Configuring MSDP

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

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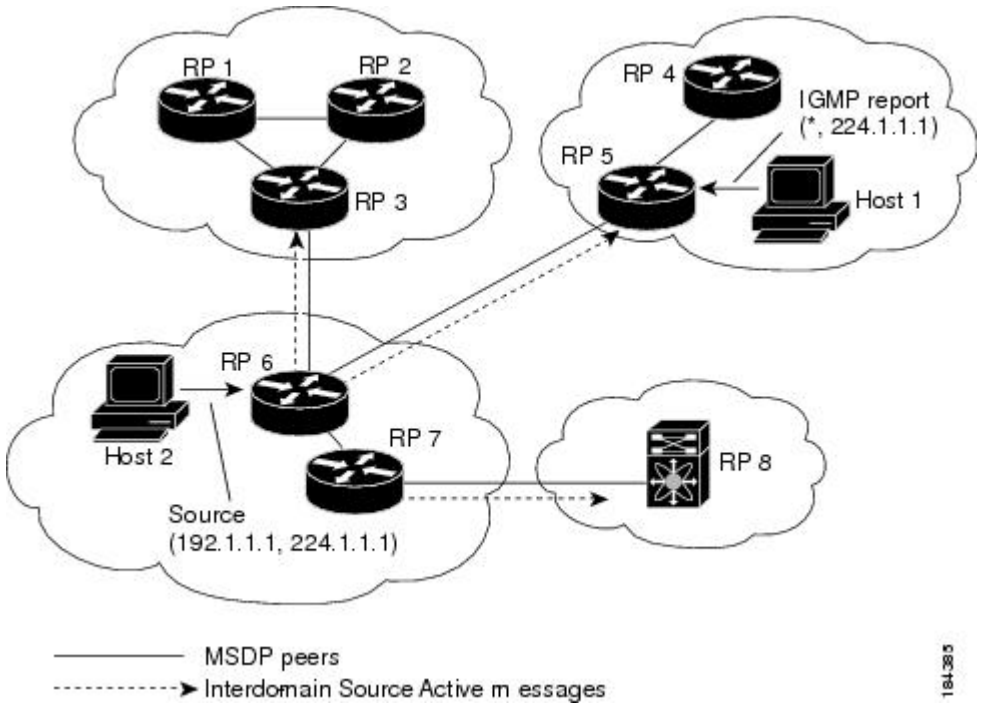
Information About MSDP

You can use the Multicast Source Discovery Protocol (MSDP) to exchange multicast source information between multiple BGP-enabled Protocol Independent Multicast (PIM) sparse-mode domains. In addition, MSDP can be used to create an Anycast-RP configuration to provide RP redundancy and load sharing. For information about PIM, see *Configuring PIM and PIM6*. For information about BGP, see the *Cisco Nexus 7000 Series NX-OS Unicast Routing Configuration Guide*.

When a receiver joins a group that is 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.

The following figure shows four PIM domains. The connected RPs (routers) are called MSDP peers because they are exchanging active source information with each other. Each MSDP peer advertises its own set of multicast source information to the other peers. Source Host 2 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 1 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 2 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.

Note You do not need to configure BGP in order to use Anycast-RP (a set of RPs that can perform load balancing and failover) within a PIM domain.

Note You can use PIM Anycast (RFC 4610) to provide the Anycast-RP function instead of MSDP. For information about PIM, see *Configuring PIM and PIM6*.

For detailed information about MSDP, see RFC 3618.

SA Messages and Caching

MSDP peers exchange Source-Active (SA) messages 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 SA cache is enabled by default and cannot be disabled.

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 or MBGP 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. 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.

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

Virtualization Support

A virtual device context (VDC) is a logical representation of a set of system resources. Within each VDC, you can define multiple virtual routing and forwarding (VRF) instances. The MSDP configuration applies to the VRF selected within the current VDC.

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 VDCs, see the *Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide*.

For information about configuring VRFs, see the *Cisco Nexus 7000 Series NX-OS Unicast Routing Configuration Guide*.

Prerequisites for MSDP

MSDP has the following prerequisites:

- You are logged onto the device.

- You are in the correct virtual device context (VDC). A VDC is a logical representation of a set of system resources. You can use the **switchto vdc** command with a VDC number.
- 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.

Default Settings for MSDP

This table lists the default settings for the 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.

1. Select the routers to act as MSDP peers.
2. Enable the MSDP feature.
3. Configure the MSDP peers for each router identified in Step 1.
4. Configure the optional MSDP peer parameters for each MSDP peer.
5. Configure the optional global parameters for each MSDP peer.
6. Configure the optional mesh groups for each MSDP peer.

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.

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

Before you begin

Before you can access the MSDP commands, you must enable the MSDP feature.

