



Implementing Layer 2 Multicast

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Implementing IGMP Snooping

IGMP snooping provides a way to constrain multicast traffic at Layer 2.

Table 1: Feature History Table

Feature Name	Release Information	Feature Description
IGMP snooping	Release 24.4.1	Introduced in this release on: Fixed Systems (8200 [ASIC: P100]), (8700 [ASIC: K100])(select variants only*). IGMP Snooping is used in Layer 2 multicast to optimize the distribution of multicast traffic. IGMP membership report messages are examined from hosts to determine which interfaces are connected to devices interested in receiving multicast traffic. This helps in reducing unnecessary traffic by ensuring that multicast data is only sent to ports with interested receivers, rather than flooding the entire VLAN. The benefit of IGMP snooping is bandwidth optimization that limits multicast traffic to only the necessary ports. *This feature is supported on: • 8212-48FH-M • 8712-MOD-M • 8711-32FH-M

Internet Group Management Protocol (IGMP) snooping restricts multicast flows at Layer 2 to only those segments with at least one interested receiver. This module describes how to implement IGMP snooping.



Note Multicast traffic without Spanning-Tree protocol is supported at Layer 2 for multicast traffic without snooping enabled.

Prerequisites for IGMP Snooping

Before implementing IGMP snooping, make sure that the network is configured with a Layer 2 VPN (L2VPN).

Supported Features and Restrictions for IGMP Snooping

- EVPN dual-homed Active Active (AA) IGMP State Sync using IGMP snooping profile is not supported.
- IGMP snooping is supported only under L2VPN bridge domains.

- Explicit host tracking (an IGMPv3 snooping feature) is not supported.
- IGMPv1 is not supported.
- ISSU is not supported on Layer 2 Multicast.
- IGMPv3-exclude is not supported in EVPN multi-homing or proxy scenarios.
- PIM control packets are supported when snooping is enabled.

Information About IGMP Snooping

IGMP Snooping Overview

Description of Basic Functions

IGMP snooping provides a way to constrain multicast traffic at Layer 2. By snooping the IGMP membership reports sent by hosts in the bridge domain, the IGMP snooping application can set up Layer 2 multicast forwarding tables to deliver traffic only to ports with at least one interested member, significantly reducing the volume of multicast traffic.

Configured at Layer 3, IGMP provides a means for hosts in an IPv4 multicast network to indicate which multicast traffic they are interested in and for routers to control and limit the flow of multicast traffic in the network at Layer 3.

IGMP snooping uses the information in IGMP membership report messages to build corresponding information in the forwarding tables to restrict IP multicast traffic at Layer 2. The forwarding table entries are in the form <Route, OIF List>, where:

- Route is a <*, G> route or <S, G> route, where * is any source, G is group and S is the source.
- OIF List comprises all bridge ports that have sent IGMP membership reports for the specified route plus all multicast router (mrouter) ports in the bridge domain.

Implemented in a multicast network, IGMP snooping has the following attributes:

- In its basic form, it reduces bandwidth consumption by reducing multicast traffic that would otherwise flood an entire VPLS bridge domain.
- With the use of some optional configurations, it provides security between bridge domains by filtering the IGMP reports received from hosts on one bridge port and preventing leakage towards the hosts on other bridge ports.
- Using optional configurations, reduces the traffic impact on upstream IP multicast routers by suppressing IGMP membership reports (IGMPv2) or by acting as an IGMP proxy reporter (IGMPv3) to the upstream IP multicast router.

High Availability Features

All high availability features apply to the IGMP snooping processes with no additional configuration beyond enabling IGMP snooping. The following high availability features are supported:

- Process restarts

- RP Failover
- Non-Stop Forwarding (NSF)—Forwarding continues unaffected while the control plane is restored following a process restart or route processor (RP) failover.
- Line card online insertion and removal (OIR)

Bridge Domain Support

IGMP snooping operates at the bridge domain level. When IGMP snooping is enabled on a bridge domain, the snooping functionality applies to all ports under the bridge domain, including:

- Physical ports under the bridge domain.
- Ethernet flow points (EFPs)—An EFP can be a VLAN, VLAN range, list of VLANs, or an entire interface port.
- Ethernet bundles—Ethernet bundles include IEEE 802.3ad link bundles and Cisco EtherChannel bundles. From the perspective of the IGMP snooping application, an Ethernet bundle is just another EFP. The forwarding application in the router randomly nominates a single port from the bundle to carry the multicast traffic.



Note The **efp-visibility** configuration is required when a bridge has attachment circuits as VLAN sub-interfaces from the same bundle-ether or physical interface.

IGMP snooping for bridge domains without Bridged Virtual Interface (BVI) is supported with the following design consideration:

You must configure **multicast-source ipv4** under L2VPN if snooping is enabled and multicast traffic source is located behind the AC port.

Configuration Example:

```
Router(config)# l2vpn
Router(config-l2vpn)# bridge group 1
Router(config-l2vpn-bg)#bridge-domain 1
Router(config-l2vpn-bg-bd)#multicast-source ipv4
Router(config-l2vpn-bg-bd)#efp-visibility
Router(config-l2vpn-bg-bd)#igmp snooping profile igmpsn
Router(config-l2vpn-bg-bd)#exit
Router(config-l2vpn-bg-bd)#interface TenGigE0/0/0/3.31
Router(config-l2vpn-bg-bd-ac)#exit
Router(config-l2vpn-bg-bd)#interface TenGigE0/0/0/3.32
Router(config-l2vpn-bg-bd-ac)#exit
Router(config-l2vpn-bg-bd)#routed interface BVI1
Router(config-l2vpn-bg-bd-bvi)#exit
```

Multicast Router Port

A Multicast router (Mrouter) port is a port that connects to a Multicast router. The device includes the Multicast router port(s) numbers when it forwards the Multicast streams and IGMP registration messages. This is required so that the Multicast routers can, in turn, forward the Multicast streams and propagate the registration messages to other subnets. The reports would be re-injected over mrouter ports.

Multicast Router and Host Ports

IGMP snooping classifies each port (for example, EFPs, PWs, physical ports, or EFP bundles) as one of the following:

- Multicast router ports (mrouter ports)—These are ports to which a multicast-enabled router is connected. Mrouter ports are usually dynamically discovered, but may also be statically configured. Multicast traffic is always forwarded to all mrouter ports, except when an mrouter port is the ingress port.
- Host ports—Any port that is not an mrouter port is a host port.

IGMP snooping classifies each port (for example, EFPs, physical ports, or EFP bundles) as a host ports, that is, any port that is not an mrouter port is a host port.

Multicast Traffic Handling within a Bridge Domain with IGMP Snooping Enabled

The following tables describe traffic handling behaviors by IGMP snooping mrouter and host ports.

By default, IGMP snooping supports IGMPv2 and IGMPv3. The version of the IGMP querier discovered in the bridge domain determines the operational version of the snooping processes. If you change the default, configuring IGMP snooping to support a minimum version of IGMPv3, IGMP snooping ignores any IGMPv2 queriers.

Table 2: Multicast Traffic Handling for an IGMPv2 Querier

Traffic Type	Received on MRouter Ports	Received on Host Ports
IP multicast source traffic	Forwards to all mrouter ports and to host ports that indicate interest.	Forwards to all mrouter ports and to host ports that indicate interest.
IGMP general queries	Forwards to all ports.	—
IGMP group-specific queries	Forwards to all other mrouter ports.	—
IGMPv2 joins	Examines (snoops) the reports. • If report suppression is enabled, forwards first join for a new group or first join following a general query for an existing group. • If report suppression is disabled, forwards on all mrouter ports.	Examines (snoops) the reports. • If report suppression is enabled, forwards first join for a new group or first join following a general query for an existing group. • If report suppression is disabled, forwards on all mrouter ports.
IGMPv3 reports	Ignores	Ignores
IGMPv2 leaves	Invokes last member query processing.	Invokes last member query processing.

Table 3: Multicast Traffic Handling for an IGMPv3 Querier

Traffic Type	Received on MRouter Ports	Received on Host Ports
IP multicast source traffic	Forwards to all mrouter ports and to host ports that indicate interest.	Forwards to all mrouter ports and to host ports that indicate interest.

