# IP Switching Configuring Multicast Distributed Switching Configuration Guide, Cisco IOS Release 15M&T


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# Configuring Multicast Distributed Switching

This module describes the required and optional tasks for configuring Multicast Distributed Switching (MDS).

## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

## Information About Multicast Distributed Switching

### Advantages of Multicast Distributed Switching

Prior to MDS, IP multicast traffic was always switched at the Route Processor (RP) in the Route Switch Processor (RSP)-based platforms.

Switching multicast traffic at the RP had the following disadvantages:

- The load on the RP increased. This affected important route updates and calculations (for Border Gateway Protocol (BGP), among others) and could stall the router if the multicast load was substantial.
- The net multicast performance was limited to what a single RP could switch.

MDS solves these problems by performing distributed switching of multicast packets received at the line cards (Versatile Interface Processors [VIPs] in the case of RSP, and line cards in the case of Cisco 12000 series router). The line card is the interface card that houses the VIPs (in the case of RSP) and the line card (in the case of Cisco 12000 series router). MDS is accomplished using a forwarding data structure called a Multicast Forwarding Information Base (MFIB), which is a subset of the routing table. A copy of MFIB runs on each line card and is always kept up to date with the MFIB table of the RP.

MDS can work in conjunction with Cisco Express Forwarding or unicast distributed fast switching (DFS).

Starting with Cisco IOS Release 11.2GS, IP multicast traffic can be distributed switched on RSP-based platforms with VIPs. MDS is the only multicast switching method on the Cisco 12000 series router starting with Cisco IOS Release 11.2(11)GS.

### Multicast Distributed Switching Is Disabled by Default

On the Cisco 7500 series router, the default is IP multicast fast switching. MDS is an option that is available and is disabled by default.

On the Cisco 12000 series routers, MDS is also disabled by default. To switch multicast packets on the Cisco 12000 series router, you need to configure all interfaces for MDS. MDS is the only multicast switching mode for the Cisco 12000 series router.

If MDS is not enabled on an incoming interface that is capable of MDS, incoming multicast packets are not distributed switched; the multicast packets are fast switched at the RP. Also, if the incoming interface is not capable of MDS, packets are fast switched or process-switched at the RP.

If MDS is enabled on the incoming interface, but at least one of the outgoing interfaces cannot fast switch, packets are process switched.

**Note** We recommended that you disable fast switching on any interface when MDS is enabled.

# How to Configure Multicast Distributed Switching

## Configuring Multicast Distributed Switching

Perform the following task to configure MDS. To configure MDS, you must enable it globally and on at least one interface because MDS is an attribute of the interface.

**Note** When you enable an interface to perform distributed switching of incoming multicast packets, you are configuring the physical interface, not the logical interface (subinterface). All subinterfaces are included in the physical interface.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable**<br><br>**Example:**<br><br>`Router> enable` | Enables privileged EXEC mode.<br><br>• Enter your password if prompted. |
| **Step 2** | **configure terminal**<br><br>**Example:**<br><br>`Router# configure termi`<br>`n`<br>`al` | Enters global configuration mode. |
| **Step 3** | **ip multicast-routing distributed**<br><br>**Example:**<br><br>`Router(config)# ip multicast-routing distributed` | Enables IP multicast routing.<br><br>• The **distributed** keyword enables MDS globally. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 4** | **interface** *type number*<br><br>**Example:**<br><br>`Router(config)# interface ethernet 0` | Configures an interface type and enters interface configuration mode.<br><br>• The *type* argument is the type of interface to be configured.<br><br>• The *number* argument is the port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the **show interfaces**command. |
| **Step 5** | **ip route-cache distributed**<br><br>**Example:**<br><br>`Router(config-if)# ip route-cache distributed` | Enables distributed switching on the RSP.<br><br>**Note** This step is required on the RSP platform only. |
| **Step 6** | **ip mroute-cache distributed**<br><br>**Example:**<br><br>`Router(config-if)# ip mroute-cache distributed` | Enables MDS on the interface.<br><br>For Cisco 7500 series routers, this keyword is optional; if it is omitted, fast switching occurs. For Cisco 12000 series, this keyword is required because the Cisco 12000 series does only distributed switching. |
| **Step 7** | Repeat Steps 4 through 6 for each interface that you want to perform MDS. | -- |
| **Step 8** | **end**<br><br>**Example:**<br><br>`Router(config-if)# end` | Exits to privileged EXEC mode. |

