Verifying IP Multicast Operation

This module describes how to verify IP multicast operation in a network after Protocol Independent Multicast (PIM) sparse mode (PIM-SM) or Source Specific Multicast (PIM-SSM) has been implemented. The tasks in this module can be used to test IP multicast reachability and to confirm that receivers and sources are operating as expected in an IP multicast network.

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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.

Prerequisites for Verifying IP Multicast Operation

- Before performing the tasks in this module, you should be familiar with the concepts described in the " IP Multicast Technology Overview " module.
- The tasks in this module assume that IP multicast has been enabled and that PIM-SM or SSM has been configured using the relevant tasks described in the " Configuring Basic IP Multicast " module.

Restrictions for Verifying IP Multicast Operation

- For PIM-SM, this module assumes that the shortest path tree (SPT) threshold for PIM-enabled routers is set to the value of zero (the default) and not infinity. For more information about setting the SPT threshold, see the **ip pim spt-threshold** command page in the *Cisco IOS IP Multicast Command Reference*.
- Verifying IP multicast operation in a bidirectional PIM (bidir-PIM) network or a PIM-SM network with a finite or infinite SPT threshold is outside the scope of this module.

Information About Verifying IP Multicast Operation

Guidelines for Verifying IP Multicast Operation in a PIM-SM and PIM-SSM Network Environment

When you verify the operation of IP multicast in a PIM-SM network environment or in an PIM-SSM network environment, a useful approach is to begin the verification process on the last hop router, and then continue the verification process on the routers along the SPT until the first hop router has been reached. The goal of the verification is to ensure that IP multicast traffic is being routed properly through an IP multicast network.

Common Commands Used to Verify IP Multicast Operation on the Last Hop Router for PIM-SM and PIM-SSM

The table describes the common commands used to verify IP multicast operation on the last hop router in PIM-SM and PIM-SSM network environments.

Table 1: Common IP Multicast Verification Commands (Last Hop Router)

Command	Description and Purpose
show ip igmp groups	Displays the multicast groups with receivers that are directly connected to the router and that were learned through the Internet Group Management Protocol (IGMP). • Use this command to confirm that the IGMP cache is being properly populated on the last hop router for the groups that receivers on the LAN have joined.

Command	Description and Purpose
show ip pim rp mapping	Displays all group-to-RP mappings of which the router is aware (either configured or learned from Auto-RP or BSR). • Use this command to confirm that the group-to-RP mappings are being populated correctly on the last hop router. **Note** The **show ip pim rp mapping**command does not work with routers in a PIM-SSM network because PIM-SSM does not use rendezvous points (RPs).
show ip mroute	Displays the contents of the multicast routing (mroute) table. • Use this command to verify that the mroute table is being populated properly on the last hop router.
show ip interface	Displays information and statistics about configured interfaces. • Use this command to verify that IP multicast fast switching is enabled on the outgoing interface on the last hop router.
show ip mfib	Displays the forwarding entries and interfaces in the IP Multicast Forwarding Information Base (MFIB).
show ip pim interface count	Displays statistics related to the number of multicast packets received by and sent out a PIM-enabled interface. • Use this command on the last hop router to confirm that multicast traffic is being forwarded on the last hop router.
show ip mroute active	Displays the rate that active sources are sending to multicast groups, in kilobits per second (kb/s). • Use this command to display information about the multicast packet rate for active sources sending to groups on the last hop router.

Command	Description and Purpose
show ip mroute count	Displays statistics related to mroutes in the mroute table. • Use this command on the last hop router to confirm that multicast traffic is flowing on the last hop router.

Common Commands Used to Verify IP Multicast Operation on Routers Along the SPT for PIM-SM and PIM-SSM

The table describes the common commands used to verify IP multicast operation on routers along the SPT in PIM-SM and PIM-SSM network environments.

Table 2: Common IP Multicast Verification Commands (Routers Along SPT)

Command	Description and Purpose
show ip mroute	Displays the contents of the mroute table. • Use this command to confirm that the Reverse Path Forwarding (RPF) neighbor toward the source is the expected RPF neighbor for each router along the SPT.
show ip mroute active	Displays the rate that active sources are sending to multicast groups, in kb/s. • Use this command to display information about the multicast packet rate for active sources sending to groups on routers along the SPT.