Traffic Type	Received on MRouter Ports	Received on Host Ports
IGMP general queries	Forwards to all ports.	—
IGMP group-specific queries	If received on the querier port floods on all ports. Forwards to all other Mrouter ports.	—
IGMPv2 joins	Handles as IGMPv3 IS_EX{} reports.	Handles as IGMPv3 IS_EX{} reports.
IGMPv3 reports	• If proxy reporting is enabled—For state changes or source-list changes, generates a state change report on all mrouter ports. • If proxy reporting is disabled—Forwards on all mrouter ports.	• If proxy reporting is enabled—For state changes or source-list changes, generates a state change report on all mrouter ports. • If proxy reporting is disabled—Forwards on all mrouter ports.
IGMPv2 leaves	Handles as IGMPv3 IS_IN{} reports.	Handles as IGMPv3 IS_IN{} reports.

IGMP Snooping Configuration Profiles

To enable IGMP snooping on a bridge domain, you must attach a profile to the bridge domain. The minimum configuration is an empty profile if BVI is configured. An empty profile enables the default configuration options and settings for IGMP snooping, as listed in the *Default IGMP Snooping Configuration Settings*.



Note You must configure the **system-ip-address** and **internal-querier** when the BVI is not configured, and no other queriers are present in the same domain.

Configuration Example:

```
Router(config)#igmp snooping profile igmpsn
Router(config-igmp-snooping-profile)#system-ip-address 192.0.2.1
Router(config-igmp-snooping-profile)#internal-querier
```

You can attach IGMP snooping profiles to bridge domains or to ports under a bridge domain. The following guidelines explain the relationships between profiles attached to ports and bridge domains:

- Any IGMP Snooping profile attached to a bridge domain, even an empty profile, enables IGMP snooping. To disable IGMP snooping, detach the profile from the bridge domain.
- An empty profile configures IGMP snooping on the bridge domain and all ports under the bridge using default configuration settings.
- A bridge domain can have only one IGMP snooping profile attached to it (at the bridge domain level) at any time.
- Port profiles are not in effect if the bridge domain does not have a profile attached to it.
- IGMP snooping must be enabled on the bridge domain for any port-specific configurations to be in effect.

- If a profile attached to a bridge domain contains port-specific configuration options, the values apply to all of the ports under the bridge, including all mrouter and host ports, unless another port-specific profile is attached to a port.
- When a profile is attached to a port, IGMP snooping reconfigures that port, disregarding any port configurations that may exist in the bridge-level profile.

Creating Profiles

To create a profile, use the **igmp snooping profile** command in global configuration mode.

Attaching and Detaching Profiles

To attach a profile to a bridge domain, use the **igmp snooping profile** command in l2vpn bridge group bridge domain configuration mode. To attach a profile to a port, use the **igmp snooping profile** command in the interface configuration mode under the bridge domain. To detach a profile, use the **no** form of the command in the appropriate configuration mode.

When you detach a profile from a bridge domain or a port, the profile still exists and is available for use at a later time. Detaching a profile has the following results:

- If you detach a profile from a bridge domain, IGMP snooping is deactivated in the bridge domain.
- If you detach a profile from a port, IGMP snooping configuration values for the port are instantiated from the bridge domain profile.

Changing Profiles

You cannot make changes to an active profile. An active profile is one that is currently attached.

- If the active profile is configured under the bridge, you must detach it from the bridge, and reattach it.
- If the active profile is configured under a specific bridge port, you must detach it from the bridge port, and reattach it.

Another way to do this is to create a new profile incorporating the desired changes and attach it to the bridges or ports, replacing the existing profile. This deactivates IGMP snooping and then reactivates it with parameters from the new profile.

Default IGMP Snooping Configuration Settings

Table 4: IGMP Snooping Default Configuration Values

Scope	Feature	Default Value
Bridge Domain	IGMP snooping	Disabled on a bridge domain until an enabling IGMP snooping profile is attached to the bridge domain.
	internal querier	By default Internal Querier is disabled. To enable Internal Querier, add it to the IGMP snooping profile. Internal Querier is not recommended, when BVI and IGMP snooping is configured under a bridge.
	last-member-query-count	2
	last-member-query-interval	1000 (milliseconds)
	minimum-version	2 (supporting IGMPv2 and IGMPv3)
	querier query-interval	60 (seconds) Note This is a nonstandard default value.
	report-suppression	Enabled (enables report suppression for IGMPv2 and proxy-reporting for IGMPv3)
	querier robustness-variable	2
	router alert check	Enabled
	tcn query solicit	Disabled
	tcn flood	Enabled
	ttl-check	Enabled
	unsolicited-report-timer	1000 (milliseconds)
Port	immediate-leave	Disabled
	mrouter	No static mrouter configured; dynamic discovery occurs by default.
	static group	None configured

IGMP Snooping Configuration at the Bridge Domain Level

IGMP Minimum Version

The **minimum-version** command determines which IGMP versions are supported by IGMP snooping in the bridge domain:

- When minimum-version is 2, IGMP snooping intercepts IGMPv2 and IGMPv3 messages. This is the default value.
- When minimum-version is 3, IGMP snooping intercepts only IGMPv3 messages and drops all IGMPv2 messages.

IGMPv1 is not supported. The scope for this command is the bridge domain. The command is ignored in a profile attached to a port.

Group Membership Interval, Robustness Variable, and Query Interval

The group membership interval (GMI) controls when IGMP snooping expires stale group membership states. The **show igmp snooping group** command shows groups with an expiry time of 0 until that stale state is cleaned up following the next query interval.

The GMI is calculated as:

$$\text{GMI} = (\text{robustness-variable} * \text{query-interval}) + \text{maximum-response-time}$$

where:

- maximum-response-time (MRT) is the amount of time during which receivers are required to report their membership state.
- robustness-variable is an integer used to influence the calculated GMI.
- query-interval is the amount of time between general queries.

Values for the components in the GMI are obtained as follows:

- MRT is advertised in the general query, for both IGMPv2 and IGMPv3.
- If the querier is running IGMPv2, IGMP snooping uses the IGMP-snooping-configured values for the robustness-variable and query-interval. These parameter values must match the configured values for the querier. In most cases, if you are interacting with other Cisco routers, you should not need to explicitly configure these values—the default values for IGMP snooping should match the default values of the querier. If they do not, use the **querier robustness-variable** and **querier query-interval** commands to configure matching values.
- IGMPv3 general queries convey values for robustness-variable and query-interval (QRV and QQI, respectively). IGMP snooping uses the values from the query, making the IGMP snooping GMI exactly match that of the querier.

How to Configure IGMP Snooping

The first two tasks are required to configure basic IGMP snooping configuration.

Creating an IGMP Snooping Profile

Procedure

Step 1 **configure**

Step 2 **igmp snooping profile** *profile-name*

Example:

```
RP/0/RP0/CPU0:router(config)# igmp snooping profile default-bd-profile
```

Enters IGMP snooping profile configuration mode and creates a named profile.

The default profile enables IGMP snooping. You can commit the new profile without any additional configurations, or you can include additional configuration options to the profile. You can also return to the profile later to add configurations, as described in other tasks in this module.

Step 3 Optionally, add commands to override default configuration values.

If you are creating a bridge domain profile, consider the following:

- An empty profile is appropriate for attaching to a bridge domain. An empty profile enables IGMP snooping with default configuration values.
- You can optionally add more commands to the profile to override default configuration values.
- If you include port-specific configurations in a bridge domain profile, the configurations apply to all ports under the bridge, unless another profile is attached to a port.

If you are creating a port-specific profile, consider the following:

- While an empty profile could be attached to a port, it would have no effect on the port configuration.
- When you attach a profile to a port, IGMP snooping reconfigures that port, overriding any inheritance of configuration values from the bridge-domain profile. You must repeat the commands in the port profile if you want to retain those configurations.

You can detach a profile, change it, and reattach it to add commands to a profile at a later time.

Step 4 **commit**

Where to Go Next

Attach the profile to bridge domains or ports to complete immediate-leave configuration. See one of the following sections:

Attaching a Profile and Activating IGMP Snooping on a Bridge Domain

To activate IGMP snooping on a bridge domain, attach an IGMP snooping profile to the bridge domain, as described in the following steps.