Procedure

	Command or Action	Purpose

Step 1	**config t**
	Example:
	`switch# config t`
	`switch(config)#`
		Enters global 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	**show running-configuration | grep** *feature* **Example:** `switch# show running-configuration | grep feature`	(Optional) Displays feature commands that you specified.
Step 4	**copy running-config startup-config** *feature* **Example:** `switch(config)# copy running-config startup-config`	(Optional) 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 configured PIM in the domains of the routers that you will configure as MSDP peers.

Procedure

	Command or Action	Purpose

Step 1	**config t**
	Example:
	`switch# config t`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**ip msdp peer** *peer-ip-address* **connect-source** *interface* [**remote-as** *as-number*]
	Example:
	`switch(config)# ip msdp peer 192.168.1.10 connect-source ethernet 2/1`
	`remote-as 8`
		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 *type slot/port*. 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.
		Note
		MSDP peering is enabled when you use this command.

Step 3	Repeat Step 2 for each MSDP peering relationship by changing the peer IP address, the interface, and the AS number as appropriate.	—
Step 4	**show ip msdp summary** [**vrf** *vrf-name* | *known-vrf-name* | **all**] **Example:** `switch# show ip msdp summary`	(Optional) Displays a summary of MDSP peers.
Step 5	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves configuration changes.

Configuring MSDP Peer Parameters

You can configure the optional MSDP peer parameters described in this table. 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.

Parameter	Description
Administrative shutdown	Method to shut down the MSDP peer. The configuration settings are not aff use this parameter to allow configuration of multiple parameters to occur be TCP connection with other peers is terminated by the shutdown. By default, a
MD5 password	MD5-shared password key used for authenticating the peer. By default, no
SA policy IN	Route-map policy[1] for incoming SA messages. By default, all SA messages
SA policy OUT	Route-map policy[2] for outgoing SA messages. By default, all registered sou
SA limit	Number of (S, G) entries accepted from the peer and stored in the SA cache

1 To configure route-map policies, see the *Cisco Nexus 7000 Series NX-OS Unicast Routing Configuration Guide.*

2 To configure route-map policies, see the *Cisco Nexus 7000 Series NX-OS Unicast Routing Configuration Guide.*

Note Only the **match ip multicast group** command is supported for MSDP SA policy. The **match ip address** command for matching an ACL is not supported.

Procedure

	Command or Action	Purpose

Step 1	**config t**
	Example:
	`switch# config t`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**Option** / **Description**
	`ip msdp description` *`peer-ip-address`*
	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.
	`ip msdp shutdown` *`peer-ip-address`*
	Example:
	`switch(config)# ip msdp shutdown 192.168.1.10`
	Shuts down the peer. By default, the peer is enabled when it is defined.
		The following commands configure the MSDP peer parameters.

	Command or Action		Purpose
	Option	**Description**	
	ip msdp password *peer-ip-address password* 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.	
	ip msdp sa-policy *peer-ip-address policy-name* **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.	
	ip msdp sa-policy *peer-ip-address policy-name* **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.	
	ip msdp sa-limit *peer-ip-address limit* **out** 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 3	**show ip msdp peer** [*peer-address*] [**vrf** *vrf-name* | *known-vrf-name* | **all**] **Example:** `switch# show ip msdp peer 1.1.1.1`		(Optional) Displays detailed MDSP peer information.

	Command or Action	Purpose
Step 4	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves configuration changes.

Configuring MSDP Global Parameters

You can configure the optional MSDP global parameters described in this table.

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. **Note** We recommend that you use a loopback interface for the RP address.
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.

Procedure

	Command or Action	Purpose

Step 1	**config t**
	Example:
	`switch# config t`
	`switch(config)#`
		Enters global configuration mode.

Step 2		

Option	Description
ip msdp originator-id *interface*	Sets a description string for the peer. By default,

<table>
<tr><th></th><th colspan="2">Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td colspan="2"><table>
<tr><th>Option</th><th>Description</th></tr>
<tr><td>Example:
<pre>switch(config)# ip msdp originator-id loopback0</pre></td><td>the peer has no description.
Sets the IP address used in the RP field of an SA message entry. The interface can take the form of type slot/port. By default, the software uses the RP address of the local system.
Note
We recommend that you use a loopback interface for the RP address.</td></tr>
<tr><td>ip msdp group-limit limit source source-prefix
Example:
<pre>switch(config)# ip msdp group-limit 1000 source 192.168.1.0/24</pre></td><td>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.</td></tr>
<tr><td>ip msdp sa-interval seconds
Example:
<pre>switch(config)# ip msdp sa-interval 80</pre></td><td>Interval at which the software transmits Source-Active (SA) messages. The range is from 60 to 65,535 seconds. The default is 60 seconds.</td></tr>
</table></td></tr>
<tr><td>Step 3</td><td>show ip msdp summary [vrf vrf-name | known-vrf-name | all]
Example:
<pre>switch# show ip msdp summary</pre></td><td>(Optional) Displays a summary of the MDSP configuration.</td></tr>
<tr><td>Step 4</td><td>copy running-config startup-config
Example:
<pre>switch(config)# copy running-config startup-config</pre></td><td>(Optional) Saves configuration changes.</td></tr>
</table>

Configuring MSDP Mesh Groups

You can configure optional MDSP 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.

