



Configuring MSDP

This chapter describes how to configure Multicast Source Discovery Protocol (MSDP) on a Cisco NX-OS switch.

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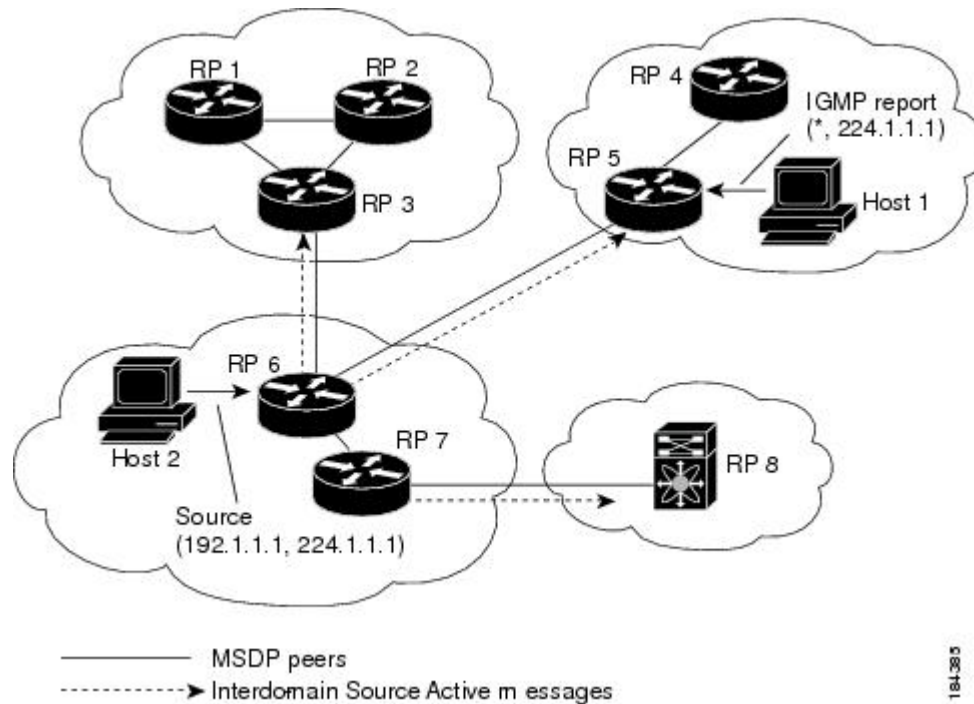
Information About MSDP

You can use MSDP to exchange multicast source information between multiple BGP-enabled Protocol Independent Multicast (PIM) sparse-mode domains. For information about PIM, see For information about BGP, see the *Cisco Nexus 3548 Switch NX-OS Unicast Routing Configuration Guide*.

When a receiver for a group matches the group transmitted by a source in another domain, the rendezvous point (RP) sends PIM join messages in the direction of the source to build a shortest path tree. The designated router (DR) sends packets on the source tree within the source domain, which may travel through the RP in the source domain and along the branches of the source tree to other domains. In domains where there are receivers, RPs in those domains can be on the source tree. The peering relationship is conducted over a TCP connection.

Figure 1 shows four PIM domains. The connected RPs (routers) are called MSDP peers because each RP maintains its own set of multicast sources. Source host 1 sends the multicast data to group 224.1.1.1. On RP 6, the MSDP process learns about the source through PIM register messages and generates Source-Active (SA) messages to its MSDP peers that contain information about the sources in its domain. When RP 3 and RP 5 receive the SA messages, they forward them to their MSDP peers. When RP 5 receives the request from host 2 for the multicast data on group 224.1.1.1, it builds a shortest path tree to the source by sending a PIM join message in the direction of host 1 at 192.1.1.1.

Figure 1: MSDP Peering Between RPs in Different PIM Domains



When you configure MSDP peering between each RP, you create a full mesh. Full MSDP meshing is typically done within an autonomous system, as shown between RPs 1, 2, and 3, but not across autonomous systems. You use BGP to do loop suppression and MSDP peer-RPF to suppress looping SA messages. For more information about mesh groups, see the [MSDP Mesh Groups](#) section.



Note You do not need to configure MSDP in order to use Anycast-RP (a set of RPs that can perform load balancing and failover) within a PIM domain. For more information, see the [Configuring a PIM Anycast-RP Set](#) section.