Procedure

Step 1 **configure**

Step 2 **l2vpn**

Example:

```
RP/0/RP0/CPU0:router(config)# l2vpn
```

Enters Layer 2 VPN configuration mode.

Step 3 **bridge group** *bridge-group-name*

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn)# bridge group GRP1
```

Enters Layer 2 VPN VPLS bridge group configuration mode for the named bridge group.

Step 4 **bridge-domain** *bridge-domain-name*

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn-bg)# bridge-domain ISP1
```

Enters Layer 2 VPN VPLS bridge group bridge domain configuration mode for the named bridge domain.

Step 5 **igmp snooping profile** *profile-name*

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn-bg-bd)# igmp snooping profile default-bd-profile
```

Attaches the named IGMP snooping profile to the bridge domain, enabling IGMP snooping on the bridge domain.

Step 6 **commit**

Step 7 **show igmp snooping bridge-domain detail**

Example:

```
RP/0/RP0/CPU0:router# show igmp snooping bridge-domain detail
```

(Optional) Verifies that IGMP snooping is enabled on a bridge domain and shows the IGMP snooping profile names attached to bridge domains and ports.

Step 8 **show l2vpn bridge-domain detail**

Example:

```
RP/0/RP0/CPU0:router# show l2vpn bridge-domain
```

(Optional) Verifies that IGMP snooping is implemented in the forwarding plane (Layer 2) on a bridge domain.

Detaching a Profile and Deactivating IGMP Snooping on a Bridge Domain

To deactivate IGMP snooping on a bridge domain, remove the profile from the bridge domain using the following steps.



Note A bridge domain can have only one profile attached to it at a time.

Procedure

Step 1 **configure**

Step 2 **l2vpn**

Example:

```
RP/0/RP0/CPU0:router(config)# l2vpn
```

Enters Layer 2 VPN configuration mode.

Step 3 **bridge group** *bridge-group-name*

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn)# bridge group GRP1
```

Enters Layer 2 VPN VPLS bridge group configuration mode for the named bridge group.

Step 4 **bridge-domain** *bridge-domain-name*

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn-bg)# bridge-domain ISP1
```

Enters Layer 2 VPN VPLS bridge group bridge domain configuration mode for the named bridge domain.

Step 5 **no igmp snooping disable**

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn-bg-bd)# no igmp snooping disable
```

Detaches the IGMP snooping profile from the bridge domain, disabling IGMP snooping on that bridge domain.

Note

Only one profile can be attached to a bridge domain at a time. If a profile is attached, IGMP snooping is enabled. If a profile is not attached, IGMP snooping is disabled.

Step 6 **commit**

Step 7 **show igmp snooping bridge-domain detail**

Example:

```
RP/0/RP0/CPU0:router# show igmp snooping bridge-domain detail
```

(Optional) Verifies that IGMP snooping is disabled on a bridge domain.

Step 8 **show l2vpn bridge-domain detail**

Example:

```
RP/0/RP0/CPU0:router# show l2vpn bridge-domain
```

(Optional) Verifies that IGMP snooping is disabled in the forwarding plane (Layer 2) on a bridge domain.

Attaching and Detaching Profiles to Ports Under a Bridge

Before you begin

IGMP snooping must be enabled on the bridge domain for port-specific profiles to affect IGMP snooping behavior.

Procedure

Step 1 **configure**

Step 2 **l2vpn**

Example:

```
RP/0/RP0/CPU0:router(config)# l2vpn
```

Enters Layer 2 VPN configuration mode.

Step 3 **bridge group *bridge-group-name***

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn)# bridge group GRP1
```

Enters Layer 2 VPN bridge group configuration mode for the named bridge group.

Step 4 **bridge-domain *bridge-domain-name***

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn-bg)# bridge-domain ISP1
```

Enters Layer 2 VPN bridge group bridge domain configuration mode for the named bridge domain.

Step 5 **interface** *interface-type interface-number*

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn-bg-bd) # interface gig 1/1/1/1
```

Enters Layer 2 VPN VPLS bridge group bridge domain interface configuration mode for the named interface or PW.

Step 6 Do one of the following:

- **igmp snooping profile** *profile-name*
- **no igmp snooping**

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn-bg-bd-if) # igmp snooping profile mrouter-port-profile
```

Attaches the named IGMP snooping profile to the port.

Note

A profile on a port has no effect unless there is also a profile attached to the bridge.

The **no** form of the command detaches a profile from the port. Only one profile can be attached to a port.

Step 7 **commit**

Step 8 **show igmp snooping bridge-domain detail**

Example:

```
RP/0/RP0/CPU0:router# show igmp snooping bridge-domain detail
```

(Optional) Verifies that IGMP snooping is enabled on a bridge domain and shows the IGMP snooping profile names attached to bridge domains and ports.

Step 9 **show l2vpn bridge-domain detail**

Example:

```
RP/0/RP0/CPU0:router# show l2vpn bridge-domain
```

(Optional) Verifies that IGMP snooping is implemented in the forwarding plane (Layer 2) on a bridge domain.

Verifying Multicast Forwarding

Procedure

Step 1 **configure**

Step 2 **show l2vpn forwarding bridge-domain** [*bridge-group-name:bridge-domain-name*] **mroute ipv4** [**group** *group_IPaddress*] [**hardware** {**ingress** | **egress**}] [**detail**]**location** *node-id*

Example:

```
RP/0/RP0/CPU0:router#show l2vpn forwarding bridge-domain bg1:bd1 mroute ipv4 group 234.192.4.1
hardware ingress detail location 0/1/cPU0
```

Displays multicast routes as they are converted into the forwarding plane forwarding tables. Use optional arguments to limit the display to specific bridge groups or bridge domains.

If these routes are not as expected, check the control plane configuration and correct the corresponding IGMP snooping profiles.

Step 3 **show l2vpn forwarding bridge-domain** [*bridge-group-name:bridge-domain-name*] **mroute ipv4 summary location** *node-id*

Example:

```
RP/0/RP0/CPU0:router# show l2vpn forwarding bridge-domain bg1:bd1 mroute ipv4 summary location 0/3/CPU0
```

Displays summary-level information about multicast routes as stored in the forwarding plane forwarding tables. Use optional arguments to limit the display to specific bridge domains.

Configuration Examples for IGMP Snooping

The following examples show how to enable IGMP snooping on Layer 2 VPLS bridge domains on Cisco 8000 Series Routers:

Configuring IGMP Snooping on Physical Interfaces Under a Bridge: Example

1. Create two profiles.

```
igmp snooping profile bridge_profile
!
igmp snooping profile port_profile
  mrouter
!
```

2. Configure two physical interfaces for L2 transport.

```
interface GigabitEthernet0/8/0/38
  negotiation auto
  l2transport
  no shut
!
!
interface GigabitEthernet0/8/0/39
  negotiation auto
  l2transport
  no shut
```

```

!
!

```

3. Add interfaces to the bridge domain. Attach bridge_profile to the bridge domain and port_profile to one of the Ethernet interfaces. The second Ethernet interface inherits IGMP snooping configuration attributes from the bridge domain profile.

```

l2vpn
  bridge group bg1
    bridge-domain bd1
    igmp snooping profile bridge_profile
    interface GigabitEthernet0/8/0/38
      igmp snooping profile port_profile
    interface GigabitEthernet0/8/0/39
!
!
!

```

4. Verify the configured bridge ports.

```

show igmp snooping port

```

Configuring IGMP Snooping on VLAN Interfaces Under a Bridge: Example

1. Configure two profiles.

```

multicast-source ipv4
igmp snooping profile bridge_profile

igmp snooping profile port_profile
  mrouter
!

```

2. Configure VLAN interfaces for L2 transport.

```

interface GigabitEthernet0/8/0/8
  negotiation auto
  no shut
!
!
interface GigabitEthernet0/8/0/8.1 l2transport
  encapsulation dot1q 1001
  rewrite ingress tag pop 1 symmetric
!
!
interface GigabitEthernet0/8/0/8.2 l2transport
  encapsulation dot1q 1002
  rewrite ingress tag pop 1 symmetric
!
!

