



Downstream Channel ID Assignment

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The DOCSIS downstream channel ID (DCID) is defined as an 8-bit identifier for recognizing a Downstream Channel within a MAC Domain. All CMTS downstream channels are assigned a DCID by default that may be subsequently changed by configuration. It is used in most DOCSIS downstream packet headers and its valid range is from 1 to 255 (0 is reserved for network management purposes).



Note All downstream channels in a MAC domain must have a unique DCID within the MAC domain.

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.

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Hardware Compatibility Matrix for the Cisco cBR Series Routers



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

Table 1: Hardware Compatibility Matrix for the Cisco cBR Series Routers

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

Information About Downstream Channel ID Assignment on the Cisco CMTS Routers

These are the downstream channel ID assignment features:

- Unique DCIDs are provided for all channels within a single controller by default.



Note DCID values for downstream channels in the same MAC Domain must be unique. If a MAC Domain only contains channels from a single controller, the default DCID values will be sufficient. If a MAC Domain contains channels from multiple controllers, DCID conflicts may be encountered within the MAC Domain. DCID conflicts may be resolved by changing the DCID value of the conflicting channels within the controller configuration or by enabling the automatic channel ID assignment feature.

- The default DCID value for each downstream channel within a controller is equivalent to rf-chan number plus one. For example, the default value for rf-chan 0 is 1, for rf-chan 1 is 2.

Manual Downstream Channel ID Assignment

When using the manual DCID provisioning feature, every downstream channel in the system is assigned a default DCID value equivalent to (controller QAM id + 1). The table below shows the default DCID ranges per downstream controller.

Table 2: Default Downstream Channel IDs Per Slot/Subslot/Controller

	0/0	1/0	2/0	3/0	6/0	7/0	8/0	9/0
DS Controller 0	1-128	1-128	1-128	1-128	1-128	1-128	1-128	1-128
DS Controller 1	1-128	1-128	1-128	1-128	1-128	1-128	1-128	1-128
DS Controller 2	1-128	1-128	1-128	1-128	1-128	1-128	1-128	1-128
DS Controller 3	1-128	1-128	1-128	1-128	1-128	1-128	1-128	1-128
DS Controller 4	1-128	1-128	1-128	1-128	1-128	1-128	1-128	1-128
DS Controller 5	1-128	1-128	1-128	1-128	1-128	1-128	1-128	1-128
DS Controller 6	1-128	1-128	1-128	1-128	1-128	1-128	1-128	1-128

	0/0	1/0	2/0	3/0	6/0	7/0	8/0	9/0
DS Controller 7	1-128	1-128	1-128	1-128	1-128	1-128	1-128	1-128

The default DCID value can be replaced with a user configurable value. The configuration is available in the downstream controller per channel. The current DCID values for the channels within a downstream controller can be viewed in the `dcid` column of the `show controller Integrated-Cable rf-chan` command output. The example shows channels with default DCID values. When a DCID value is changed in the configuration, the new value appears in the output below.

```
Router#show controllers integrated-Cable 3/0/0 rf-channel 1-127
Chan State Admin Frequency Type Annex Mod srate Interleaver dcid power output
1 NPRE UP 99000000 DOCSIS B 256 5361 I32-J4 2 37 NORMAL
2 NPRE UP 105000000 DOCSIS B 256 5361 I32-J4 3 37 NORMAL
3 NPRE UP 111000000 DOCSIS B 256 5361 I32-J4 4 37 NORMAL
4 NPRE UP 117000000 DOCSIS B 256 5361 I32-J4 5 37 NORMAL
5 NPRE UP 123000000 DOCSIS B 256 5361 I32-J4 6 37 NORMAL
6 NPRE UP 129000000 DOCSIS B 256 5361 I32-J4 7 37 NORMAL
7 NPRE UP 135000000 DOCSIS B 256 5361 I32-J4 8 37 NORMAL
8 NPRE UP 141000000 DOCSIS B 256 5361 I32-J4 9 37 NORMAL
9 NPRE UP 147000000 DOCSIS B 256 5361 I32-J4 10 37 NORMAL
10 NPRE UP 153000000 DOCSIS B 256 5361 I32-J4 11 37 NORMAL
11 NPRE UP 159000000 DOCSIS B 256 5361 I32-J4 12 37 NORMAL
12 NPRE UP 165000000 DOCSIS B 256 5361 I32-J4 13 37 NORMAL
13 NPRE UP 171000000 DOCSIS B 256 5361 I32-J4 14 37 NORMAL
14 NPRE UP 177000000 DOCSIS B 256 5361 I32-J4 15 37 NORMAL
15 NPRE UP 183000000 DOCSIS B 256 5361 I32-J4 16 37 NORMAL
```