For detailed information about MSDP, see [RFC 3618](#).

SA Messages and Caching

MSDP peers exchange Source-Active (SA) messages that the MSDP software uses to propagate information about active sources. SA messages contain the following information:

- Source address of the data source
- Group address that the data source uses
- IP address of the RP or the configured originator ID

When a PIM register message advertises a new source, the MSDP process reencapsulates the message in an SA message that is immediately forwarded to all MSDP peers.

The SA cache holds the information for all sources learned through SA messages. Caching reduces the join latency for new receivers of a group because the information for all known groups can be found in the cache.

You can limit the number of cached source entries by configuring the SA limit peer parameter. You can limit the number of cached source entries for a specific group prefix by configuring the group limit global parameter.

The MSDP software sends SA messages for each group in the SA cache every 60 seconds or at the configured SA interval global parameter. An entry in the SA cache is removed if an SA message for that source and group is not received within SA interval plus 3 seconds.

MSDP Peer-RPF Forwarding

MSDP peers forward the SA messages that they receive away from the originating RP. This action is called peer-RPF flooding. The router examines the BGP routing table to determine which peer is the next hop in the direction of the originating RP of the SA message. This peer is called a reverse path forwarding (RPF) peer.

If the MSDP peer receives the same SA message from a non-RPF peer in the direction of the originating RP, it drops the message. Otherwise, it forwards the message to all its MSDP peers.

MSDP Mesh Groups

You can use MSDP mesh groups to reduce the number of SA messages that are generated by peer-RPF flooding. In Figure 6-1, RPs 1, 2, and 3 receive SA messages from RP 6. By configuring a peering relationship between all the routers in a mesh and then configuring a mesh group of these routers, the SA messages that originate at a peer are sent by that peer to all other peers. SA messages received by peers in the mesh are not forwarded. An SA message that originates at RP 3 is forwarded to RP 1 and RP 2, but these RPs do not forward those messages to other RPs in the mesh.

A router can participate in multiple mesh groups. By default, no mesh groups are configured.

Virtualization Support

You can define multiple virtual routing and forwarding (VRF) instances. The MSDP configuration applies to the selected VRF.

You can use the **show** commands with a VRF argument to provide a context for the information displayed. The default VRF is used if no VRF argument is supplied.

For information about configuring VRFs, see the *Cisco Nexus 3548 Switch NX-OS Unicast Routing Configuration Guide*.

Prerequisites for MSDP

MSDP has the following prerequisites:

- You are logged onto the switch.
- For global commands, you are in the correct virtual routing and forwarding (VRF) mode. The default configuration mode shown in the examples in this chapter applies to the default VRF.
- You configured PIM for the networks where you want to configure MSDP.
- You configured BGP for the PIM domains where you want to configure MSDP.

Default Settings for MSDP

Table 1 lists the default settings for MSDP parameters.

Table 1: Default MSDP Parameters

Parameters	Default
Description	Peer has no description
Administrative shutdown	Peer is enabled when it is defined
MD5 password	No MD5 password is enabled
SA policy IN	All SA messages are received
SA policy OUT	All registered sources are sent in SA messages
SA limit	No limit is defined
Originator interface name	RP address of the local system
Group limit	No group limit is defined
SA interval	60 seconds

Configuring MSDP

You can establish MSDP peering by configuring the MSDP peers within each PIM domain.

To configure MSDP peering, follow these steps:

Step 1 Select the routers to act as MSDP peers.

Step 2 Enable the MSDP feature. See the [Enabling the MSDP Feature](#) section.

Step 3 Configure the MSDP peers for each router identified in Step 1. See the [Configuring MSDP Peers](#) section.

Step 4 Configure the optional MSDP peer parameters for each MSDP peer. See the [Configuring MSDP Peer Parameters](#) section.

Step 5 Configure the optional global parameters for each MSDP peer. See the [Configuring MSDP Global Parameters](#) section.

Step 6 Configure the optional mesh groups for each MSDP peer. See the [Configuring MSDP Mesh Groups](#) section.



Note The MSDP commands that you enter before you enable MSDP are cached and then run when MSDP is enabled. Use the **ip msdp peer** or **ip msdp originator-id** command to enable MSDP.