```

3. Attach a profile and add interfaces to the bridge domain. Attach a profile to one of the interfaces. The other interface inherits IGMP snooping configuration attributes from the bridge domain profile.

```

l2vpn
  bridge group bg1
    bridge-domain bd1
    multicast-source ipv4
    igmp snooping profile bridge_profile
    interface GigabitEthernet0/8/0/8.1
      igmp snooping profile port_profile
    interface GigabitEthernet0/8/0/8.2
  !
!
!

```

4. Verify the configured bridge ports.

```
show igmp snooping port
```

Configuring IGMP Snooping on Ethernet Bundles Under a Bridge: Example

1. This example assumes that the front-ends of the bundles are preconfigured. For example, a bundle configuration might consist of three switch interfaces, as follows:

```

interface Port-channel1
!
interface GigabitEthernet0/0/0/0
!
interface GigabitEthernet0/0/0/1
!
  interface GigabitEthernet0/0/0/2
    channel-group 1 mode on
  !
  interface GigabitEthernet0/0/0/3
    channel-group 1 mode on
  !

```

2. Configure two IGMP snooping profiles.

```

multicast-source ipv4
  igmp snooping profile bridge_profile
!
multicast-source ipv4
  igmp snooping profile port_profile
  mrouter
!

```

3. Configure interfaces as bundle member links.

```

interface GigabitEthernet0/0/0/0
  bundle id 1 mode on
  negotiation auto
!
interface GigabitEthernet0/0/0/1
  bundle id 1 mode on
  negotiation auto
!

```

```

interface GigabitEthernet0/0/0/2
  bundle id 2 mode on
  negotiation auto
!
interface GigabitEthernet0/0/0/3
  bundle id 2 mode on
  negotiation auto
!

```

4. Configure the bundle interfaces for L2 transport.

```

interface Bundle-Ether 1
  l2transport
!
interface Bundle-Ether 2
  l2transport
!
!

```

5. Add the interfaces to the bridge domain and attach IGMP snooping profiles.

```

l2vpn
  bridge group bg1
  bridge-domain bdl
  igmp snooping profile bridge_profile
  interface bundle-Ether 1
    igmp snooping profile port_profile
  interface bundle-Ether 2
!
!
!

```

6. Verify the configured bridge ports.

```
show igmp snooping port
```

Configuring Multicast over Integrated Routing Bridging Active/Active Multihome

Configurations performed on peer 1:

1. Layer 2 Base Configuration

```

hostname peer1
!
interface Bundle-Ether2
!
interface Bundle-Ether2.2 l2transport
  encapsulation dot1q 2
  rewrite ingress tag pop 1 symmetric
!
interface TenGigE0/0/0/0

```

```
bundle id 2 mode on
no shut
!
```

2. IGMPv2 Snoop Configurations

```
hostname peer1
!
router igmp

    version 2
    !
    !
l2vpn
bridge group VLAN2
bridge-domain VLAN2
multicast-source ipv4
igmp snoop profile 1
interface Bundle-Ether2.2
!

    evi 2
    !
    !
!
multicast-source ipv4
igmp snoop profile 1
!
```

Configurations Performed on Peer 2:

1. Layer 2 Base Configuration

```
hostname peer2
!
interface Bundle-Ether2
!
interface Bundle-Ether2.2 l2transport
encapsulation dot1q 2
rewrite ingress tag pop 1 symmetric
!
interface TenGigE0/0/0/0
bundle id 2 mode on
no shut
!
```

2. IGMPv2 Snoop Configurations

```
hostname peer2
!
router igmp

    version 2
    !
    !
l2vpn
bridge group VLAN2
bridge-domain VLAN2
multicast-source ipv4
igmp snoop profile 1
interface Bundle-Ether2.2
!

    evi 2
    !
    !
!
```

```

!
multicast-source ipv4
igmp snooping profile 1
!

```

Verifying IGMP Snooping

In this example, the receiver sends an IGMPv2 join for the group 239.0.0.2. On Peer2, this group has a D Flag, that means the actual IGMP joined peer2, but not peer1. On Peer1, this group has a B flag, that means this group is learnt from BGP.

```

RP/0/RP0/CPU0:peer1#show igmp snooping group
Fri Aug 31 22:27:46.363 UTC

```

Key: GM=Group Filter Mode, PM=Port Filter Mode
 Flags Key: S=Static, D=Dynamic, B=BGP Learnt, E=Explicit Tracking, R=Replicated

Bridge Domain VLAN10:VLAN10

Group	Ver	GM	Source	PM	Port	Exp	Flgs
----	---	--	-----	--	----	---	----
239.0.0.2	V2	-	*	-	BE2.2	never	B

```

RP/0/RP0/CPU0:peer2#show igmp snooping group
Fri Aug 31 22:27:49.686 UTC

```

Key: GM=Group Filter Mode, PM=Port Filter Mode
 Flags Key: S=Static, D=Dynamic, B=BGP Learnt, E=Explicit Tracking, R=Replicated

Bridge Domain VLAN10:VLAN10

Group	Ver	GM	Source	PM	Port	Exp	Flgs
----	---	--	-----	--	----	---	----
239.0.0.2	V2	-	*	-	BE2.2	74	D

Verifying Dual DR PIM Uplink

In this example, when the source 126.0.0.100 sends traffic to group 239.0.0.2, you see both Peer1 and Peer2 are sending PIM join upstream. The incoming interface for (*,G) and (S,G) should be the interface toward the RP and source respectively. For both Peer1 and Peer2, the outgoing interface should be the BVI interface facing the receiver.

```

RP/0/RP0/CPU0:peer1#show mrib route
:
:
(*,239.0.0.2) RPF nbr: 30.0.0.4 Flags: C RPF
Up: 00:13:41
Incoming Interface List
  HundredGigE0/0/0/1 Flags: A NS, Up: 00:13:41
Outgoing Interface List
  BVI2 Flags: F NS LI, Up: 00:13:41

(126.0.0.100,239.0.0.2) RPF nbr: 30.0.0.4 Flags: RPF
Up: 00:03:34
Incoming Interface List
  HundredGigE0/0/0/1 Flags: A, Up: 00:03:34

```

```

    Outgoing Interface List
      BVI2 Flags: F NS, Up: 00:03:34
    :
    :
RP/0/RP0/CPU0:peer2#show mrib route
:
:

(*,239.0.0.2) RPF nbr: 50.0.0.4 Flags: C RPF
  Up: 00:13:33
  Incoming Interface List
    HundredGigE0/0/0/2 Flags: A NS, Up: 00:13:33
  Outgoing Interface List
    BVI2 Flags: F NS LI, Up: 00:13:33

(126.0.0.100,239.0.0.2) RPF nbr: 50.0.0.4 Flags: RPF
  Up: 00:03:24
  Incoming Interface List
    HundredGigE0/0/0/2 Flags: A, Up: 00:03:24
  Outgoing Interface List
    BVI2 Flags: F NS, Up: 00:03:24
:
:

```

MLD Snooping

Multicast Listener Discovery (MLD) snooping is a technique that uses the MLD protocol to optimize the delivery of multicast traffic.

Table 5: Feature History Table

Feature Name	Release Information	Feature Description
MLD snooping	Release 25.2.1	Introduced in this release on: Centralized Systems (8400 [ASIC: K100]) (select variants only*) *This feature is now supported on Cisco 8404 routers.

Feature Name	Release Information	Feature Description
MLD snooping	Release 24.4.1	Introduced in this release on: Fixed Systems (8200 [ASIC: P100]), (8700 [ASIC: K100])(select variants only*). Multicast Listener Discovery (MLD) snooping is a technique that uses the MLD protocol to optimize the delivery of multicast traffic. When you enable MLD snooping on the router, it sends multicast data only to network segments with devices that have expressed interest in receiving it. By sending multicast data only to interested devices, the router minimizes unnecessary traffic and conserves bandwidth on the network. *This feature is now supported on: • 8212-48FH-M • 8712-MOD-M • 8711-32FH-M

Multicast Listener Discovery (MLD) snooping provides a way to constrain multicast traffic at Layer 2. By snooping the MLD membership reports sent by hosts in the bridge domain, the MLD snooping application can set up Layer 2 multicast forwarding tables to deliver traffic only to ports with at least one interested member, significantly reducing the volume of multicast traffic.