Common Commands Used to Verify IP Multicast Operation on the First Hop Router for PIM-SM and PIM-SSM

The table describes the common commands used to verify IP multicast operation on the first hop router in PIM-SM and PIM-SSM network environments.

Table 3: Common IP Multicast Verification Commands (First Hop Router)

Command	Description and Purpose
show ip mroute	Displays the contents of the mroute table. • Use this command to confirm that the F flag is set for the mroutes on the first hop router.

Command	Description and Purpose
show ip mroute active	Displays the rate that active sources are sending to multicast groups, in kb/s. • Use this command to display information about the multicast packet rate for active sources sending to groups on the first hop router.

How to Verify IP Multicast Operation

Using PIM-Enabled Routers to Test IP Multicast Reachability

Perform the following tasks to use PIM-enabled routers to test IP multicast reachability.

If all the PIM-enabled routers and access servers that you administer are members of a multicast group, pinging that group causes all routers to respond, which can be a useful administrative and debugging tool.

To use PIM-enabled routers to test IP multicast reachability, perform the following tasks:

Configuring Routers to Respond to Multicast Pings

Perform the following task to configure routers to respond to multicast pings. Performing this task configures interfaces on the router to join a specified group. This task should be performed on each interface on the router participating in the multicast network and on all routers participating in the multicast network.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip igmp join-group** *group-address*
5. Repeat Step 3 and Step 4 for each interface on the router participating in the multicast network.
6. **end**

DETAILED STEPS

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

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Router(config)# interface gigabitethernet 1/0/0`	Enters interface configuration mode. • For the *type* and *number* arguments, specify an interface that is directly connected to hosts or is facing hosts.
Step 4	**ip igmp join-group** *group-address* **Example:** `Router(config-if)# ip igmp join-group 225.2.2.2`	(Optional) Configures an interface on the router to join the specified group. • For the purpose of this task, configure the same group address for the *group-address* argument on all interfaces on the router participating in the multicast network. **Note** With this method, the router accepts the multicast packets in addition to forwarding them. Accepting the multicast packets prevents the router from fast switching.
Step 5	Repeat Step 3 and Step 4 for each interface on the router participating in the multicast network.	--
Step 6	**end** **Example:** `Router(config-if)# end`	Ends the current configuration session and returns to privileged EXEC mode.

Pinging Routers Configured to Respond to Multicast Pings

Perform the following task on a router to initiate a ping test to the routers configured to respond to multicast pings. This task is used to test IP multicast reachability in a network.

SUMMARY STEPS

1. **enable**
2. **ping** *group-address*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**ping** *group-address* **Example:** `Router# ping 225.2.2.2`	Pings an IP multicast group address. • A successful response indicates that the group address is functioning.

Verifying IP Multicast Operation in a PIM-SM or a PIM-SSM Network

Perform the following optional tasks to verify IP multicast operation in a PIM-SM or a PIM-SSM network. You can perform the steps in these tasks to locate a faulty hop when sources and receivers are not operating as expected.

Note If packets are not reaching their expected destinations, you might want consider disabling IP multicast fast switching, which would place the router in process switching mode. If packets begin reaching their proper destinations after IP multicast fast switching has been disabled, then the issue most likely was related to IP multicast fast switching. See the " Monitoring and Maintaining IP Multicast " module for information on how to disable IP multicast fast switching.

To verify IP multicast operation in a PIM-SM or PIM-SSM multicast network, perform the following verification tasks:

Verifying IP Multicast Operation on the Last Hop Router

Perform the following task to verify the operation of IP multicast on the last hop router.

Note If you are verifying a last hop router in a PIM-SSM network, ignore Step 3.

SUMMARY STEPS

1. **enable**
2. **show ip igmp groups**
3. **show ip pim rp mapping**
4. **show ip mroute**
5. **show ip interface** [*type number*]
6. **show ip mfib**
7. **show ip pim interface count**
8. **show ip mroute count**
9. **show ip mroute active** [*kb/s*]

DETAILED STEPS

Step 1 **enable**

Enables privileged EXEC mode. Enter your password if prompted.

```
Router> enable
```

Step 2 **show ip igmp groups**

Use this command to verify IGMP memberships on the last hop router. This information will confirm the multicast groups with receivers that are directly connected to the last hop router and that are learned through IGMP.