This section includes the following topics:

- [Enabling the MSDP Feature](#)
- [Configuring MSDP Peers](#)
- [Configuring MSDP Peer Parameters](#)
- [Configuring MSDP Global Parameters](#)
- [Remote Multicast Source Support](#)
- [Configuring MSDP Mesh Groups](#)
- [Restarting the MSDP Process](#)



Note If you are familiar with the Cisco IOS CLI, be aware that the Cisco NX-OS commands for this feature might differ from the Cisco IOS commands that you would use.

Enabling the MSDP Feature

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	feature msdp Example: switch# feature msdp	Enables the MSDP feature so that you can enter MSDP commands. By default, the MSDP feature is disabled.
Step 3	(Optional) show running-configuration grep feature Example: switch# show running-configuration grep feature	Shows feature commands that you specified.
Step 4	(Optional) copy running-config startup-config Example: switch(config)# copy running-config startup-config	Saves configuration changes.

Configuring MSDP Peers

You can configure an MSDP peer when you configure a peering relationship with each MSDP peer that resides either within the current PIM domain or in another PIM domain. MSDP is enabled on the router when you configure the first MSDP peering relationship.

Before you begin

Ensure that you have installed the LAN Base Services license and enabled PIM and MSDP.

Ensure that you configured BGP and PIM in the domains of the routers that you will configure as MSDP peers.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: <pre>switch# configure terminal switch(config)#</pre>	Enters configuration mode.
Step 2	ip msdp peer peer-ip-address connect-source interface [remote-as as-number] Example: <pre>switch(config)# ip msdp peer 192.168.1.10 connect-source ethernet 2/1 remote-as 8</pre>	<p>Configures an MSDP peer with the specified peer IP address. The software uses the source IP address of the interface for the TCP connection with the peer. The interface can take the form of <i>type slot/port</i>. If the AS number is the same as the local AS, then the peer is within the PIM domain; otherwise, this peer is external to the PIM domain. By default, MSDP peering is disabled.</p> <p>Note MSDP peering is enabled when you use this command.</p> <p>Note Repeat Step 2 for each MSDP peering relationship by changing the peer IP address, the interface, and the AS number as appropriate.</p>
Step 3	(Optional) show ip msdp summary [vrf vrf-name all] Example: <pre>switch# show ip msdp summary</pre>	Displays a summary of MSDP peers.
Step 4	(Optional) copy running-config startup-config Example: <pre>switch(config)# copy running-config startup-config</pre>	Saves configuration changes.

Configuring MSDP Peer Parameters

You can configure the optional MSDP peer parameters described in Table 2. You configure these parameters in global configuration mode for each peer based on its IP address.

Table 2: MSDP Peer Parameters

Parameter	Description
Description	Description string for the peer. By default, the peer has no description.
Administrative shutdown	Method to shut down the MSDP peer. The configuration settings are not affected by this command. You can use this parameter to allow configuration of multiple parameters to occur before making the peer active. The TCP connection with other peers is terminated by the shutdown. By default, a peer is enabled when it is defined.
MD5 password	MD5-shared password key used for authenticating the peer. By default, no MD5 password is enabled.
SA policy IN	Route-map policy for incoming SA messages. By default, all SA messages are received. Note To configure route-map policies, see the <i>Cisco Nexus 3548 Switch NX-OS Unicast Routing Configuration Guide</i> .
SA policy OUT	Route-map policy for outgoing SA messages. By default, all registered sources are sent in SA messages. Note To configure route-map policies, see the <i>Cisco Nexus 3548 Switch NX-OS Unicast Routing Configuration Guide</i> .
SA limit	Number of (S, G) entries accepted from the peer and stored in the SA cache. By default, there is no limit.

For information about configuring multicast route maps, see the [Configuring Route Maps to Control RP Information Distribution](#) section.



Note For information about configuring mesh groups, see the [Configuring MSDP Mesh Groups, on page 11](#) section.