# Maintaining Multicast Distributed Switching

## Maintaining Multicast Distributed Switching on the Line Card

Perform the following task to maintain MDS on the line card.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable**<br><br>**Example:**<br><br>`Router> enable` | Enables privileged EXEC mode.<br><br>• Enter your password if prompted. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 2** | **clear ip mds forwarding**<br><br>**Example:**<br><br>`Router# clear ip mds forwarding` | Clears MDS information from the router,<br><br>• Clears the Multicast Forwarding Information Base (MFIB) table of the line card and resynchronizes it with the RP. |
| **Step 3** | **exit**<br><br>**Example:**<br><br>`Router# exit` | Exits to user EXEC mode. |

### Maintaining Multicast Distributed Switching on the Route Processor

Perform the following task to maintain MDS on the RP.

#### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable**<br><br>**Example:**<br><br>`Router> enable` | Enables privileged EXEC mode.<br><br>• Enter your password if prompted. |
| **Step 2** | **clear ip mroute** {***** \| *group* [*source*]}<br><br>**Example:**<br><br>`Router# clear ip mroute *` | Deletes entries from the IP multicast routing table.<br><br>• The *****(asterisk) keyword deletes all entries from the IP multicast routing table.<br><br>• The *group* argument is either of the following:<br><br>  • Name of the multicast group, as defined in the Domain Name System (DNS) hosts table or with the **ip host**command.<br><br>  • IP address of the multicast group. This is a multicast IP address in four-part dotted-decimal notation.<br><br>• The *source* argument is a name or address of a multicast source that is sending to the group. A source need not be a member of the group. If you specify a group name or address, you can also specify a source name or address. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 3** | **clear ip pim interface count**<br><br>**Example:**<br><br>`Router# clear ip pim interface count` | Clears all line card counts or packet counts. |
| **Step 4** | **exit**<br><br>**Example:**<br><br>`Router# exit` | Exits to user EXEC mode. |

## Monitoring Multicast Distributed Switching

### Monitoring Multicast Distributed Switching on the Line Card

Perform the following task to monitor MDS on the line cards.

Remember that to reach a line card's console, enter the **attach** *slot#*command, using the slot number where the line card resides.

```
Router> attach 1
LC-Slot1> enable
LC-Slot1#
```

#### Procedure

**Step 1** **enable**
Use this command to enable privileged EXEC mode. Enter a password, if prompted. For example:

**Example:**

```
Router> enable
Router#
```

**Step 2** **show ip mds forwarding** [*group-address*]
Use this command to display the MFIB table, forwarding information, related flags, and counts. For example:

**Example:**

```
Router# show ip mds forwarding

IP multicast MDFS forwarding information and statistics:
Flags: N - Not MDFS switchable, F - Not all MDFS switchable, O - OIF Null
       R - In-ratelimit, A - In-access, M - MTU mismatch, P - Register set
Interface state: Interface, Next-Hop, Mac header
(*, 224.2.170.73),
 Incoming interface: Null
  Pkts: 0, last used: never, Kbps: 0, fast-flags: N
  Outgoing interface list: Null
```

```
(192.168.62.86, 224.2.170.73) [31]
  Incoming interface: Fddi3/0/0
  Pkts: 3034, last used: 00:00:00, Kbps: 0, fast-flags: M
  Outgoing interface list:
```

**Step 3** **show ip mds summary**

Use this command to display a summary of the MFIB. For example:

**Example:**

```
Router# show ip mds summary
IP multicast MDFS forwarding information and statistics:
Flags: N - Not MDFS switchable, F - Not all MDFS switchable, O - OIF Null
       R - In-ratelimit, A - In-access, M - MTU mismatch, P - Register set
Interface state: Interface, Next-Hop, Mac header
(*, 224.2.170.73),
  Incoming interface: Null
  Pkts: 0, last used: never, Kbps: 0, fast-flags: N
(192.168.62.86, 224.2.170.73) [31]
  Incoming interface: Fddi3/0/0
  Pkts: 3045, last used: 00:00:03, Kbps: 0, fast-flags: M
(192.168.3.7, 224.2.170.73) [334]
  Incoming interface: Fddi3/0/0
  Pkts: 0, last used: never, Kbps: 0, fast-flags: M
```

**Step 4** **exit**

Use this command to exit to user EXEC mode. For example:

**Example:**

```
Router# exit
Router>
```

## Monitoring Multicast Distributed Switching on the Route Processor

Perform the following task to monitor MDS on the RP.

### Procedure

**Step 1** **enable**

Use this command to enable privileged EXEC mode. Enter a password, if prompted. For example:

**Example:**

```
Router> enable
Router#
```

**Step 2** **show ip mds stats** [**switching** | **linecard**]

Use this command to display switching statistics or line card statistics for MDS. This example displays switching statistics:

**Example:**

```
Router# show ip mds stats switching
Slot Total       Switched    Drops      RPF        Punts      Failures
```

```
                                                                  (switch/clone)
 1   0           0           0          0          4          0/0
 3   20260925    18014717    253        93         2247454    1/0
```

This example displays linecard statistics:

**Example:**

```
Router# show ip mds linecard
Slot      Status    IPC(seq/max) Q(high/route)  Reloads
 1        active    10560/10596      0/0            9
 3        active    11055/11091      0/0            9
```

**Step 3** **show mds interface**

Use this command to display MDS interfaces. For example:

**Example:**

```
Router# show mds interface
Interface                SW-Index  HW-Index  HW IDB      FS Vector   VRF
Ethernet1/0/0            2         1         0x60C2DB40  0x602FB7A4 default
Ethernet1/0/1            3         2         0x60C32280  0x603D52B8 default
Ethernet1/0/2            4         3         0x60C35E40  0x602FB7A4 default
Ethernet1/0/3            5         4         0x60C39E60  0x603D52B8 default
Ethernet1/0/4            6         5         0x60C3D780  0x602FB7A4 default
Ethernet1/0/5            7         6         0x60C41140  0x602FB7A4 default
Ethernet1/0/6            8         7         0x60C453A0  0x602FB7A4 default
Ethernet1/0/7            9         8         0x60C48DC0  0x602FB7A4 default
POS2/0/0                 10        9         0x0                    default
POS3/0/0                 11        10        0x0                    default
Virtual-Access1          13        11        0x0                    default
Loopback0                14        12        0x0                    default
Tunnel0                  15        23        0x61C2E480  0x603D52B8  vrf1
Tunnel1                  16        24        0x61C267E0  0x603D52B8  vrf2
Ethernet1/0/3.1          17        4         0x60C39E60  0x603D52B8  vrf1
Ethernet1/0/3.2          18        4         0x60C39E60  0x603D52B8  vrf2
```

**Step 4** **show interface stats**

Use this command to display numbers of packet that were process switched, fast switched, and distributed switched. For example:

**Example:**

```
Router# show interface stats
GigabitEthernet0/0
          Switching path    Pkts In   Chars In   Pkts Out  Chars Out
               Processor          0          0        225      77625
             Route cache          0          0          0          0
  Multi-Processor Fwding        950     221250        500      57000
                 Total          950     221250        725     134625
GigabitEthernet0/1
          Switching path    Pkts In   Chars In   Pkts Out  Chars Out
               Processor          1         60        226      77685
             Route cache          0          0          0          0
  Multi-Processor Fwding        500      57000        500      57000
                 Total          501      57060        726     134685
GigabitEthernet0/2
          Switching path    Pkts In   Chars In   Pkts Out  Chars Out
               Processor          1         60        226      77685
             Route cache          0          0          0          0
  Multi-Processor Fwding          0          0          0          0
                 Total          1          60        226      77685
FastEthernet1/0
          Switching path    Pkts In   Chars In   Pkts Out  Chars Out
               Processor      34015    5331012       1579     158190
```

```
                  Route cache          0          0          0          0
                        Total      34015    5331012       1579     158190
```

**Step 5** **exit**

Use this command to exit to user EXEC mode. For example:

**Example:**

```
Router# exit
Router>
```

# Configuration Examples for Multicast Distributed Switching

## Example Configuring Multicast Distributed Switching

The following example show how to enables MDS:

```
configure terminal
ip multicast-routing distributed
interface pos 1/0/0
 ip route-cache distributed
 ip mroute-cache distributed
 end
```

The **ip route-cache distributed**command is needed on the RSP only, not on the GSR.

