



Configuring IGMP Proxy

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Prerequisites for IGMP Proxy

- All devices on the IGMP UDL have the same subnet address. If all devices on the UDL cannot have the same subnet address, the upstream device must be configured with secondary addresses to match all of the subnets to which the downstream devices are attached.
- IP multicast is enabled and the PIM interfaces are configured.



Note Use the following guidelines when configuring PIM interfaces for IGMP proxy:

- Use PIM sparse mode (PIM-SM) when the interface is operating in a sparse-mode region and you are running static RP, bootstrap (BSR), or Auto-RP with the Auto-RP listener capability.
- Use PIM sparse-dense mode when the interface is running in a sparse-dense mode region and you are running Auto-RP without the Auto-RP listener capability.
- Use PIM dense mode (PIM-DM) when the interface is operating in dense mode and is, thus, participating in a dense-mode region.
- Use PIM-DM with the proxy-register capability when the interface is receiving source traffic from a dense-mode region that needs to reach receivers that are in a sparse-mode region.

Information about IGMP Proxy

IGMP Proxy

An IGMP proxy enables hosts in a unidirectional link routing (UDLR) environment that are not directly connected to a downstream router to join a multicast group sourced from an upstream network.

The figure below illustrates a sample topology that shows two UDLR scenarios:

- Traditional UDL routing scenario--A UDL device with directly connected receivers.
- IGMP proxy scenario--UDL device without directly connected receivers.



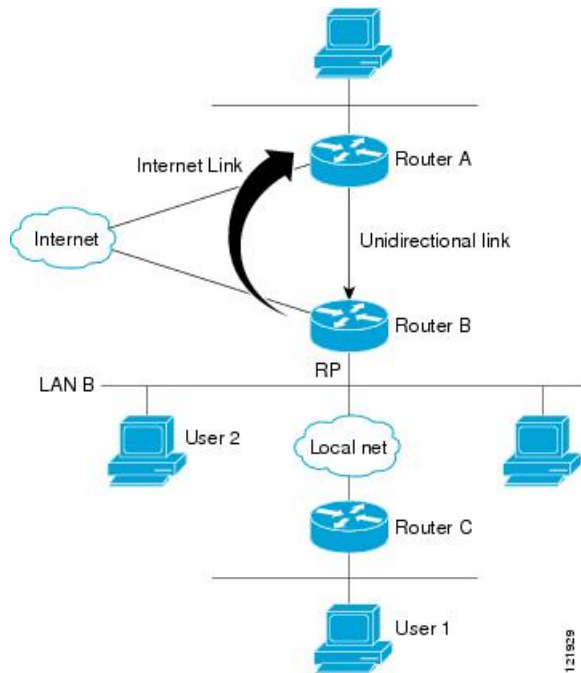
Note IGMP UDLs are needed on the upstream and downstream devices.



Note Although the following illustration and example uses routers in the configuration, any device (router or controller) can be used.



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Scenario 1--Traditional UDLR Scenario (UDL Device with Directly Connected Receivers)

For scenario 1, no IGMP proxy mechanism is needed. In this scenario, the following sequence of events occurs:

1. User 2 sends an IGMP membership report requesting interest in group G.
2. Router B receives the IGMP membership report, adds a forwarding entry for group G on LAN B, and proxies the IGMP report to Router A, which is the UDLR upstream device.
3. The IGMP report is then proxied across the Internet link.
4. Router A receives the IGMP proxy and maintains a forwarding entry on the unidirectional link.

Scenario 2--IGMP Proxy Scenario (UDL Device without Directly Connected Receivers)

For scenario 2, the IGMP proxy mechanism is needed to enable hosts that are not directly connected to a downstream device to join a multicast group sourced from an upstream network. In this scenario, the following sequence of events occurs:

1. User 1 sends an IGMP membership report requesting interest in group G.
2. Router C sends a PIM Join message hop-by-hop to the RP (Router B).
3. Router B receives the PIM Join message and adds a forwarding entry for group G on LAN B.
4. Router B periodically checks its mroute table and proxies the IGMP membership report to its upstream UDL device across the Internet link.
5. Router A creates and maintains a forwarding entry on the unidirectional link (UDL).

In an enterprise network, it is desirable to be able to receive IP multicast traffic via satellite and forward the traffic throughout the network. With unidirectional link routing (UDLR) alone, scenario 2 would not be possible because receiving hosts must be directly connected to the downstream device, Router B. The IGMP proxy mechanism overcomes this limitation by creating an IGMP report for (*, G) entries in the multicast forwarding table. To make this scenario functional, therefore, you must enable IGMP report forwarding of proxied (*, G) multicast static route (mroute) entries (using the **ip igmp mroute-proxy** command) and enable the mroute proxy service (using the **ip igmp proxy-service** command) on interfaces leading to PIM-enabled networks with potential members.



Note Because PIM messages are not forwarded upstream, each downstream network and the upstream network have a separate domain.

How to Configure IGMP Proxy

Configuring the Upstream UDL Device for IGMP UDLR

Perform this task to configure the upstream UDL device for IGMP UDLR.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	interface <i>type number</i> Example: Device(config)# interface gigabitethernet 1/0/0	Enters interface configuration mode. <ul style="list-style-type: none"> • For the <i>type</i> and <i>number</i> arguments, specify the interface to be used as the UDL on the upstream device.
Step 4	ip igmp unidirectional-link Example: Device(config-if)# ip igmp unidirectional-link	Configures IGMP on the interface to be unidirectional for IGMP UDLR.
Step 5	end Example: Device(config-if)# end	Ends the current configuration session and returns to privileged EXEC mode.