Before you begin

Ensure that you have installed the LAN Base Services license and enabled PIM and MSDP.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters global configuration mode. Note Use the commands listed from step-2 to configure the MSDP peer parameters.
Step 2	ip msdp description <i>peer-ip-address</i> <i>description</i> Example: switch(config)# ip msdp description 192.168.1.10 peer in Engineering network	Sets a description string for the peer. By default, the peer has no description.
Step 3	ip msdp shutdown <i>peer-ip-address</i> Example: switch(config)# ip msdp shutdown 192.168.1.10	Shuts down the peer. By default, the peer is enabled when it is defined.
Step 4	ip msdp password <i>peer-ip-address password</i> Example: switch(config)# ip msdp password 192.168.1.10 my_md5_password	Enables an MD5 password for the peer. By default, no MD5 password is enabled.
Step 5	ip msdp sa-policy <i>peer-ip-address policy-name</i> in Example: switch(config)# ip msdp sa-policy 192.168.1.10 my_incoming_sa_policy in	Enables a route-map policy for incoming SA messages. By default, all SA messages are received.
Step 6	ip msdp sa-policy <i>peer-ip-address policy-name</i> out Example: switch(config)# ip msdp sa-policy 192.168.1.10 my_outgoing_sa_policy out	Enables a route-map policy for outgoing SA messages. By default, all registered sources are sent in SA messages.
Step 7	ip msdp sa-limit <i>peer-ip-address limit</i> Example: switch(config)# ip msdp sa-limit 192.168.1.10 5000	Sets a limit on the number of (S, G) entries accepted from the peer. By default, there is no limit.
Step 8	(Optional) show ip msdp peer [<i>peer-address</i>] [vrf [<i>vrf-name</i> <i>known-vrf-name</i> all]] Example: switch# show ip msdp peer 192.168.1.10	Displays detailed MDSP peer information.

	Command or Action	Purpose
Step 9	(Optional) <code>copy running-config startup-config</code> Example: <code>switch(config)# copy running-config startup-config</code>	Saves configuration changes.

Configuring MSDP Global Parameters

You can configure the optional MSDP global parameters described in Table 3:

Table 3: MSDP Global Parameters

Parameter	Description
Originator interface name	IP address used in the RP field of an SA message entry. When Anycast RPs are used, all RPs use the same IP address. You can use this parameter to define a unique IP address for the RP of each MSDP peer. By default, the software uses the RP address of the local system.
Group limit	Maximum number of (S, G) entries that the software creates for the specified prefix. The software ignores groups when the group limit is exceeded and logs a violation. By default, no group limit is defined.
SA interval	Interval at which the software transmits Source-Active (SA) messages. The range is from 60 to 65,535 seconds. The default is 60 seconds.

Before you begin

Ensure that you have installed the LAN Base Services license and enabled PIM and MSDP.

Procedure

	Command or Action	Purpose
Step 1	<code>configure terminal</code> Example: <code>switch# configure terminal</code> <code>switch(config)#</code>	Enters configuration mode.
Step 2	<code>ip msdp originator-id interface</code> Example: <code>switch(config)# ip msdp originator-id loopback0</code>	Sets a description string for the peer. By default, the peer has no description. Sets the IP address used in the RP field of an SA message entry. By default, the software uses the RP address of the local system.

	Command or Action	Purpose
		Note We recommend that you use a loopback interface for the RP address.
Step 3	ip msdp group-limit <i>limit source source-prefix</i> Example: switch(config)# ip msdp group-limit 1000 source 192.168.1.0/24	Maximum number of (S, G) entries that the software creates for the specified prefix. The software ignores groups when the group limit is exceeded and logs a violation. By default, no group limit is defined.
Step 4	ip msdp sa-interval <i>seconds</i> Example: switch(config)# ip msdp sa-interval 80	Interval at which the software transmits Source-Active (SA) messages. The range is from 60 to 65,535 seconds. The default is 60 seconds.
Step 5	(Optional) show ip msdp summary [<i>vrf vrf-name</i> <i>all</i>] Example: switch(config)# show ip msdp summary	Displays a summary of the MSDP configuration.
Step 6	(Optional) copy running-config startup-config Example: switch(config)# copy running-config startup-config	Saves configuration changes.

Remote Multicast Source Support

If multicast traffic is received from a source which is not attached, the (S,G) route is not formed and all traffic continuously hits the CPU. You can enable this feature to avoid sending traffic to the CPU and the traffic is then handled in the hardware with the configured mroute.

When this feature is enabled, static mroute to the source is configured using the **ip mroute** *src-ip next-hop* command and when the prebuild spt is enabled using the **ip pim pre-build-spt** command, the (S,G) route is formed without traffic hitting the CPU. Also, for these sources, register messages are sent periodically and MSDP SA messages are sent to the peer.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters configuration mode.