## Example Maintaining Multicast Distributed Switching

This section contains the following examples for maintaining MDS:

### Example Maintaining Multicast Distributed Switching on the Line Card

The following example shows how to maintain MDS on the line card:

```
enable
clear ip mds forwarding
exit
```

In this example, the MFIB table of the line card is cleared of entries and resynchronized with the RP.

### Example Maintaining Multicast Distributed Switching on the Route Processor

The following example shows how to maintain MDS on the RP:

```
enable
clear ip mroute *
clear ip pim interface count
exit
```

In this example, all entries are deleted from the IP multicast routing table and all line card counts or packet counts are cleared.

# Additional References

### Related Documents

| Related Topic | Document Title |
|---|---|
| Cisco IOS commands | Cisco IOS Master Commands List, All Releases |
| IP switching commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples. | *Cisco IOS IP Switching Command Reference* |
| Overview of switching paths available on Cisco IOS devices | Cisco IOS Switching Paths Overview |

### Standards

| Standard | Title |
|---|---|
| No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature. | -- |

### MIBs

| MIB | MIBs Link |
|---|---|
| No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature. | To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:<br>http://www.cisco.com/go/mibs |

### RFCs

| RFC | Title |
|---|---|
| No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature. | -- |

**Technical Assistance**

| Description | Link |
|---|---|
| The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password. | http://www.cisco.com/cisco/web/support/index.html |

# Feature Information for Multicast Distributed Switching

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to . An account on Cisco.com is not required.

***Table 1: Feature Information for Configuring Multicast Distributed Switching***

| Feature Name | Releases | Feature Information |
|---|---|---|
| This table is intentionally left blank because no features were introduced or modified in Cisco IOS Release 12.2(1) or later. This table will be updated when feature information is added to this module. | -- | -- |

# Glossary

**Cisco Express Forwarding** --A Layer 3 switching technology. Cisco Express Forwarding can also refer to central Cisco Express Forwarding mode, one of two modes of Cisco Express Forwarding operation. Cisco Express Forwarding enables a Route Processor (RP) to perform express forwarding. Distributed Cisco Express Forwarding is the other mode of Cisco Express Forwarding operation

**line card** --A general term for an interface processor that can be used in various Cisco products. For example, a Versatile Interface Processor (VIP) is a line card for the Cisco 7500 series router.

**MFIB** --Multicast Forwarding Information Base. A protocol-independent multicast forwarding system that contains unique multicast forwarding entries for each source or group pair known in a given network. There is a separate MFIB for every logical network (VPN) in which the router is configured. Each MFIB entry resolves a given source or group pair to an incoming interface (IIF) for reverse forwarding (RPF) checking and an outgoing interface list (olist) for multicast forwarding.

**RP** --Route Processor. The processor module in the Cisco 7000 series routers that contains the CPU, system software, and most of the memory components that are used in the router. It is sometimes called a supervisory processor.

**RSP** --Route Switch Processor. Processor module in the Cisco 7000 series routers that integrates the functions of the Route Processor (RP) and the Switch processor (SP).

**VIP** --Versatile Interface Processor. An interface card used in Cisco 7000 and Cisco 7500 series routers. The VIP provides multilayer switching and runs Cisco IOS.

**Americas Headquarters**
Cisco Systems, Inc.
San Jose, CA 95134-1706
USA

**Asia Pacific Headquarters**
Cisco Systems (USA) Pte. Ltd.
Singapore

**Europe Headquarters**
Cisco Systems International BV
Amsterdam, The Netherlands