CHAPTER 27

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 Cisco 7600 series routers:

- The *Cisco IOS IPv6 Configuration Library*, "Implementing IPv6 Multicast":

  http://www.cisco.com/en/US/docs/ios/ipv6/configuration/guide/ip6-multicast.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 Cisco 7600 series routers:

- Features that Support IPv6 Multicast, page 27-1
- IPv6 Multicast Guidelines and Restrictions, page 27-2
- 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 7, "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

- SSM mapping for IPv6—See this publication:
  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 Cisco 7600 series routers:

- 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 7, “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

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.

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 27-3
- Displaying the Switching Capability, page 27-4
- Verifying the (S,G) Forwarding Capability, page 27-4
- Verifying the (*,G) Forwarding Capability, page 27-4
- Verifying the Subnet Entry Support Status, page 27-4
- Displaying the Replication Mode Capabilities, page 27-5
- Displaying Subnet Entries, page 27-5
- Displaying the IPv6 Multicast Summary, page 27-5
- Displaying the NetFlow Hardware Forwarding Count, page 27-5
- Displaying the FIB Hardware Bridging and Drop Counts, page 27-6
- Displaying the Shared and Well-Known Hardware Adjacency Counters, page 27-6

Note The show commands in the following sections are for a router 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 multicast ipv6 capability** command:

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

Slot Replication-Capability Replication-Mode
   2 Egress                 Egress
   3 Egress                 Egress
   4 Egress                 Egress
   6 Egress                 Egress

PE1-7600#
```

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.
```

Displaying the Replication Mode Capabilities

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

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

Slot Replication-Capability Replication-Mode
   2 Egress                 Egress
   3 Egress                 Egress
   4 Egress                 Egress
   6 Egress                 Egress
```

Displaying Subnet Entries

This example shows how to display subnet entries:

```
Router# show platform software multicast ipv6 connected
IPv6 Multicast Subnet entries
Flags : H - Installed in ACL-TCAM
        X - Not installed in ACL-TCAM due to
            label-full exception
```

Displaying the IPv6 Multicast Summary

This example shows how to display the IPv6 multicast summary:

```
Router# show platform software multicast ipv6 summary module 4
IPv6 Multicast Netflow SC summary on Slot[4]:
Shortcut Type               Shortcut count
----------------------------+--------------
(S, G)                      0
(*, G)                      0

IPv6 Multicast FIB SC summary on Slot[4]:
Shortcut Type               Shortcut count
----------------------------+--------------
(*, G/128)                  0
(*, G/m)                    3
```

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 multicast ipv6 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 multicast ipv6 shared-adjacencies module 4

---- SLOT [4] ----

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      0             0
StarG (spt == INF) adjacency  0xB      0             0
StarG (spt != INF) adjacency  0xC      0             0
Router
```