MLD snooping uses the information in MLD membership report messages to build corresponding information in the forwarding tables to restrict IPv6 multicast traffic at Layer 2. The forwarding table entries are in the form <Route, OIF List>, where:

- Route is a <*, G> route or <S, G> route.
- OIF List comprises all bridge ports that have sent MLD membership reports for the specified route plus all multicast router (mrouter) ports in the bridge domain.

For more information regarding MLD snooping, refer the *Multicast Configuration Guide for Cisco 8000 Series Routers*.

Prerequisites for MLD Snooping

- The network must be configured with a layer2 VPN.
- You must be in a user group associated with a task group that includes the proper task IDs. The command reference guides include the task IDs required for each command. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Supported Features and Restrictions for MLD Snooping

- Receiver behind L2 ACs in the same L2 bridge domain is supported.
- Source behind L2 ACs in the same L2 bridge domain is supported.
- EVPN MLD sync is not supported.
- VPLS is not supported.
- The **router-alert-check disable** configuration command is not supported.
- EVPN configuration must have the **control-word-disable** configuration.
- PIM control packets (join and hello) processing is not supported when snooping is enabled, so a multicast router selection based on PIM packets won't occur.
- Explicit host tracking.
- Multicast Admission Control.
- Security filtering.
- Report rate limiting.
- Multicast router discovery.
- In an EVPN dual-home AA scenario:
 - If the multicast source and receiver are in the same bridge domain (BD), the receiver might receive permanent traffic duplication.
 - In an EVPN dual-home receiver AA scenario, transient traffic duplication is expected when the DH node role changes from DF to nDF and vice versa.
 - Source=ESI1=BE-X.A, Receiver=ESI1=BE-X.B under the same BD is not supported (where X.A and X.B represent two AC ports for the bundle interface BE).

Advantages of MLD Snooping

- In its basic form, it reduces bandwidth consumption by reducing multicast traffic that would otherwise flood an entire VPLS bridge domain.
- With the use of some optional configurations, it provides security between bridge domains by filtering the MLD reports received from hosts on one bridge port and preventing leakage towards the hosts on other bridge ports.

High Availability (HA) features for MLD

MLD supports the following HA features:

- Process restarts
- Stateful Switch-Over (SSO)

Bridge Domain Support for MLD

MLD snooping operates at the bridge domain level. When MLD snooping is enabled on a bridge domain, the snooping functionality applies to all ports under the bridge domain, including:

- Physical ports under the bridge domain.
- Ethernet flow points (EFPs)—An EFP can be a VLAN, VLAN range, list of VLANs, or an entire interface port.
- Ethernet bundles—Ethernet bundles include IEEE 802.3ad link bundles and Cisco EtherChannel bundles. From the perspective of the MLD snooping application, an Ethernet bundle is just another EFP. The forwarding application in the Cisco 8000 Series Routers randomly nominates a single port from the bundle to carry the multicast traffic.



Note

The **efp-visibility** configuration is required when a bridge has attachment circuits as VLAN sub-interfaces from the same bundle-ether or physical interface.

Multicast Router and Host Ports

MLD snooping classifies each port as one of the following:

- Multicast router ports (mrrouter ports)—These are ports to which a multicast-enabled router is connected. Mrrouter ports are usually dynamically discovered, but may also be statically configured. Multicast traffic is always forwarded to all mrrouter ports, except when an mrrouter port is the ingress port.
- Host ports—Any port that is not an mrrouter port is a host port.

Multicast Router Discovery for MLD

MLD snooping discovers mrrouter ports dynamically. You can also explicitly configure a port as an emrouter port.

- Discovery- MLD snooping identifies upstream mrrouter ports in the bridge domain by snooping mld query messages and Protocol Independent Multicast Version 2 (PIMv2) hello messages. Snooping PIMv2 hello messages identifies mld nonqueriers in the bridge domain.
- Static configuration—You can statically configure a port as an mrrouter port with the **mrrouter** command in a profile attached to the port. Static configuration can help in situations when incompatibilities with non-Cisco equipment prevent dynamic discovery.

Multicast Traffic Handling for MLD

The following tables describe the traffic handling behavior by MLD mrouters and host ports.

Table 6: Multicast Traffic Handling for a MLDv1 Querier

Traffic Type	Received on MRouter Ports	Received on Host Ports
IP multicast source traffic	Forwards to all mrouter ports and to host ports that indicate interest.	Forwards to all mrouter ports and to host ports that indicate interest.
MLD general queries	Forwards to all ports.	—
MLD group-specific queries	Forwards to all other mrouter ports.	Dropped
MLDv1 joins	Examines (snoops) the reports. • If report suppression is enabled, forwards first join for a new group or first join following a general query for an existing group. • If report suppression is disabled, forwards on all mrouter ports.	Examines (snoops) the reports. • If report suppression is enabled, forwards first join for a new group or first join following a general query for an existing group. • If report suppression is disabled, forwards on all mrouter ports.
MLDv2 reports	Ignores	Ignores
MLDv1 leaves	Invokes last member query processing.	Invokes last member query processing.

Table 7: Multicast Traffic Handling for a MLDv2 Querier

Traffic Type	Received on MRouter Ports	Received on Host Ports
IP multicast source traffic	Forwards to all mrouter ports and to host ports that indicate interest.	Forwards to all mrouter ports and to host ports that indicate interest.
MLD general queries	Forwards to all ports.	—
MLD group-specific queries	If received on the querier port floods on all ports.	—
MLDv1 joins	Handles as MLDv2 IS_EX{} reports.	Handles as MLDv2 IS_EX{} reports.
MLDv2 reports	• If proxy reporting is enabled—For state changes or source-list changes, generates a state change report on all mrouter ports. • If proxy reporting is disabled—Forwards on all mrouter ports.	• If proxy reporting is enabled—For state changes or source-list changes, generates a state change report on all mrouter ports. • If proxy reporting is disabled—Forwards on all mrouter ports.
MLDv1 leaves	Handles as MLDv2 IS_IN{} reports.	Handles as MLDv2 IS_IN{} reports.

Multicast Listener Discovery over BVI

Multicast IPv6 packets received from core, which has BVI as forwarding interface, is forwarded to access over snooped L2 AC or interface.

**Note**

- As per MLDv2 RFC recommendation the MLDv2 reports should carry the Hop-by-Hop options header for the reports to get punted up.
- MLDv2 is supported over BVI only when BVI is configured as a forwarding interface.

MLD and BVI Overview

Routers use the Internet Group Management Protocol (IGMP) (IPv4) and Multicast Listener Discovery (MLD) (IPv6) to learn whether members of a group are present on their directly attached subnets. Hosts join multicast groups by sending IGMP or MLD report messages.

MLDv1 and MLDv2 are supported on Cisco 8010 Series Routers (*select variants). However, MLDv2 is enabled when you configure MLD by default.

MLDv2 shares feature parity with IGMPv3 with respect to all supported interface types with the exception of PPOE and subinterfaces. MLDv2 enables a node to report interest in listening to packets only from specific multicast source addresses.

A BVI interface is a routed interface representing a set of interfaces (bridged) in the same L2 broadcast domain. MLD join messages coming in or out of this broadcast domain passes through the BVI interface.

Multicast Traffic Over Layer 2 IPv6 Network

The Multicast Traffic over Layer 2 IPv6 Network (L2MC IPv6) is an optimized forwarding technique, and it helps in saving the bandwidth. By default, the bridge floods IPv6 multicast packets to all AC, whereas the L2MC IPv6 feature allows you to forward the IPv6 multicast packets only to the interested MLD-snooped AC.

When IPv6 multicast packets are received over Layer 2 AC and interfaces, the lookup gets done for Virtual Switch Interfaces (VSI), Groups (G), and Services (S) or for VSI and G. The VSI details show the VLAN or VXLAN segment to which the packet belongs, while the G and S identify the multicast groups and services to which the packet should be forwarded. Based on this lookup, the traffic is forwarded to the interested receivers connected to the Layer 2 AC.

The MLD control packets received over Layer 2 AC are snooped and punted to create the route entries. This route entries are needed to avail the following supports:

- Layer 2 Multicast IPv6 support.
- EVPN sync support for IPv4 routes.