The following is sample output from the **show ip igmp groups** command:

Example:

```
Router# show ip igmp groups
IGMP Connected Group Membership
Group Address    Interface                Uptime    Expires   Last Reporter
239.1.2.3        GigabitEthernet1/0/0     00:05:14  00:02:14  10.1.0.6
224.0.1.39       GigabitEthernet0/0/0     00:09:11  00:02:08  172.31.100.1
```

Step 3 **show ip pim rp mapping**

Use this command to confirm that the group-to-RP mappings are being populated correctly on the last hop router.

Note Ignore this step if you are verifying a last hop router in a PIM-SSM network. The **show ip pim rp mapping**command does not work with routers in a PIM-SSM network because PIM-SSM does not use RPs. In addition, if configured correctly, PIM-SSM groups should not appear in the output of the **show ip pim rp mapping**command.

The following is sample output from the **show ip pim rp mapping**command:

Example:

```
Router# show ip pim rp mapping
PIM Group-to-RP Mappings

Group(s) 224.0.0.0/4
  RP 172.16.0.1 (?), v2v1
```

```
    Info source: 172.16.0.1 (?), elected via Auto-RP
         Uptime: 00:09:11, expires: 00:02:47
```

Step 4 **show ip mroute**

Use this command to verify that the mroute table is being populated properly on the last hop router.

The following is sample output from the **show ip mroute** command:

Example:

```
Router# show ip mroute
(*, 239.1.2.3), 00:05:14/00:03:04, RP 172.16.0.1, flags: SJC
  Incoming interface: GigabitEthernet0/0/0, RPF nbr 172.31.100.1
  Outgoing interface list:
  GigabitEthernet1/0, Forward/Sparse-Dense, 00:05:10/00:03:04

(10.0.0.1, 239.1.2.3), 00:02:49/00:03:29, flags: T
  Incoming interface: GigabitEthernet0/0/0, RPF nbr 172.31.100.1
  Outgoing interface list:
  GigabitEthernet1/0, Forward/Sparse-Dense, 00:02:49/00:03:04

(*, 224.0.1.39), 00:10:05/stopped, RP 0.0.0.0, flags: DC
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet1/0, Forward/Sparse-Dense, 00:05:15/00:00:00
    GigabitEthernet0/0, Forward/Sparse-Dense, 00:10:05/00:00:00

(172.16.0.1, 224.0.1.39), 00:02:00/00:01:33, flags: PTX
  Incoming interface: GigabitEthernet0/0/0, RPF nbr 172.31.100.1
```

Step 5 **show ip interface** [*type number*]

Use this command to verify that multicast fast switching is enabled for optimal performance on the outgoing interface on the last hop router.

Note Using the **no ip mroute-cache** interface command disables IP multicast fast-switching. When IP multicast fast switching is disabled, packets are forwarded through the process-switched path.

The following is sample output from the **show ip interface**command for a particular interface:

Example:

```
Router# show ip interface GigabitEthernet 0/0/0
GigabitEthernet0/0 is up, line protocol is up
  Internet address is 172.31.100.2/24
  Broadcast address is 255.255.255.255
  Address determined by setup command
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is disabled
  Multicast reserved groups joined: 224.0.0.1 224.0.0.22 224.0.0.13
      224.0.0.5 224.0.0.6
  Outgoing access list is not set
  Inbound  access list is not set
  Proxy ARP is enabled
  Local Proxy ARP is disabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  IP fast switching is enabled
  IP fast switching on the same interface is disabled
  IP Flow switching is disabled
  IP CEF switching is disabled
  IP Fast switching turbo vector
  IP multicast fast switching is enabled
```

```
  IP multicast distributed fast switching is disabled
  IP route-cache flags are Fast
  Router Discovery is disabled
  IP output packet accounting is disabled
  IP access violation accounting is disabled
  TCP/IP header compression is disabled
  RTP/IP header compression is disabled
  Policy routing is disabled
  Network address translation is disabled
  WCCP Redirect outbound is disabled
  WCCP Redirect inbound is disabled
  WCCP Redirect exclude is disabled
  BGP Policy Mapping is disabled
```

Step 6 **show ip mfib**

Use this command to display the forwarding entries and interfaces in the IP Multicast Forwarding Information Base (MFIB).

