



CHAPTER 24

Configuring IPv6 Multicast PFC3 and DFC3 Layer 3 Switching

The PFC3 and DFC3 provide hardware support for IPv6 multicast traffic. Use these publications to configure IPv6 multicast on Catalyst 6500 series switches:

- The *Cisco IOS IPv6 Configuration Library*, “Implementing IPv6 Multicast”:
<http://www.cisco.com/en/US/docs/ios-xml/ios/ipv6/configuration/12-2sx/ipv6-12-2sx-book.html>
- The *Cisco IOS IPv6 Command Reference*:
http://www.cisco.com/en/US/docs/ios/ipv6/command/reference/ipv6_book.html

These sections provide additional information about IPv6 multicast support on Catalyst 6500 series switches:

- [Features that Support IPv6 Multicast, page 24-2](#)
- [IPv6 Multicast Guidelines and Restrictions, page 24-2](#)
- [New or Changed IPv6 Multicast Commands, page 24-3](#)
- [Configuring IPv6 Multicast Layer 3 Switching, page 24-3](#)
- [Using show Commands to Verify IPv6 Multicast Layer 3 Switching, page 24-3](#)



Tip

For additional information about Cisco Catalyst 6500 Series Switches (including configuration examples and troubleshooting information), see the documents listed on this page:

http://www.cisco.com/en/US/products/hw/switches/ps708/tsd_products_support_series_home.html

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Features that Support IPv6 Multicast

These features support IPv6 multicast:

- RPR and RPR+ redundancy mode—See [Chapter 6, “Configuring RPR Supervisor Engine Redundancy.”](#)
- Multicast Listener Discovery version 2 (MLDv2) snooping—See [Chapter 26, “Configuring MLDv2 Snooping for IPv6 Multicast Traffic.”](#)



Note MLDv1 snooping is not supported.

- IPv6 Multicast rate limiters—See [Chapter 33, “Configuring Denial of Service Protection.”](#)
- IPv6 Multicast: Bootstrap Router (BSR)—See the BSR information in the *Cisco IOS IPv6 Configuration Library* and *Cisco IOS IPv6 Command Reference*.
- IPv6 Access Services—See DHCPv6 Prefix Delegation—See this publication: http://www.cisco.com/en/US/docs/ios-xml/ios/ipv6/config_library/15-sy/ipv6-15-sy-library.html
- SSM mapping for IPv6—See this publication: http://www.cisco.com/en/US/docs/ios-xml/ios/ipv6/config_library/15-sy/ipv6-15-sy-library.html

IPv6 Multicast Guidelines and Restrictions

These guidelines and restrictions apply to IPv6 multicast support on Catalyst 6500 series switches:

- With Release 12.2(18)SXE and later releases, the PFC3 and DFC3 provide hardware support for the following:
 - Completely switched IPv6 multicast flows
 - IPv6 PIM-Sparse Mode (PIM-SM) (S,G) forwarding
 - Multicast RPF check for IPv6 PIM-SM (S,G) traffic using the NetFlow table
 - Rate limiting of IPv6 PIM-SM (S,G) traffic that fails the multicast RPF check
 - Static IPv6 multicast routes
 - SSM Mapping for IPv6 (PIM-SSM)
 - IPv6 multicast forwarding information base (MFIB) using the NetFlow table
 - IPv6 distributed MFIB (dMFIB) using the NetFlow table
 - Link-local and link-global IPv6 multicast scopes
 - Egress multicast replication with the **ipv6 mfib hardware-switching** command
 - Ingress interface statistics for multicast routes (egress interface statistics not available)
 - RPR and RPR+ redundancy mode (see [Chapter 6, “Configuring RPR Supervisor Engine Redundancy”](#))
 - Ingress and egress PFC QoS (see [Chapter 38, “Configuring PFC QoS”](#))
 - Input and output Cisco access-control lists (ACLs)

- The PFC3 and DFC3 do not provide hardware support for the following:
 - Partially switched IPv6 multicast flows
 - PIM-SM (*,G) forwarding
 - Multicast RPF check for PIM-SM (*,G) traffic
 - Multicast helper maps
 - Site-local multicast scopes
 - Manually configured IPv6 over IPv4 tunnels
 - IPv6 multicast 6to4 tunnels
 - IPv6 multicast automatic tunnels
 - IPv6 over GRE tunnels
 - IPv6-in-IPv6 PIM register tunnels
 - IPv6 multicast basic ISATAP tunnels
 - ISATAP tunnels with embedded 6to4 tunnels