Limitations and Restrictions

- This feature doesn't support MLD sync.
- With L2MC IPv6 support, the existing L2MC IPv4 scale reduces proportionally.

Configuration Example

The L2MC IPv6 feature is not enabled by default. Following is a configuration example that shows how to enable the feature.

```
router(config)# l2vpn
router(config-l2vpn)# bridge group 1
router(config-l2vpn-bg)#bridge-domain 1
router(config-l2vpn-bg-bd)#multicast-source ipv6
router(config-l2vpn-bg-bd)#efp-visibility
router(config-l2vpn-bg-bd)#mld snooping profile prof1
router(config-l2vpn-bg-bd)#igmp snooping profile prof1
router(config-l2vpn-bg-bd)#interface TenGigE0/0/0/0
router(config-l2vpn-bg-bd-ac)#exit
router(config-l2vpn-bg-bd)#interface TenGigE0/0/0/4.1
router(config-l2vpn-bg-bd-ac)#exit
router(config-l2vpn-bg-bd)#interface TenGigE0/0/0/4.2
router(config-l2vpn-bg-bd-ac)#exit
router(config-l2vpn-bg-bd)#routed interface BVI1
router(config-l2vpn-bg-bd-bvi)#exit
!
!

router(config-l2vpn-bg-bd)#mld snooping profile prof1
router(config-l2vpn-bg-bd)#internal-querier
!
router(config-l2vpn-bg-bd)#igmp snooping profile prof1
router(config-l2vpn-bg-bd)#system-ip-address 1.2.3.4
router(config-l2vpn-bg-bd)#internal-querier
```



Note With BVI configurations, there is no need to have internal queries address configured MLD snooping profile. It implies that you can make BVI as querier under BVI configuration.

Verification

The following command shows the information about group membership in the Layer 2 Forwarding tables.

```
router# show mld snooping group
```

Flags Key: S=Static, D=Dynamic, E=Explicit Tracking

```
Bridge Domain bg1:bd1

Group          Ver GM Source          PM Port          Exp Flg
Ff12:1:1::1    V2  Exc -                - GigabitEthernet0/1/1/0 122 DE
Ff12:1:1::1    V2  Exc 2002:1::1        Inc GigabitEthernet0/1/1/1 5 DE
Ff12:1:1::1    V2  Exc 2002:1::1        Inc GigabitEthernet0/1/1/2 never S
Ff12:1:1::1    V2  Exc 2002:1::1        Exc GigabitEthernet0/1/1/3 - DE
Ff12:1:1::1    V2  Exc 2002:1::2        Inc GigabitEthernet0/1/1/0 202 DE
Ff12:1:1::1    V2  Exc 2002:1::2        Exc GigabitEthernet0/1/1/1 - DE
Ff12:1:1::2    V2  Exc 2002:1::1        Inc GigabitEthernet0/1/1/0 145 DE
Ff12:1:1::2    V2  Exc 2002:1::1        Inc GigabitEthernet0/1/1/1 0 DE
Ff12:1:1::2    V2  Exc 2002:1::1        Exc GigabitEthernet0/1/1/2 11 DE
```

```
Bridge Domain bg1:bd4

Group          Ver GM Source          PM Port          Exp Flg
```

```

Ff24:1:1::2      V1  Exc  -          -  GigabitEthernet0/1/1/0  122  DE
Ff28:1:1::1      V1  -    -          -  GigabitEthernet0/1/1/1   33  DE
Ff29:1:2::3      V1  Exc  -          -  GigabitEthernet0/1/2/0  122  DE
Ff22:1:2::3      V2  Exc  2000:1:1::2  Exc GigabitEthernet0/1/2/1    5  DE

```

The following command summarizes the number of bridge domains, mrouter ports, host ports, groups, and sources configured on the router.

```

router#show mld snooping summary
Bridge Domains:                        1
MLD Snooping Bridge Domains:          1
Ports:                                3
MLD Snooping Ports:                   3
Mrouters:                             0
STP Forwarding Ports:                 0
ICCP Group Ports:                     0
MLD Groups:                           0
  Member Ports:                       0
MLD Source Groups:                    0
  Static/Include/Exclude:              0/0/0
  Member Ports (Include/Exclude):      0/0

```

IPv6 Multicast Listener Discovery Snooping over BVI

Multicast Listener Discovery (MLD) snooping provides a way to constrain multicast traffic at L2. By snooping the MLD membership reports sent by hosts in the bridge domain, the MLD snooping application can set up L2 multicast forwarding tables. This table is later used to deliver traffic only to ports with at least one interested member, significantly reducing the volume of multicast traffic.

MLDv2 support over BVI enables implementing IPv6 multicast routing over a L2 segment of the network that is using an IPv6 VLAN. The multicast routes are bridged via BVI interface from L3 segment to L2 segment of the network.

MLDv2 snooping over BVI enables forwarding MLDv2 membership reports received over the L2 domain to MLD snooping instead of MLD.

Restrictions

- You cannot configure `ttl-check` and disable `router-alert-check` on the router for mld messages.
- Static mrouters are not supported for MLD snooping.
- Querier is supported for MLDV2, but it is not supported on MLDV1.

Configuring Internal Querier for MLD Snooping

This configuration enables a multicast router acting as a MLD querier to send out group-and-source-specific query:

```

router# config
RP0/0/RP0/CPU0:router(config)# mld snooping profile grpl
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# system-ip-address fe80::1 link-local
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# internal-querier
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# commit

```

Verification

Use the **show mld snooping profile detail** command to verify the MLD snooping configuration:

```

router# show mld snooping profile detail
Thu Nov 22 13:58:18.844 UTC
MLD Snoop Profile grp1:
  System IP Address:          fe80::1
  Bridge Domain References:    2
  Port References:            12

MLD Snoop Profile grp10:
  System IP Address:          fe80::5610
  Bridge Domain References:    0
  Port References:            0

```

Creating a MLD Snooping Profile

Configuration

```

/* Enter the global configuration mode */
RP/0/RP0/CPU0:router # configure
/* Enters MLD snooping profile configuration mode and creates a named profile. */
RP/0/RP0/CPU0:router(config)# mld snooping profile default-bd-profile
RP/0/RP0/CPU0:router # commit

```

The default profile enables MLD snooping. You can commit the new profile without any additional configurations, or you can include additional configuration options to the profile. You can also return to the profile later to add configurations, as described in other tasks in this module.

If you are creating a bridge domain profile, consider the following:

- An empty profile is appropriate for attaching to a bridge domain. An empty profile enables MLD snooping with default configuration values.
- You can optionally add more commands to the profile to override default configuration values.
- If you include port-specific configurations in a bridge domain profile, the configurations apply to all ports under the bridge, unless another profile is attached to a port.

If you are creating a port-specific profile, consider the following:

- While an empty profile could be attached to a port, it would have no effect on the port configuration.
- When you attach a profile to a port, MLD snooping reconfigures that port, overriding any inheritance of configuration values from the bridge-domain profile. You must repeat the commands in the port profile if you want to retain those configurations.

You can detach a profile, change it, and reattach it to add commands to a profile at a later time.

Running Configuration

```

RP/0/RP0/CPU0:router(config)# show running-config
configure
  mld snooping profile default-bd-profile
!

```

Verification

Verify that the MLD snooping profile is created:

```
RP/0/RP0/CPU0:router#show mld snooping profile
```

Profile	Bridge Domain	Port
-----	-----	----
default-bd-profile	0	0
grp1	1	2
grp10	1	2

Deactivating MLD Snooping on a Bridge Domain

To deactivate MLD snooping from a bridge domain, remove the profile from the bridge domain:



Note A bridge domain can have only one profile attached to it at a time.

