



## Configuring IPv6 Multicast PFC3 and DFC3 Layer 3 Switching

With Release 12.2(18)SXE and later releases, 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/ipv6/configuration/guide/12\\_2sx/ipv6\\_12\\_2sx\\_book.html](http://www.cisco.com/en/US/docs/ios/ipv6/configuration/guide/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](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 27-1](#)
- [IPv6 Multicast Guidelines and Restrictions, page 27-2](#)
- [New or Changed IPv6 Multicast Commands, page 27-3](#)
- [Configuring IPv6 Multicast Layer 3 Switching, page 27-3](#)
- [Using show Commands to Verify IPv6 Multicast Layer 3 Switching, page 27-3](#)

## Features that Support IPv6 Multicast

These features support IPv6 multicast:

- RPR and RPR+ redundancy mode—See [Chapter 8, “Configuring RPR and RPR+ Supervisor Engine Redundancy.”](#)
- Multicast Listener Discovery version 2 (MLDv2) snooping—See [Chapter 29, “Configuring MLDv2 Snooping for IPv6 Multicast Traffic.”](#)



**Note** MLDv1 snooping is not supported.

- IPv6 Multicast rate limiters—See [Chapter 36, “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/12\\_2t/ipv6/ipv6\\_vgf.html](http://www.cisco.com/en/US/docs/ios/12_2t/ipv6/ipv6_vgf.html)
- SSM mapping for IPv6—See this publication:  
[http://www.cisco.com/en/US/docs/ios/12\\_2t/ipv6/ipv6\\_vgf.html](http://www.cisco.com/en/US/docs/ios/12_2t/ipv6/ipv6_vgf.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 8, “Configuring RPR and RPR+ Supervisor Engine Redundancy”](#))
  - Ingress and egress PFC QoS (see [Chapter 41, “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 *Cisco IOS Master Command List*, Release 12.2SX 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 36, “Configuring Denial of Service Protection”](#))
- **show ipv6 mfib**
- **show mls rate-limit** (see [Chapter 36, “Configuring Denial of Service Protection”](#))
- **show platform software ipv6-multicast**
- **show tcam interface**

## Configuring IPv6 Multicast Layer 3 Switching

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

|        | Command   | Purpose  |
|--------|---|--|
| Step 1 | Router(config)# <b>ipv6 unicast-routing</b>         | Enables unicast routing on all Layer 3 interfaces. |
| Step 2 | Router(config)# <b>ipv6 multicast-routing</b>       | Enables PIM-SM on all Layer 3 interfaces.          |
| Step 3 | Router(config)# <b>ipv6 mfib hardware-switching</b> | 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 27-4](#)
- [Displaying the Switching Capability, page 27-4](#)
- [Verifying the \(S,G\) Forwarding Capability, page 27-4](#)
- [Verifying the \(\\*,G\) Forwarding Capability, page 27-5](#)
- [Verifying the Subnet Entry Support Status, page 27-5](#)
- [Verifying the Current Replication Mode, page 27-5](#)
- [Displaying the Replication Mode Auto Detection Status, page 27-5](#)
- [Displaying the Replication Mode Capabilities, page 27-5](#)
- [Displaying Subnet Entries, page 27-6](#)
- [Displaying the IPv6 Multicast Summary, page 27-6](#)
- [Displaying the NetFlow Hardware Forwarding Count, page 27-6](#)
- [Displaying the FIB Hardware Bridging and Drop Counts, page 27-7](#)
- [Displaying the Shared and Well-Known Hardware Adjacency Counters, page 27-7](#)

**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
```

## Using show Commands to Verify IPv6 Multicast Layer 3 Switching

```
---- 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       |