Router#

Automatic Downstream Channel ID Assignment on the Cisco CMTS Routers

It is possible to automatically assign a unique set of downstream channel IDs to meet all DOCSIS requirements by enabling the Automatic DCID Assignment feature. When enabled, Downstream channel DCIDs will be automatically assigned when the channels are added to a fiber node and associated with a MAC Domain. Therefore, the use of fiber node configuration is a prerequisite for this feature.

Service Impact

Changing the DOCSIS downstream channel ID causes cable modems to re-register. Cable modems receive MAC Domain Descriptor (MDD) and Upstream Channel Descriptor (UCD) messages with a changed DCID in their headers.

- Enabling the automatic DCID assignment displays the following message:

```
WARNING: Enabling automatic DCID assignment will cause modems to flap and will apply
to all fiber nodes on this CMTS.
```

- Disabling the automatic DCID assignment displays the following message:

```
WARNING: Disabling automatic DCID assignment will no longer enforce channel-id uniqueness
at fiber nodes. Channel ID changes may require manual verification to prevent conflicts.
```

- If there is a DCID conflict with another channel in the MAC Domain, the following error message is displayed:

```
ERROR: <slot>/<subslot>/<controller> rf-channel <channel>: The downstream channel id
conflicts with interface In<slot>/<subslot>/<controller>:channel. Downstream channel
id must be unique in a CGD.
```

- After automatic DCID assignment is configured, if there is a DCID conflict when a downstream channel that belongs to a fiber node is added to a MAC Domain, the automatic DCID feature tries to resolve the conflict by assigning another automatic DCID and the following message is displayed:

```
WARNING: The downstream channel id conflict for <slot>/<subslot>/<controller> rf-channel
<channel> was resolved by Automatic DCID Assignment.
Please run "interface <md-slot>/<md-subslot>/<md-index>" followed by
"<slot>/<subslot>/<controller> rf-channel <channel>" again in order to add the channel.
```

To add the channel, use this channel grouping domain (CGD) command again:

```
cable downstream x/y/z rf-channel channel
```

- If automatic DCID is configured and the channel does not belong to a fiber node, or if automatic DCID cannot resolve the conflict, the following message is displayed:

```
WARNING: The downstream channel id conflict for <slot>/<subslot>/<controller> rf-channel
<channel> could not be resolved by Automatic DCID Assignment.
```

To resolve this issue, add the channel to a fiber node.

How to Configure Downstream Channel ID Assignment on the Cisco CMTS Routers

The following sections describe how to configure downstream channel ID assignment.

Configuring Manual Downstream Channel ID Assignment

Procedure

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.

	Command or Action	Purpose
Step 3	interface controller integrated-Cable <i>slot/subslot/port</i> Example: <pre>Router(config)# interface controller integrated-Cable 1/0/1</pre>	Enters controller configuration mode for the Channel Grouping Domain host line card.
Step 4	rf-chan <i>downstream QAM ID</i> <ul style="list-style-type: none"> Alternatively, use the rf-chan <i>starting downstream QAM ID ending downstream QAM ID</i> command to set the range of downstream channel IDs. Example: <pre>Router(config-controller)# rf-chan 0</pre>	Enters the rf-channel configuration mode.
Step 5	docsis-channel-id <i>DCID</i> Example: <pre>Router(config-rf-chan)# docsis-channel-id 1</pre>	<p>Configures the downstream channel's DCID to the specified value, for the RF channel.</p> <p>For the rf-channel range that was configured using the rf-chan <i>starting downstream QAM ID ending downstream QAM ID</i> command, the docsis-channel-id <i>DCID</i> command configures the DCIDs for the rf-channels in that range.</p>

Configuring Automatic Downstream Channel ID Assignment

Automatic DCID assignment should be permanently configured. However, if you need to remove the feature, use the **no** or **default** commands.



