channels in a DOCSIS 3.1 modem.

```
Router# show cable load-balance docsis-group fn 5 md c1/0/4 rfch-util
Interface     Pstate  Pending-In  Pending-Out  Throughput(Kbps)  Util  NBCM  WBCM
In1/0/4:0     up      No          No           10632             28%   0     45
In1/0/4:1     NA      No          No           11226             29%   0     41
In1/0/4:2     NA      No          No           11225             29%   0     41
In1/0/4:3     NA      No          No           11225             29%   0     41
In1/0/4:4     down    No          No           11225             29%   0     41
In1/0/4:5     down    No          No           11225             29%   0     41
In1/0/4:6     down    No          No           11225             29%   0     41
In1/0/4:7     down    No          No           11225             29%   0     41
In1/0/4:8     up      No          No           10620             28%   0     43
....
....
In1/0/4:35    NA      No          No           6646              17%   0     6
In1/0/4:36    NA      No          No           6646              17%   0     6
In1/0/4:37    NA      No          No           6647              17%   0     6
In1/0/4:38    NA      No          No           6646              17%   0     6
In1/0/4:39    NA      No          No           6647              17%   0     6
In1/0/4:40    up      No          No           6088              16%   0     6
In1/0/4:41    NA      No          No           6648              17%   0     6
In1/0/4:42    NA      No          No           6647              17%   0     6
In1/0/4:43    NA      No          No           6647              17%   0     6
In1/0/4:44    NA      No          No           6646              17%   0     6
In1/0/4:45    NA      No          No           6646              17%   0     6
In1/0/4:46    No      No          No           6647              17%   0     6
In1/0/4:47    NA      No          No           6648              17%   0     6
In1/0/4:48    NA      No          No           6648              17%   0     6
In1/0/4:49    NA      No          No           6648              17%   0     6
In1/0/4:50    NA      No          No           6646              17%   0     6
In1/0/4:51    NA      No          No           6648              17%   0     6
In1/0/4:52    NA      No          No           6647              17%   0     6
In1/0/4:53    NA      No          No           6648              17%   0     6
In1/0/4:54    No      No          No           6647              17%   0     6
In1/0/4:55    NA      No          No           6648              17%   0     6
In1/0/4:56    NA      No          No           6647              17%   0     6
In1/0/4:57    NA      No          No           6647              17%   0     6
In1/0/4:58    NA      No          No           6646              17%   0     6
In1/0/4:59    NA      No          No           6645              17%   0     6
In1/0/4:60    NA      No          No           6646              17%   0     6
In1/0/4:61    NA      No          No           6646              17%   0     6
In1/0/4:62    NA      No          No           6647              17%   0     6
```

```
In1/0/4:63    NA    No    No    6647       17%   0   6
In1/0/4:159   NA    No    No    1819685    100%  0   47
```

Feature Information for Dynamic Bonding Group

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 4: Feature Information for Dynamic Bonding Group

Feature Name	Releases	Feature Information
Dynamic Bonding Group	Cisco 1x2 / Compact Shelf RPD Software 4.1	This feature was introduced on the Cisco Remote PHY Device.