Configuration

```
/* Enter the global configuration mode followed by the bridge group and the bridge domain
mode */
RP/0/RP0/CPU0:router# configuration
RP/0/RP0/CPU0:router(config)# l2vpn
RP/0/RP0/CPU0:router(config-l2vpn)# bridge group GRP1
RP/0/RP0/CPU0:router(config-l2vpn-bg)# bridge domain ISP1
```

```
/* Detache the MLD snooping profile from the bridge domain. This disables MLD snooping on
that bridge domain */
```

```
/* Note: Only one profile can be attached to a bridge domain at a time. If a profile is
attached, MLD snooping is enabled.
```

```
If a profile is not attached, MLD snooping is disabled. */
```

```
RP/0/RP0/CPU0:router(config-l2vpn-bg-bd)# no mld snooping profile
RP/0/RP0/CPU0:router(config-l2vpn-bg-bd)# commit
```

Running Configuration

```
RP/0/RP0/CPU0:router# show running-config
configuration
l2vpn
  bridge-group GRP1
  bridge-domain ISP1
    no mld snooping profile
!
```

Configuring Static Mrouter Ports (MLD)

Prerequisite

MLD snooping must be enabled on the bridge domain for port-specific profiles to affect MLD snooping behavior.



Note Static mrouter port configuration is a port-level option and should be added to profiles intended for ports. It is not recommended to add mrouter port configuration to a profile intended for bridge domains.

Configuration

```
/* Enter the global configuration mode */
RP0/0/RP0/CPU0:router# configuration

/* Enter the MLD snooping profile configuration mode and create a new profile or accesses
an existing profile.*/
RP0/0/RP0/CPU0:router(config)# mld snooping profile mrouter-port-profile
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# mrouter
/* Configures a static mrouter on a port. */

RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# commit
```

Running Configuration

```
RP0/0/RP0/CPU0:router# show running-config
configuration
  mld snooping profile mrouter-port-profile
  mrouter
!
```

Verification

The below show command output confirms that the mrouter configuration is enabled:

```
RP0/0/RP0/CPU0:router# show mld snooping profile mrouter-port-profile
```

```
MLD Snoop Profile mrouter-port-profile:
```

Static Mrouter:	Enabled
Bridge Domain References:	0
Port References:	0

Configuring Immediate-leave for MLD

To add the MLD snooping immediate-leave option to an MLD snooping profile:

Configuration

```
/* Enter the global configuration mode. */
RP0/0/RP0/CPU0:router# configuration

/* Enter MLD snooping profile configuration mode and create a new profile or accesses an
existing profile. */
RP0/0/RP0/CPU0:router(config)# mld snooping profile host-port-profile
/* Enable the immediate-leave option */
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# immediate-leave
RP0/0/RP0/CPU0:router(config-l2vpn-bg-bd)# commit
```

If you add the **immediate-leave** option:

- to a profile attached to a bridge domain, it applies to all ports under the bridge.
- to a profile attached to a port, it applies to the port.

Running Configuration

```
RP0/0/RP0/CPU0:router# show running-config
configuration
  mld snooping profile host-port-profile
  immediate-leave
!
```

Verification

Verify that the immediate leave config in the named profile is enabled:

```
RP0/0/RP0/CPU0:router# show mld snooping profile host-port-profile detail
```

```
MLD Snoop Profile host-port-profile:
```

Immediate Leave:	Enabled
Router Guard:	Enabled
Bridge Domain References:	0
Port References:	0

Configuring Internal Querier for MLD

Prerequisite

MLD snooping must be enabled on the bridge domain for this procedure to take effect.

Configuration

```
/* Enter the global configuration mode. */
RP0/0/RP0/CPU0:router# configuration

/* Enter MLD snooping profile configuration mode and create a new profile or accesses an
existing profile. */
RP0/0/RP0/CPU0:router(config)# mld snooping profile internal-querier-profile

/* Configure an IP address for internal querier use. The default system-ip-address value
(0.0.0.0) is not valid for the internal querier.
You must explicitly configure an IP address. Enter a valid link-local IPv6 address. */
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# system-ip-address fe80::98 link-local

/* Enable an internal querier with default values for all options.*/
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# internal-querier
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# commit
```

Running Configuration

```
RP0/0/RP0/CPU0:router# show running-config
configuration
  mld snooping profile internal-querier-profile
  system-ip-address fe80::98 link-local
```

```
internal-querier
!
```



Note Internal Querier is not recommended, when BVI and MLD snooping is configured under a bridge.

Verification

Verify that the internal querier config is enabled:

```
RP0/0/RP0/CPU0:router# show mld snooping profile internal-querier-profile detail
```

```
MLD Snoop Profile internal-querier-profile:
```

```
System IP Address:                fe80::98
```

```
Internal Querier Support:         Enabled
```

```
Bridge Domain References:         0
```

```
Port References:                  0
```

Configuring Static Groups for MLD

To add one or more static groups or MLDv2 source groups to an MLD snooping profile, follow these steps:

Prerequisite

MLD snooping must be enabled on the bridge domain for port-specific profiles to affect MLD snooping behavior.

Configuration

```
/* Enter the global configuration mode. */
```

```
RP0/0/RP0/CPU0:router# configuration
```

```
/* Enter MLD snooping profile configuration mode and create a new profile or accesses an existing profile. */
```

```
RP0/0/RP0/CPU0:router(config)# mld snooping profile host-port-profile
```

```
/* Configure a static group. */
```

```
/* Note: Repeat this step to add additional static groups. */
```

```
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# static group 239.1.1.1 source 198.168.1.1
```

```
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# commit
```

If you add the **static group** option:

- to a profile attached to a bridge domain, it applies to all ports under the bridge.
- to a profile attached to a port, it applies to the port.

Running Configuration

```
RP0/0/RP0/CPU0:router# show running-config
configuration
mld snooping profile host-port-profile
```

```
static group 239.1.1.1 source 198.168.1.1
!
```

Verification

```
RP0/0/RP0/CPU0:router# show mld snooping bridge-domain f1:100 detail
```

Bridge Domain #SGs	Profile	Act	Ver	#Ports	#Mrtrs	#Grps
-----	-----	---	---	-----	-----	-----
f1:100	grp1	Y	v2	3	1	1000 1002

Profile Configured Attributes:

```
System IP Address:      fe80::99
Minimum Version:        1
Report Suppression:     Enabled
Unsolicited Report Interval: 1000 (milliseconds)
TCN Query Solicit:      Disabled
TCN Membership Sync:    Disabled
TCN Flood:              Enabled
TCN Flood Query Count:  2
Router Alert Check:     Disabled
TTL Check:              Enabled
nV Mcast Offload:       Disabled
Internal Querier Support: Disabled
Querier Query Interval: 125 (seconds)
Querier LMQ Interval:   1000 (milliseconds)
Querier LMQ Count:      2
Querier Robustness:     2
Startup Query Interval: 31 seconds
Startup Query Count:    2
Startup Query Max Response Time: 10.0 seconds
Mrouter Forwarding:     Enabled
P2MP Capability:         Disabled
Default IGMP Snooping profile: Disabled
IP Address:              fe80::f278:16ff:fe63:4d81
Port:                   BVI1000
Version:                 v2
Query Interval:          125 seconds
Robustness:              2
Max Resp Time:           10.0 seconds
Time since last G-Query: 97 seconds
Mrouter Ports:          1
  Dynamic:               BVI1000
STP Forwarding Ports:   0
ICCP Group Ports:       0
Groups:                 1000
  Member Ports:         0
V2 Source Groups:       1002
  Static/Include/Exclude: 0/1002/0
  Member Ports (Include/Exclude): 1002/0
```