Procedure

	Command or Action	Purpose

Step 1	**config t**
	Example:
	`switch# config t`
	`switch(config)#`
		Enters global 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.
Step 3	Repeat Step 2 for each MSDP peer in the mesh by changing the peer IP address.	—
Step 4	**show ip msdp mesh-group** [*mesh-group*] [**vrf** *vrf-name* | *known-vrf-name* | **all**] **Example:** `switch# show ip msdp summary`	(Optional) Displays information about the MDSP mesh group configuration.
Step 5	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves configuration changes.

Restarting the MSDP Process

Before you begin

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

Procedure

	Command or Action	Purpose
Step 1	**restart msdp** **Example:** `switch# restart msdp`	Restarts the MSDP process.

	Command or Action	Purpose

Step 2	**config t**
	Example:
	`switch# config t`
	`switch(config)#`
		Enters global 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	**show running-configuration | include flush-routes** **Example:** `switch(config)# show running-configuration | include flush-routes`	(Optional) Shows flush-routes configuration lines in the running configuration.
Step 5	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves configuration changes.

Verifying the MSDP Configuration

To display the MSDP configuration, perform one of the following tasks:

Command	Description
show ip msdp count [*as-number*] [**vrf** *vrf-name* | *known-vrf-name* | **all**]	Displays MSDP (S, G) entry and group counts by the AS number.
show ip msdp mesh-group [*mesh-group*] [**vrf** *vrf-name* | *known-vrf-name* | **all**]	Displays the MSDP mesh group configuration.
show ip msdp peer [*peer-address*] [**vrf** *vrf-name* | *known-vrf-name* | **all**]	Displays MSDP information for the MSDP peer.
show ip msdp rpf [*rp-address*] [**vrf** *vrf-name* | *known-vrf-name* | **all**]	Displays next-hop AS on the BGP path to an RP address.
show ip msdp sources [**vrf** *vrf-name* | *known-vrf-name* | **all**]	Displays the MSDP-learned sources and violations of configured group limits.
show ip msdp summary [**vrf** *vrf-name* | *known-vrf-name* | **all**]	Displays a summary of the MSDP peer configuration.

For detailed information about the fields in the output from these commands, see *Cisco Nexus 7000 Series NX-OS Multicast Routing Command Reference*.

Monitoring MSDP

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 this table.

Command	Description
show ip msdp [*as-number*] **internal event-history** {**errors** | **messages**}	Displays memory allocation statistics.
show ip msdp policy statistics sa-policy *peer-address* { **in** | **out**} [**vrf** *vrf-name* | *known-vrf-name* | **all**]	Displays the MSDP policy statistics for the MSDP peer.
show ip msdp {**sa-cache** | **route**} [*source-address*] [*group-address*] **vrf** *vrf-name* | *known-vrf-name* | **all**] [*asn-number*] [**peer***peer-address*]	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 this table.

Table 4: MSDP Clear Statistics Commands

Command	Description
clear ip msdp peer [*peer-address*] [**vrf** *vrf-name* | *known-vrf-name*]	Clears the TCP connection to an MSDP peer.
clear ip msdp policy statistics sa-policy*peer-address* {**in** | **out** } [**vrf** *vrf-name* | *known-vrf-name*]	Clears statistics counters for MSDP peer SA policies.
clear ip msdp statistics*peer-address* [**vrf** *vrf-name* | *known-vrf-name*]	Clears statistics for MSDP peers.
clear ip msdp {**sa-cache** | **route**} [*group -address*] [**vrf** *vrf-name* | *known-vrf-name*] **all**]	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# config t
switch(config)# switch(config)# ip msdp peer 192.168.1.10 connect-source ethernet 1/0
remote-as 8
```

2. Configure the optional peer parameters.

```
switch# config t
switch(config)# ip msdp password 192.168.1.10 my_peer_password_AB
```

3. Configure the optional global parameters.

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

4. Configure the peers in each mesh group.

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

This example shows how to configure a subset of the MSDP peering.

RP 3: 192.168.3.10 (AS 7)

```
config t
  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)

```
config t
  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)

```
config t
  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
```

Related Documents

Related Topic	Document Title
VDCs	*Cisco Nexus 7000 Series NX-OS Virtual Device Context C Reference*
CLI Commands	*Cisco Nexus 7000 Series NX-OS Multicast Routing Comma*
Configuring Policy Based Routing and MBGP	*Cisco Nexus 7000 Series NX-OS Unicast Routing Configu*

Standards

Standards	Title
RFC 4624	Multicast Source Discovery Protocol (MSDP) MIB