Example:

Step 7 **show ip pim interface count**

Use this command to confirm that multicast traffic is being forwarded on the last hop router.

The following is sample output from the **show ip pim interface** command with the **count** keyword:

Example:

```
Router# show ip pim interface count

State: * - Fast Switched, D - Distributed Fast Switched
       H - Hardware Switching Enabled
Address          Interface                FS Mpackets In/Out
172.31.100.2     GigabitEthernet0/0/0     *   4122/0
10.1.0.1         GigabitEthernet1/0/0     *   0/3193
```

Step 8 **show ip mroute count**

Use this command to confirm that multicast traffic is being forwarded on the last hop router.

The following is sample output from the **show ip mroute**command with the **count** keyword:

Example:

```
Router# show ip mroute count
IP Multicast Statistics
6 routes using 4008 bytes of memory
3 groups, 1.00 average sources per group
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kilobits per second
Other counts: Total/RPF failed/Other drops(OIF-null, rate-limit etc)

Group: 239.1.2.3, Source count: 1, Packets forwarded: 3165, Packets received: 3165
  RP-tree: Forwarding: 0/0/0/0, Other: 0/0/0
  Source: 10.0.0.1/32, Forwarding: 3165/20/28/4, Other: 0/0/0

Group: 224.0.1.39, Source count: 1, Packets forwarded: 21, Packets received: 120
  Source: 172.16.0.1/32, Forwarding: 21/1/48/0, Other: 120/0/99

Group: 224.0.1.40, Source count: 1, Packets forwarded: 10, Packets received: 10
  Source: 172.16.0.1/32, Forwarding: 10/1/48/0, Other: 10/0/0
```

Step 9 **show ip mroute active** [*kb/s*]

Use this command on the last hop router to display information about active multicast sources sending traffic to groups on the last hop router. The output of this command provides information about the multicast packet rate for active sources.

Note By default, the output of the **show ip mroute** command with the **active** keyword displays information about active sources sending traffic to groups at a rate greater than or equal to 4 kb/s. To display information about active sources sending low-rate traffic to groups (that is, traffic less than 4 kb/s), specify a value of 1 for the *kb/s* argument. Specifying a value of 1 for this argument displays information about active sources sending traffic to groups at a rate equal to or greater than 1 kb/s, which effectively displays information about all possible active source traffic.

The following is sample output from the **show ip mroute**command with the **active** keyword:

Example:

```
Router# show ip mroute active
Active IP Multicast Sources - sending >= 4 kbps

Group: 239.1.2.3, (?)
   Source: 10.0.0.1 (?)
     Rate: 20 pps/4 kbps(1sec), 4 kbps(last 50 secs), 4 kbps(life avg)
```

Verifying IP Multicast on Routers Along the SPT

Perform the following task to verify the operation of IP multicast on routers along the SPT in a PIM-SM or PIM-SSM network.

SUMMARY STEPS

1. **enable**
2. **show ip mroute** [*group-address*]
3. **show ip mroute active**

DETAILED STEPS

Step 1 **enable**

Enables privileged EXEC mode. Enter your password if prompted.

```
Router> enable
```

Step 2 **show ip mroute** [*group-address*]

Use this command on routers along the SPT to confirm the RPF neighbor toward the source for a particular group or groups.

The following is sample output from the **show ip mroute**command for a particular group:

Example:

```
Router# show ip mroute 239.1.2.3
(*, 239.1.2.3), 00:17:56/00:03:02, RP 172.16.0.1, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet0/0/0, Forward/Sparse-Dense, 00:17:56/00:03:02

(10.0.0.1, 239.1.2.3), 00:15:34/00:03:28, flags: T
  Incoming interface: Serial1/0, RPF nbr 172.31.200.1
  Outgoing interface list:
    GigabitEthernet0/0/0, Forward/Sparse-Dense, 00:15:34/00:03:02
```

Step 3 **show ip mroute active**

Use this command on routers along the SPT to display information about active multicast sources sending to groups. The output of this command provides information about the multicast packet rate for active sources.