Configuring MLD Snooping

Configure

```
RP0/0/RP0/CPU0:router# configure
/* Create two profiles. */
RP0/0/RP0/CPU0:router(config)# mld snooping profile bridge_profile
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# mld snooping profile port_profile
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# mrouter
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# exit
RP0/0/RP0/CPU0:router(config)#

/* Configure two physical interfaces for L2 support.*/
RP0/0/RP0/CPU0:router(config)# interface GigabitEthernet0/8/0/38
RP0/0/RP0/CPU0:router(config-if)# negotiation auto
RP0/0/RP0/CPU0:router(config-if)# l2transport
RP0/0/RP0/CPU0:router(config-if)# no shut
RP0/0/RP0/CPU0:router(config-if)# exit
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# interface GigabitEthernet0/8/0/39
RP0/0/RP0/CPU0:router(config-if)# negotiation auto
RP0/0/RP0/CPU0:router(config-if)# l2transport
RP0/0/RP0/CPU0:router(config-if)# no shut
RP0/0/RP0/CPU0:router(config-if)# exit

/* Add interfaces to the bridge domain. Attach bridge_profile to the bridge domain and
port_profile to one of the Ethernet interfaces.
The second Ethernet interface inherits MLD snooping configuration attributes from the bridge
domain profile.*/
RP0/0/RP0/CPU0:router(config)# l2vpn
RP0/0/RP0/CPU0:router(config-l2vpn)# bridge group bg1
RP0/0/RP0/CPU0:router(config-l2vpn-bg)# bridge-domain bd1
RP0/0/RP0/CPU0:router(config-l2vpn-bg-bd)# mld snooping profile bridge_profile
RP0/0/RP0/CPU0:router(config-l2vpn-bg-bd-mld-snooping)# interface GigabitEthernet0/8/0/38
RP0/0/RP0/CPU0:router(config-l2vpn-bg-bd-mld-snooping-if)# mld snooping profile port_profile
RP0/0/RP0/CPU0:router(config-l2vpn-bg-bd-mld-snooping-if)# interface GigabitEthernet0/8/0/39
RP0/0/RP0/CPU0:router(config-l2vpn-bg-bd-mld-snooping-if)# exit
RP0/0/RP0/CPU0:router(config-l2vpn-bg-bd-mld-snooping)# exit
RP0/0/RP0/CPU0:router(config-l2vpn-bg-bd)# commit
```

Running Configuration

```
RP0/0/RP0/CPU0:router# show running-config
configuration
  mld snooping profile bridge_profile
  !
  mld snooping profile port_profile
  mrouter
  !

  interface GigabitEthernet0/8/0/38
    negotiation auto
    l2transport
    no shut
    !
  !
  interface GigabitEthernet0/8/0/39
    negotiation auto
    l2transport
    no shut
```

```

!
!
l2vpn
  bridge group bg1
    bridge-domain bd1
    mld snooping profile bridge_profile
    interface GigabitEthernet0/8/0/38
      mld snooping profile port_profile
    interface GigabitEthernet0/8/0/39
  !
!
!

```

Verification

Verify the configured bridge ports.

```
RP0/0/RP0/CPU0:router# show mld snooping port
```

```

Bridge Domain f10:109

Port
----
BVI1009
GigabitEthernet0/8/0/38
GigabitEthernet0/8/0/39

```

	State			#Grps	#SGs
Oper	STP	Red			
----	---	---	-----	----	----
Up	-	-	0	0	
Up	-	-	1000	1000	
Up	-	-	1000	1000	

Configuring MLD Snooping on Ethernet Bundles

This example assumes that the front-ends of the bundles are preconfigured. For example, a bundle configuration might consist of three switch interfaces, as follows:

Configure

```

/* Configure the front-ends of the bundles consisting of three switch interfaces.*/
RP0/0/RP0/CPU0:router# configure
RP0/0/RP0/CPU0:router(config)# interface bundle-ether 1
RP0/0/RP0/CPU0:router(config-if)# exit
RP0/0/RP0/CPU0:router(config)# interface GigabitEthernet0/0/0/0
RP0/0/RP0/CPU0:router(config-if)# exit
RP0/0/RP0/CPU0:router(config)# interface GigabitEthernet0/0/0/1
RP0/0/RP0/CPU0:router(config-if)# exit
RP0/0/RP0/CPU0:router(config)# interface GigabitEthernet0/0/0/2
RP0/0/RP0/CPU0:router(config-if)# channel-group 1 mode on
RP0/0/RP0/CPU0:router(config-if)# exit
RP0/0/RP0/CPU0:router(config)# interface GigabitEthernet0/0/0/3
RP0/0/RP0/CPU0:router(config-if)# channel-group 1 mode on
RP0/0/RP0/CPU0:router(config-if)# exit

/* Configure two MLD snooping profiles. */
RP0/0/RP0/CPU0:router(config)# mld snooping profile bridge_profile
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# exit !
RP0/0/RP0/CPU0:router(config)# mld snooping profile port_profile
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# mrouter
RP0/0/RP0/CPU0:router(config-mld-snooping-profile)# exit

```

```

/* Configure interfaces as bundle member links. */

RP0/0/RP0/CPU0:router(config)# interface GigabitEthernet0/0/0/0
RP0/0/RP0/CPU0:router(config-if)# bundle id 1 mode on
RP0/0/RP0/CPU0:router(config-if)# negotiation auto
RP0/0/RP0/CPU0:router(config-if)# exit
RP0/0/RP0/CPU0:router(config)# interface GigabitEthernet0/0/0/1
RP0/0/RP0/CPU0:router(config-if)# bundle id 1 mode on
RP0/0/RP0/CPU0:router(config-if)# negotiation auto
RP0/0/RP0/CPU0:router(config-if)# exit
RP0/0/RP0/CPU0:router(config)# interface GigabitEthernet0/0/0/2
RP0/0/RP0/CPU0:router(config-if)# bundle id 2 mode on
RP0/0/RP0/CPU0:router(config-if)# negotiation auto
RP0/0/RP0/CPU0:router(config-if)# exit
RP0/0/RP0/CPU0:router(config)# interface GigabitEthernet0/0/0/3
RP0/0/RP0/CPU0:router(config-if)# bundle id 2 mode on
RP0/0/RP0/CPU0:router(config-if)# negotiation auto
RP0/0/RP0/CPU0:router(config-if)# exit

/* Configure the bundle interfaces for L2 transport. */
RP0/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP0/0/RP0/CPU0:router(config-if)# l2transport
RP0/0/RP0/CPU0:router(config-if)# exit
RP0/0/RP0/CPU0:router(config)# interface Bundle-Ether 2
RP0/0/RP0/CPU0:router(config-if)# l2transport
RP0/0/RP0/CPU0:router(config-if)# exit

/* Add the interfaces to the bridge domain and attach MLD snooping profiles. */
RP0/0/RP0/CPU0:router(config)# l2vpn
RP0/0/RP0/CPU0:router(config-l2vpn)# bridge group bg1
RP0/0/RP0/CPU0:router(config-l2vpn-bg)# mld snooping profile bridge_profile
RP0/0/RP0/CPU0:router(config-l2vpn-bg-mld-snooping-profile)# interface bundle-Ether 1
RP0/0/RP0/CPU0:router(config-l2vpn-bg-mld-snooping-profile-if)# mld snooping profile
port_profile
RP0/0/RP0/CPU0:router(config-l2vpn-bg-mld-snooping-profile-if)# interface bundle-Ether 2
RP0/0/RP0/CPU0:router(config-l2vpn-bg-mld-snooping-profile-if)# commit

```

Running Configuration

```

RP0/0/RP0/CPU0:router# show running-config
configuration
  interface Port-channel1
  !
  interface GigabitEthernet0/0/0/0
  !
  interface GigabitEthernet0/0/0/1
  !
    interface GigabitEthernet0/0/0/2
      channel-group 1 mode on
    !
    interface GigabitEthernet0/0/0/3
      channel-group 1 mode on
  !
  mld snooping profile bridge_profile
  !
  mld snooping profile port_profile
  mrouter
  !
  interface GigabitEthernet0/0/0/0
    bundle id 1 mode on
    negotiation auto
  !

```

```

interface GigabitEthernet0/0/0/1
  bundle id 1 mode on
  negotiation auto
!
interface GigabitEthernet0/0/0/2
  bundle id 2 mode on
  negotiation auto
!
interface GigabitEthernet0/0/0/3
  bundle id 2 mode on
  negotiation auto
!
interface Bundle-Ether 1
  l2transport
!
!
interface Bundle-Ether 2
  l2transport
!
!

l2vpn
  bridge group bg1
  bridge-domain bd1
  mld snooping profile bridge_profile
  interface bundle-Ether 1
    mld snooping profile port_profile
  interface bundle-Ether 2
  !
!
!

```

Verification

```

RP0/0/RP0/CPU0:router# show mld snooping port
Bridge Domain BG1:BD1
State
Port Oper STP Red #Grps #SGs
----
HundredGigE0/0/0/3 Up - - 1 1
HundredGigE0/0/0/7 Up - - 1 1
HundredGigE0/19/0/11 Up - - 1 1
HundredGigE0/19/0/5 Up - - 1 1
RP/0/RP1/CPU0:Router#

```