Note The **no** or **default** form of the command is not written to startup-config file.

In this case, the DCIDs are retained as computed for all channels, and are not set to the defaults of the channels. Save the configuration containing the newly-assigned DCIDs to the startup-config file by using the **write memory** command.

When you enable automatic DCID assignment, any DCID conflict arising due to adding a channel to a MAC Domain is resolved automatically.

**Restriction**

- After running the **cable downstream-channel-id automatic** command in the configuration, manually editing the configuration file in an editor to add RF channels to the fiber nodes could cause DCID conflicts. The feature assumes all channels in fiber nodes have unique automatic DCIDs in global configuration mode. If the configuration is manually edited and the feature does not verify the unique DCIDs, the DCIDs of the newly-added channels may conflict with those of the existing channels. To fix any DCID conflicts, undo and re-apply the global automatic DCID configuration.

**Note**

Re-applying global automatic DCID configuration is a disruptive operation.

To avoid DCID conflicts, edit the configuration to configure the fiber nodes, then run the **cable downstream-channel-id automatic** command so all channels have unique automatic DCIDs.

Make additions to the fiber nodes on the Cisco uBR10012 router command line interface with the automatic DCID configured.

- The **cable downstream-channel-id automatic** command should not be manually edited in to the startup-config file, since it does not guarantee unique DCIDs for channels in the fiber node.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	cable downstream-channel-id automatic Example: Router(config)# cable downstream-channel-id automatic	Specifies automatic assignment of the DCIDs by the Cisco CMTS.

Example

This example displays the restriction on manually editing configurations:

```
Router# show run | include automatic
cable downstream-channel-id automatic

router# show cable fiber-node 3
-----
Fiber-Node 3
Channel(s) : downstream Integrated-Cable 1/0/2: 0-3, 32-35, 64-67, 96-99
Channel ID(s): 1 2 3 4 33 34 35 36 65 66 67 68 97 98 99 100
```

```
Upstream-Cable 1/0/2
FN Config Status: Configured (status flags = 0x01)
MDD Status: Valid
Router#
```

If you manually edit the startup-config file in an editor to add a downstream controller, for example, 1/0/3, it causes a conflict.

```
Router> configure terminal
Router# cable fiber-node 3
Router# downstream integrated-Cable 1/0/3
```

If this downstream controller is added, the automatic DCID assignment feature automatically resolves it. However, since the startup-config file was manually edited to add the downstream controller, the automatic DCID assignment feature is unable to resolve it. This causes a DCID conflict when the edited startup-config file is loaded and invalidates the fiber node.

```
down Modular-Cable 5/0/0 rf-channel 0
DS frequency is not unique.
DS channel id is not unique.
Warning: D3.0 CMs cannot get w-online with an invalid fiber-node.
router#
```

What to do next

Run the **show cable fibernode** command to view DCIDs assigned to all the channels in the fiber node.

```
Router# show cable fiber-node 3
Fiber-Node 3
Channel(s) : downstream Integrated-Cable 1/0/2: 0-3, 32-35, 64-67,
96-99
Channel ID(s): 1 2 3 4 33 34 35 36 65 66 67 68 97 98
99 100
Upstream-Cable 1/0/2
FN Config Status: Configured (status flags = 0x01)
MDD Status: Valid
```


Additional References

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>	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Downstream Channel ID Assignment

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 3: Feature Information for Downstream Channel ID Assignment

Feature Name	Releases	Feature Information
Downstream Channel ID Assignment	Cisco IOS XE Fuji 16.7.1	This feature was integrated on the Cisco cBR Series Converged Broadband Router.