Note By default, the output of the **show ip mroute** command with the **active** keyword displays information about active sources sending traffic to groups at a rate greater than or equal to 4 kb/s. To display information about active sources sending low-rate traffic to groups (that is, traffic less than 4 kb/s), specify a value of 1 for the *kb/s* argument. Specifying a value of 1 for this argument displays information about active sources sending traffic to groups at a rate equal to or greater than 1 kb/s, which effectively displays information about all possible active source traffic.

The following is sample output from the **show ip mroute** command with the **active** keyword:

Example:

```
Router# show ip mroute active
Active IP Multicast Sources - sending >= 4 kbps

Group: 239.1.2.3, (?)
   Source: 10.0.0.1 (?)
     Rate: 20 pps/4 kbps(1sec), 4 kbps(last 30 secs), 4 kbps(life avg)
```

Verifying IP Multicast on the First Hop Router

Perform the following task to verify the operation of IP multicast on the first hop router.

SUMMARY STEPS

1. **enable**
2. **show ip mroute** [*group-address*]
3. **show ip mroute active** [*kb/s*]

DETAILED STEPS

Step 1 **enable**

Enables privileged EXEC mode.

- Enter your password if prompted.

```
Router> enable
```

Step 2 **show ip mroute** [*group-address*]

Use this command on the first hop router to confirm the F flag has been set for mroutes on the first hop router.

The following is sample output from the **show ip mroute**for a particular group:

Example:

```
Router# show ip mroute 239.1.2.3
(*, 239.1.2.3), 00:18:10/stopped, RP 172.16.0.1, flags: SPF
  Incoming interface: Serial1/0, RPF nbr 172.31.200.2
  Outgoing interface list: Null

(10.0.0.1, 239.1.2.3), 00:18:10/00:03:22, flags: FT
  Incoming interface: GigabitEthernet0/0/0, RPF nbr 0.0.0.0
  Outgoing interface list:
    Serial1/0, Forward/Sparse-Dense, 00:18:10/00:03:19
```

Step 3 **show ip mroute active** [*kb/s*]

Use this command on the first hop router to display information about active multicast sources sending to groups. The output of this command provides information about the multicast packet rate for active sources.

Note By default, the output of the **show ip mroute** command with the **active** keyword displays information about active sources sending traffic to groups at a rate greater than or equal to 4 kb/s. To display information about active sources sending low-rate traffic to groups (that is, traffic less than 4 kb/s), specify a value of 1 for the *kb/s* argument. Specifying a value of 1 for this argument displays information about active sources sending traffic to groups at a rate equal to or greater than 1 kb/s, which effectively displays information about all possible active source traffic.

The following is sample output from the **show ip mroute** command with the **active** keyword:

Example:

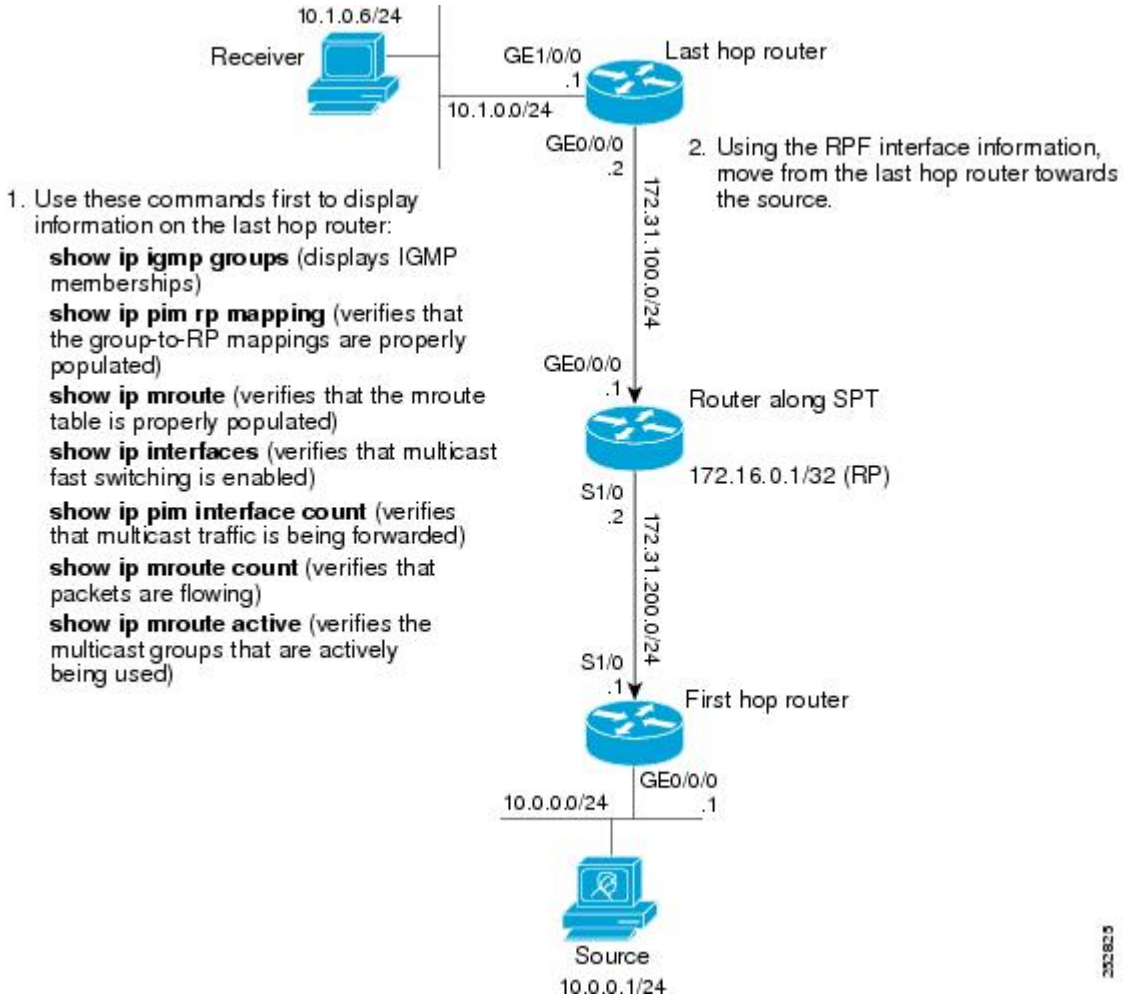
```
Router# show ip mroute active
Active IP Multicast Sources - sending >= 4 kbps

Group: 239.1.2.3, (?)
   Source: 10.0.0.1 (?)
     Rate: 20 pps/4 kbps(1sec), 4 kbps(last 30 secs), 4 kbps(life avg)
```

Configuration Examples for Verifying IP Multicast Operation

Verifying IP Multicast Operation in a PIM-SM or PIM-SSM Network Example

The following example shows how to verify IP multicast operation after PIM-SM has been deployed in a network. The example is based on the PIM-SM topology illustrated in the figure.

From the last hop router to the first hop router shown in the figure, this example shows how to verify IP multicast operation for this particular PIM-SM network topology.



Verifying IP Multicast on the Last Hop Router Example

The following is sample output from the **show ip igmp groups** command. The sample output displays the IGMP memberships on the last hop router shown in the figure. This command is used in this example to confirm that the IGMP cache is being properly populated for the groups that receivers on the LAN have joined.

```
Router# show ip igmp groups
IGMP Connected Group Membership
Group Address    Interface                Uptime    Expires   Last Reporter
239.1.2.3        GigabitEthernet1/0/0     00:05:14  00:02:14  10.1.0.6
224.0.1.39       GigabitEthernet0/0/0     00:09:11  00:02:08  172.31.100.1
```

The following is sample output from the **show ip pim rp mapping**command. In the sample output, notice the RP address displayed for the RP field. Use the RP address and group information to verify that the group-to-RP mappings have been properly populated on the last hop router shown in the figure.