	Command or Action	Purpose
Step 2	ip mfwf mstatic register Example: switch(config)# ip mfwf mstatic register	Enables the remote multicast source support.
Step 3	(Optional) copy running-config startup-config Example: switch(config)# copy running-config startup-config	Saves configuration changes.

Configuring MSDP Mesh Groups

You can configure optional MSDP mesh groups in global configuration mode by specifying each peer in the mesh. You can configure multiple mesh groups on the same router and multiple peers per mesh group.

Before you begin

Ensure that you have installed the LAN Base Services license and enabled PIM and MSDP.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	ip msdp mesh-group peer-ip-addr mesh-name Example: switch(config)# ip msdp mesh-group 192.168.1.10 my_mesh_1	Configures an MSDP mesh with the peer IP address specified. You can configure multiple meshes on the same router and multiple peers per mesh group. By default, no mesh groups are configured. Note Repeat Step 2 for each MSDP peer in the mesh by changing the peer IP address.
Step 3	(Optional) show ip msdp mesh-group [mesh-group] [vrf [vrf-name known-vrf-name all]] Example: switch# show ip msdp mesh-group	Displays information about the MSDP mesh group configuration.
Step 4	(Optional) copy running-config startup-config Example: switch(config)# copy running-config startup-config	Saves configuration changes.

Restarting the MSDP Process

You can restart the MSDP process and optionally flush all routes.

Before you begin

Ensure that you have installed the LAN Base Services license and enabled PIM and MSDP.

Procedure

	Command or Action	Purpose
Step 1	restart msdp Example: switch# restart msdp	Restarts the MSDP process.
Step 2	configure terminal Example: switch# configure terminal switch(config)#	Enters configuration mode.
Step 3	ip msdp flush-routes Example: switch(config)# ip msdp flush-routes	Removes routes when the MSDP process is restarted. By default, routes are not flushed.
Step 4	(Optional) show running-configuration include flush-routes Example: switch(config)# show running-configuration include flush-routes	Shows flush-routes configuration lines in the running configuration.
Step 5	(Optional) copy running-config startup-config Example: switch(config)# copy running-config startup-config	Saves configuration changes.

Verifying the MSDP Configuration

To display the MSDP configuration information, perform one of the following tasks.

Command	Description
show ip msdp count [<i>as-number</i>] [vrf <i>vrf-name</i> <i>known-vrf-name</i> all]	Displays MSDP (S, G) entry and group counts by the autonomous system (AS) number.
show ip msdp mesh-group [<i>mesh-group</i>] [vrf <i>vrf-name</i> all]	Displays the MSDP mesh group configuration.

Command	Description
show ip msdp peer [<i>peer-address</i>] [vrf <i>vrf-name</i> <i>known-vrf-name</i> all]	Displays MSDP information for the MSDP peer.
show ip msdp rpf [<i>peer-address</i>] [vrf <i>vrf-name</i> <i>known-vrf-name</i> all]	Displays the next-hop AS on the BGP path to an RP address.
show ip msdp sources [<i>peer-address</i>] [vrf <i>vrf-name</i> <i>known-vrf-name</i> all]	Displays the MSDP-learned sources and violations of configured group limits.
show ip msdp summary [<i>peer-address</i>] [vrf <i>vrf-name</i> <i>known-vrf-name</i> all]	Displays a summary of the MSDP peer configuration.
show ip igmp snooping	Displays whether vPC multicast optimization is enabled or disabled.

For detailed information about the fields in the output from these commands, see the [Cisco Nexus 3000 Series NX-OS Multicast Routing Command Reference](#).

Displaying Statistics

You can display and clear MSDP statistics by using the features in this section.

Displaying Statistics

You can display MSDP statistics using the commands listed in Table 4.

Table 4: MSDP Statistics Commands

Command	Purpose
show ip msdp policy statistics sa-policy <i>peer-address</i> { in out } [vrf <i>vrf-name</i> <i>known-vrf-name</i> all]	Displays the MSDP policy statistics for the MSDP peer.
show ip msdp { sa-cache route } [<i>source-address</i>] [<i>group-address</i>] [vrf <i>vrf-name</i> <i>known-vrf-name</i> all] [<i>asn-number</i>] [peer <i>peer-address</i>]	Displays the MSDP SA route cache. If you specify the source address, all groups for that source are displayed. If you specify a group address, all sources for that group are displayed.

Clearing Statistics

You can clear the MSDP statistics using the commands listed in Table 5.