New or Changed IPv6 Multicast Commands

Refer to the *Catalyst Supervisor Engine 32 PISA Cisco IOS Command Reference*, Release 12.2ZY for information about these IPv6 multicast commands, which are new or changed in Release 12.2(18)SXE:

- **ipv6 mfib hardware-switching**
- **mls rate-limit multicast ipv6** (see [Chapter 33, “Configuring Denial of Service Protection”](#))
- **show ipv6 mfib**
- **show mls rate-limit** (see [Chapter 33, “Configuring Denial of Service Protection”](#))
- **show platform software ipv6-multicast**
- **show team interface**

Configuring IPv6 Multicast Layer 3 Switching

To configure IPv6 multicast Layer 3 switching, perform this task:

	Command	Purpose
Step 1	Router(config)# ipv6 unicast-routing	Enables unicast routing on all Layer 3 interfaces.
Step 2	Router(config)# ipv6 multicast-routing	Enables PIM-SM on all Layer 3 interfaces.
Step 3	Router(config)# ipv6 mfib hardware-switching	Enables MFIB hardware switching globally.

Using show Commands to Verify IPv6 Multicast Layer 3 Switching

These sections describe how to use **show** commands to verify IPv6 multicast Layer 3 switching:

- [Verifying MFIB Clients, page 24-4](#)

- [Displaying the Switching Capability, page 24-5](#)
- [Verifying the \(S,G\) Forwarding Capability, page 24-5](#)
- [Verifying the \(*,G\) Forwarding Capability, page 24-5](#)
- [Verifying the Subnet Entry Support Status, page 24-5](#)
- [Verifying the Current Replication Mode, page 24-5](#)
- [Displaying the Replication Mode Auto Detection Status, page 24-6](#)
- [Displaying the Replication Mode Capabilities, page 24-6](#)
- [Displaying Subnet Entries, page 24-6](#)
- [Displaying the IPv6 Multicast Summary, page 24-6](#)
- [Displaying the NetFlow Hardware Forwarding Count, page 24-7](#)
- [Displaying the FIB Hardware Bridging and Drop Counts, page 24-7](#)
- [Displaying the Shared and Well-Known Hardware Adjacency Counters, page 24-8](#)

**Note**

The **show** commands in the following sections are for a switch with a DFC3-equipped switching module in slot 1 and a Supervisor Engine 720 with a PFC3 in slot 6.

Verifying MFIB Clients

This example shows the complete output of the **show ipv6 mrib client** command:

```
Router# show ipv6 mrib client
IP MRIB client-connections
mfib ipv6:81      (connection id 0)
igmp:124         (connection id 1)
pim:281 (connection id 2)
slot 1 mfib ipv6 rp agent:15 (connection id 3)
slot 6 mfib ipv6 rp agent:15 (connection id 4)
```

This example shows how to display the MFIB client running on the MSFC:

```
Router# show ipv6 mrib client | include ^mfib ipv6
mfib ipv6:81      (connection id 0)
```

This example shows how to display the MFIB clients running on the PFC3 and any DFC3s:

```
Router# show ipv6 mrib client | include slot
slot 1 mfib ipv6 rp agent:15 (connection id 3)
slot 6 mfib ipv6 rp agent:15 (connection id 4)
```

Displaying the Switching Capability

This example displays the complete output of the **show platform software ipv6-multicast capability** command:

```
Router# show platform software ipv6-multicast capability

Hardware switching for IPv6 is enabled
(S,G) forwarding for IPv6 supported using Netflow
(*,G) bridging for IPv6 is supported using FIB
Directly-connected entries for IPv6 is supported using ACL-TCAM.

Current System HW Replication Mode : Ingress
Auto-detection of Replication Mode : ON

Slot Replication-Capability Replication-Mode
  1 Ingress                    Ingress
  2 Egress                      Ingress
  6 Egress                      Ingress
  8 Ingress                    Ingress
```

Verifying the (S,G) Forwarding Capability

This example shows how to verify the (S,G) forwarding:

```
Router# show platform software ipv6-multicast capability | include (S,G)
(S,G) forwarding for IPv6 supported using Netflow
```

Verifying the (*,G) Forwarding Capability

This example shows how to verify the (*,G) forwarding:

```
Router# show platform software ipv6-multicast capability | include (\*,G)
(*,G) bridging for IPv6 is supported using FIB
```

Verifying the Subnet Entry Support Status

This example shows how to verify the subnet entry support status:

```
Router# show platform software ipv6-multicast capability | include entries
Directly-connected entries for IPv6 is supported using ACL-TCAM.
```

Verifying the Current Replication Mode

This example shows how to verify the current replication mode:

```
Router# show platform software ipv6-multicast capability | include Current
Current System HW Replication Mode : Ingress
```



Note

Enter the **no ipv6 mfib hardware-switching replication-mode ingress** command to enable replication mode auto detection.