Note In the output, the "(?)" indicates that the router is unable to resolve an IP address to a hostname.

```
Router# show ip pim rp mapping
PIM Group-to-RP Mappings

Group(s) 224.0.0.0/4
  RP 172.16.0.1 (?), v2v1
    Info source: 172.16.0.1 (?), elected via Auto-RP
         Uptime: 00:09:11, expires: 00:02:47
```

The following is sample output from the **show ip mroute** command. This command is used to verify that the mroute table is being properly populated on the last hop router shown in the figure. In the sample output, notice the T flag for the (10.0.0.1, 239.1.2.3) mroute. The T flag indicates that the SPT-bit has been set, which means a multicast packet was received on the SPT tree for this particular mroute. In addition, the RPF nbr field should point toward the RPF neighbor with the highest IP address determined by unicast routing toward the multicast source.

```
Router# show ip mroute
(*, 239.1.2.3), 00:05:14/00:03:04, RP 172.16.0.1, flags: SJC
  Incoming interface: GigabitEthernet0/0/0, RPF nbr 172.31.100.1
  Outgoing interface list:
    Ethernet1/0, Forward/Sparse-Dense, 00:05:10/00:03:04

(10.0.0.1, 239.1.2.3), 00:02:49/00:03:29, flags: T
  Incoming interface: GigabitEthernet0/0/0, RPF nbr 172.31.100.1
  Outgoing interface list:
    Ethernet1/0, Forward/Sparse-Dense, 00:02:49/00:03:04

(*, 224.0.1.39), 00:10:05/stopped, RP 0.0.0.0, flags: DC
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    Ethernet1/0, Forward/Sparse-Dense, 00:05:15/00:00:00
    Ethernet0/0, Forward/Sparse-Dense, 00:10:05/00:00:00
```

The following is sample output from the **show ip interface** command for the incoming interface. This command is used in this example to confirm that IP multicast fast switching is enabled on the last hop router shown in the figure. When IP multicast fast switching is enabled, the line "IP multicast fast switching is enabled" displays in the output.

```
Router# show ip interface GigabitEthernet 0/0/0
GigabitEthernet0/0/0 is up, line protocol is up
  Internet address is 172.31.100.2/24
  Broadcast address is 255.255.255.255
  Address determined by setup command
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is disabled
  Multicast reserved groups joined: 224.0.0.1 224.0.0.22 224.0.0.13
      224.0.0.5 224.0.0.6
  Outgoing access list is not set
  Inbound  access list is not set
  Proxy ARP is enabled
  Local Proxy ARP is disabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  IP fast switching is enabled
  IP fast switching on the same interface is disabled
  IP Flow switching is disabled
  IP CEF switching is disabled
  IP Fast switching turbo vector
  IP multicast fast switching is enabled
  IP multicast distributed fast switching is disabled
```

```
  IP route-cache flags are Fast
  Router Discovery is disabled
  IP output packet accounting is disabled
  IP access violation accounting is disabled
  TCP/IP header compression is disabled
  RTP/IP header compression is disabled
  Policy routing is disabled
  Network address translation is disabled
  WCCP Redirect outbound is disabled
  WCCP Redirect inbound is disabled
  WCCP Redirect exclude is disabled
  BGP Policy Mapping is disabled
```

The following is sample output from the **show ip pim interface count** command. This command is used in this example to confirm that multicast traffic is being forwarded to the last hop router shown in the figure. In the sample output, notice the Mpackets In/Out field. This field displays the number of multicast packets received by and sent on each interface listed in the output.

```
Router# show ip pim interface count

State: * - Fast Switched, D - Distributed Fast Switched
       H - Hardware Switching Enabled
Address          Interface                FS Mpackets In/Out
172.31.100.2     GigabitEthernet0/0/0     *   4122/0
10.1.0.1         GigabitEthernet1/0/0     *   0/3193
```

The following is sample output from the **show ip mroute**command with the **count** keyword. This command is used on the last hop router shown in the figure to verify the packets being sent to groups from active sources. In the sample output, notice the packet count displayed for the Forwarding field. This field displays the packet forwarding count for sources sending to groups.

```
Router# show ip mroute count
IP Multicast Statistics
6 routes using 4008 bytes of memory
3 groups, 1.00 average sources per group
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kilobits per second
Other counts: Total/RPF failed/Other drops(OIF-null, rate-limit etc)

Group: 239.1.2.3, Source count: 1, Packets forwarded: 3165, Packets received: 3165
  RP-tree: Forwarding: 0/0/0/0, Other: 0/0/0
  Source: 10.0.0.1/32, Forwarding: 3165/20/28/4, Other: 0/0/0

Group: 224.0.1.39, Source count: 1, Packets forwarded: 21, Packets received: 120
  Source: 172.16.0.1/32, Forwarding: 21/1/48/0, Other: 120/0/99

Group: 224.0.1.40, Source count: 1, Packets forwarded: 10, Packets received: 10
  Source: 172.16.0.1/32, Forwarding: 10/1/48/0, Other: 10/0/0
```

The following is sample output from the **show ip mroute**command with the **active** keyword. This command is used on the last hop router shown in the figure to confirm the multicast groups with active sources on the last hop router.