Table 5: Clear Statistics Commands

Command	Description
<code>clear ip msdp peer [peer-address] [vrf vrf-name known-vrf-name]</code>	Clears the TCP connection to an MSDP peer.
<code>clear ip msdp policy statistics sa-policy peer-address {in out} [vrf vrf-name known-vrf-name]</code>	Clears statistics counters for MSDP peer SA policies.
<code>clear ip msdp statistics [peer-address] [vrf vrf-name known-vrf-name]</code>	Clears statistics for MSDP peers.
<code>clear ip msdp {sa-cache route} [group-address] [vrf vrf-name known-vrf-name all]</code>	Clears the group entries in the SA cache.

Configuration Examples for MSDP

To configure MSDP peers, some of the optional parameters, and a mesh group, follow these steps for each MSDP peer:

1. Configure the MSDP peering relationship with other routers.

```
switch# configure terminal
switch(config)# ip msdp peer 192.168.1.10 connect-source ethernet 1/0 remote-as 8
```

2. Configure the optional peer parameters.

```
switch# configure terminal
switch(config)# ip msdp password 192.168.1.10 my_peer_password_AB
```

3. Configure the optional global parameters.

```
switch# configure terminal
switch(config)# ip msdp sa-interval 80
```

4. Configure the peers in each mesh group.

```
switch# configure terminal
switch(config)# ip msdp mesh-group 192.168.1.10 mesh_group_1
```

The following example shows how to configure a subset of the MSDP peering that is shown below.

RP 3: 192.168.3.10 (AS 7)

```
configure terminal
ip msdp peer 192.168.1.10 connect-source ethernet 1/1
ip msdp peer 192.168.2.10 connect-source ethernet 1/2
ip msdp peer 192.168.6.10 connect-source ethernet 1/3 remote-as 9
ip msdp password 192.168.6.10 my_peer_password_36
ip msdp sa-interval 80
ip msdp mesh-group 192.168.1.10 mesh_group_123
ip msdp mesh-group 192.168.2.10 mesh_group_123
```

```
ip msdp mesh-group 192.168.3.10 mesh_group_123
```

RP 5: 192.168.5.10 (AS 8)

```
configure terminal
ip msdp peer 192.168.4.10 connect-source ethernet 1/1
ip msdp peer 192.168.6.10 connect-source ethernet 1/2 remote-as 9
ip msdp password 192.168.6.10 my_peer_password_56
ip msdp sa-interval 80
```

RP 6: 192.168.6.10 (AS 9)

```
configure terminal
ip msdp peer 192.168.7.10 connect-source ethernet 1/1
ip msdp peer 192.168.3.10 connect-source ethernet 1/2 remote-as 7
ip msdp peer 192.168.5.10 connect-source ethernet 1/3 remote-as 8
ip msdp password 192.168.3.10 my_peer_password_36
ip msdp password 192.168.5.10 my_peer_password_56
ip msdp sa-interval 80
```

This example shows how to display information about IGMP snooping information on a switch that runs Cisco NX-OS Release 5.0(3)U2(1) and shows the status of multicast optimization on a virtual Port Channel (vPC):

```
switch# show ip igmp snooping
Global IGMP Snooping Information:
IGMP Snooping enabled
Optimised Multicast Flood (OMF) disabled
IGMPv1/v2 Report Suppression enabled
IGMPv3 Report Suppression disabled
Link Local Groups Suppression enabled
VPC Multicast optimization disabled
IGMP Snooping information for vlan 1
IGMP snooping enabled
Optimised Multicast Flood (OMF) disabled
IGMP querier present, address: 10.1.1.7, version: 2, interface Ethernet1/13
Switch-querier disabled
IGMPv3 Explicit tracking enabled
IGMPv2 Fast leave disabled
IGMPv1/v2 Report suppression enabled
IGMPv3 Report suppression disabled
Link Local Groups suppression enabled
Router port detection using PIM Hellos, IGMP Queries
Number of router-ports: 1
Number of groups: 0
Active ports:
Eth1/11 Eth1/13
switch#
```

Additional References

For additional information related to implementing MSDP, see the following sections:

- [Related Documents](#)
- [Standards](#)
- [Appendix A, IETF RFCs for IP Multicast](#)

Related Documents

Related Topic	Document Title
CLI commands	Cisco Nexus 3000 Series NX-OS Multicast Routing Command Reference

Standards

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