Displaying the Replication Mode Auto Detection Status

This example shows how to display the replication mode auto detection status:

```
Router# show platform software ipv6-multicast capability | include detection
Auto-detection of Replication Mode : ON
```

Displaying the Replication Mode Capabilities

This example shows how to display the replication mode capabilities of the installed modules:

```
Router# show platform software ipv6-multicast capability | begin ^Slot
Slot Replication-Capability Replication-Mode
 1 Ingress Ingress
 2 Egress Ingress
 6 Egress Ingress
 8 Ingress Ingress
```

Displaying Subnet Entries

This example shows how to display subnet entries:

```
Router# show platform software ipv6-multicast connected
IPv6 Multicast Subnet entries
Flags : H - Installed in ACL-TCAM
       X - Not installed in ACL-TCAM due to
           label-full exception
Interface: Vlan20 [ H ]
           S:20::1 G:FF00::
Interface: Vlan10 [ H ]
           S:10::1 G:FF00::
```



Note In this example, there are subnet entries for VLAN 10 and VLAN 20.

Displaying the IPv6 Multicast Summary

This example shows how to display the IPv6 multicast summary:

```
Router# show platform software ipv6-multicast summary
IPv6 Multicast Netflow SC summary on Slot[1]:
Shortcut Type          Shortcut count
-----+-----
(S, G)                 100
(*, G)                 0
IPv6 Multicast FIB SC summary on Slot[1]:
Shortcut Type          Shortcut count
-----+-----
(*, G/128)            10
(*, G/m)              47

IPv6 Multicast Netflow SC summary on Slot[6]:
Shortcut Type          Shortcut count
-----+-----
(S, G)                 100
(*, G)                 0
```

```
IPv6 Multicast FIB SC summary on Slot[6]:
Shortcut Type          Shortcut count
-----+-----
(*, G/128)            10
(*, G/m)              47
```

Displaying the NetFlow Hardware Forwarding Count

This example shows how to display the NetFlow hardware forwarding count:

```
Router# show platform software ipv6-multicast summary
IPv6 Multicast Netflow SC summary on Slot[1]:
Shortcut Type          Shortcut count
-----+-----
(S, G)                100
(*, G)                0

<...Output deleted...>

IPv6 Multicast Netflow SC summary on Slot[6]:
Shortcut Type          Shortcut count
-----+-----
(S, G)                100
(*, G)                0

<...Output truncated...>
```



Note

The NetFlow (*, G) count is always zero because PIM-SM (*,G) forwarding is supported in software on the MSFC3.

Displaying the FIB Hardware Bridging and Drop Counts

This example shows how to display the FIB hardware bridging and drop hardware counts:

```
Router# show platform software ipv6-multicast summary | begin FIB
IPv6 Multicast FIB SC summary on Slot[1]:
Shortcut Type          Shortcut count
-----+-----
(*, G/128)            10
(*, G/m)              47

<...Output deleted...>

IPv6 Multicast FIB SC summary on Slot[6]:
Shortcut Type          Shortcut count
-----+-----
(*, G/128)            10
(*, G/m)              47
```



Note

- The (*, G/128) value is a hardware bridge entry count.
- The (*, G/m) value is a hardware bridge/drop entry count.

Displaying the Shared and Well-Known Hardware Adjacency Counters

The **show platform software ipv6-multicast shared-adjacencies** command displays the shared and well-known hardware adjacency counters used for IPv6 multicast by entries in FIB and ACL-TCAM.

```
Router# show platform software ipv6-multicast shared-adjacencies
```

```
---- SLOT [1] ----
```

Shared IPv6 Mcast Adjacencies	Index	Packets	Bytes
Subnet bridge adjacency	0x7F802	0	0
Control bridge adjacency	0x7	0	0
StarG_M bridge adjacency	0x8	0	0
S_G bridge adjacency	0x9	0	0
Default drop adjacency	0xA	0	0
StarG (spt == INF) adjacency	0xB	0	0
StarG (spt != INF) adjacency	0xC	0	0

```
---- SLOT [6] ----
```

Shared IPv6 Mcast Adjacencies	Index	Packets	Bytes
Subnet bridge adjacency	0x7F802	0	0
Control bridge adjacency	0x7	0	0
StarG_M bridge adjacency	0x8	0	0
S_G bridge adjacency	0x9	0	0
Default drop adjacency	0xA	28237	3146058
StarG (spt == INF) adjacency	0xB	0	0
StarG (spt != INF) adjacency	0xC	0	0



Tip

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