Note In the output, the "(?)" indicates that the router is unable to resolve an IP address to a hostname.

```
Router# show ip mroute active
Active IP Multicast Sources - sending >= 4 kbps

Group: 239.1.2.3, (?)
   Source: 10.0.0.1 (?)
     Rate: 20 pps/4 kbps(1sec), 4 kbps(last 50 secs), 4 kbps(life avg)
```

Verifying IP Multicast on Routers Along the SPT Example

The following is sample output from the **show ip mroute**for a particular group. This command is used in this example to verify that the RPF neighbor toward the source is the expected RPF neighbor for the router along the SPT shown in the figure.

```
Router# show ip mroute 239.1.2.3
(*, 239.1.2.3), 00:17:56/00:03:02, RP 172.16.0.1, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    Ethernet0/0, Forward/Sparse-Dense, 00:17:56/00:03:02

(10.0.0.1, 239.1.2.3), 00:15:34/00:03:28, flags: T
  Incoming interface: Serial1/0, RPF nbr 172.31.200.1
  Outgoing interface list:
```

Ethernet0/0, Forward/Sparse-Dense, 00:15:34/00:03:02

The following is sample output from the **show ip mroute** command with the **active** keyword from the router along the SPT shown in the figure. This command is used to confirm the multicast groups with active sources on this router.

Note In the output, the "(?)" indicates that the router is unable to resolve an IP address to a hostname.

```
Router# show ip mroute active
Active IP Multicast Sources - sending >= 4 kbps

Group: 239.1.2.3, (?)
   Source: 10.0.0.1 (?)
     Rate: 20 pps/4 kbps(1sec), 4 kbps(last 30 secs), 4 kbps(life avg)
```

Verifying IP Multicast on the First Hop Router Example

The following is sample output from the **show ip mroute**for a particular group. This command is used in this example to verify the packets being sent to groups from active sources on the first hop router shown in the figure. In the sample output, notice the packet count displayed for the Forwarding field. This field displays the packet forwarding count for sources sending to groups on the first hop router.

Note The RPF nbr 0.0.0.0 field indicates that the source of an mroute has been reached.

```
Router# show ip mroute 239.1.2.3
(*, 239.1.2.3), 00:18:10/stopped, RP 172.16.0.1, flags: SPF
  Incoming interface: Serial1/0, RPF nbr 172.31.200.2
  Outgoing interface list: Null

(10.0.0.1, 239.1.2.3), 00:18:10/00:03:22, flags: FT
  Incoming interface: GigabitEthernet0/0/0, RPF nbr 0.0.0.0
  Outgoing interface list:
    Serial1/0/0, Forward/Sparse-Dense, 00:18:10/00:03:19
```

The following is sample output from the **show ip mroute** command with the **active** keyword from the first hop router shown in the figure:

Note In the output, the "(?)" indicates that the router is unable to resolve an IP address to a host name.

```
Router# show ip mroute active
Active IP Multicast Sources - sending >= 4 kbps

Group: 239.1.2.3, (?)
   Source: 10.0.0.1 (?)
     Rate: 20 pps/4 kbps(1sec), 4 kbps(last 30 secs), 4 kbps(life avg)
```

Additional References

Related Documents

Related Topic	Document Title
Overview of the IP multicast technology area	" IP Multicast Technology Overview " module
PIM-SM and SSM concepts and configuration examples	" Configuring Basic IP Multicast " module
IP multicast commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS IP Multicast Command Reference*

Standards

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

MIBs

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

RFCs

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

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. 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. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/techsupport

Feature Information for Verifying IP Multicast Operation

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 www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 4: Feature Information for Verifying IP Multicast Operation

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