Configuring the Downstream UDL Device for IGMP UDLR with IGMP Proxy Support

Perform this task to configure the downstream UDL device for IGMP UDLR with IGMP proxy support.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.

	Command or Action	Purpose
Step 3	interface <i>type number</i> Example: <pre>Device(config)# interface gigabitethernet 0/0/0</pre>	Enters interface configuration mode. <ul style="list-style-type: none"> For the <i>type</i> and <i>number</i> arguments, specify the interface to be used as the UDL on the downstream device for IGMP UDLR.
Step 4	ip igmp unidirectional-link Example: <pre>Device(config-if)# ip igmp unidirectional-link</pre>	Configures IGMP on the interface to be unidirectional for IGMP UDLR.
Step 5	exit Example: <pre>Device(config-if)# exit</pre>	Exits interface configuration mode and returns to global configuration mode.
Step 6	interface <i>type number</i> Example: <pre>Device(config)# interface gigabitethernet 1/0/0</pre>	Enters interface configuration mode. <ul style="list-style-type: none"> For the <i>type</i> and <i>number</i> arguments, select an interface that is facing the nondirectly connected hosts.
Step 7	ip igmp mroute-proxy <i>type number</i> Example: <pre>Device(config-if)# ip igmp mroute-proxy loopback 0</pre>	Enables IGMP report forwarding of proxied (*, G) multicast static route (mroute) entries. <ul style="list-style-type: none"> This step is performed to enable the forwarding of IGMP reports to a proxy service interface for all (*, G) forwarding entries in the multicast forwarding table. In this example, the ip igmp mroute-proxy command is configured on Gigabit Ethernet interface 1/0/0 to request that IGMP reports be sent to loopback interface 0 for all groups in the mroute table that are forwarded to Gigabit Ethernet interface 1/0/0.
Step 8	exit Example: <pre>Device(config-if)# exit</pre>	Exits interface configuration mode and returns to global configuration mode.
Step 9	interface <i>type number</i> Example: <pre>Device(config)# interface loopback 0</pre>	Enters interface configuration mode for the specified interface. <ul style="list-style-type: none"> In this example, loopback interface 0 is specified.

	Command or Action	Purpose
Step 10	<p>ip igmp helper-address udl <i>interface-type</i> <i>interface-number</i></p> <p>Example:</p> <pre>Device(config-if)# ip igmp helper-address udl gigabitethernet 0/0/0</pre>	<p>Configures IGMP helping for UDLR.</p> <ul style="list-style-type: none"> This step allows the downstream device to helper IGMP reports received from hosts to an upstream device connected to a UDL associated with the interface specified for the <i>interface-type</i> and <i>interface-number</i> arguments. In the example topology, IGMP helping is configured over loopback interface 0 on the downstream device. Loopback interface 0, thus, is configured to helper IGMP reports from hosts to an upstream device connected to Gigabit Ethernet interface 0/0/0.
Step 11	<p>ip igmp proxy-service</p> <p>Example:</p> <pre>Device(config-if)# ip igmp proxy-service</pre>	<p>Enables the mroute proxy service.</p> <ul style="list-style-type: none"> When the mroute proxy service is enabled, the device periodically checks the static mroute table for (*, G) forwarding entries that match interfaces configured with the ip igmp mroute-proxy command (see Step 7) based on the IGMP query interval. Where there is a match, one IGMP report is created and received on this interface. <p>Note The ip igmp proxy-service command is intended to be used with the ip igmp helper-address (UDL) command.</p> <ul style="list-style-type: none"> In this example, the ip igmp proxy-service command is configured on loopback interface 0 to enable the forwarding of IGMP reports out the interface for all groups on interfaces registered through the ip igmp mroute-proxy command (see Step 7).
Step 12	<p>end</p> <p>Example:</p> <pre>Device(config-if)# end</pre>	<p>Ends the current configuration session and returns to privileged EXEC mode.</p>
Step 13	<p>show ip igmp interface</p> <p>Example:</p>	<p>(Optional) Displays multicast-related information about an interface.</p>

	Command or Action	Purpose
	Device# show ip igmp interface	
Step 14	show ip igmp udldr Example: Device# show ip igmp udldr	(Optional) Displays UDLR information for directly connected multicast groups on interfaces that have a UDL helper address configured.

Configuration Examples for IGMP Proxy

Example: IGMP Proxy Configuration

The following example shows how to configure the upstream UDL device for IGMP UDLR and the downstream UDL device for IGMP UDLR with IGMP proxy support.

Upstream Device Configuration

```
interface gigabitethernet 0/0/0
ip address 10.1.1.1 255.255.255.0
ip pim sparse-mode
!
interface gigabitethernet 1/0/0
ip address 10.2.1.1 255.255.255.0
ip pim sparse-mode
ip igmp unidirectional-link
!
interface gigabitethernet 2/0/0
ip address 10.3.1.1 255.255.255.0
```

Downstream Device Configuration

```
ip pim rp-address 10.5.1.1 5
access-list 5 permit 239.0.0.0 0.255.255.255
!
interface loopback 0
ip address 10.7.1.1 255.255.255.0
ip pim sparse-mode
ip igmp helper-address udl ethernet 0
ip igmp proxy-service
!
interface gigabitethernet 0/0/0
ip address 10.2.1.2 255.255.255.0
ip pim sparse-mode
ip igmp unidirectional-link
!
interface gigabitethernet 1/0/0
ip address 10.5.1.1 255.255.255.0
ip pim sparse-mode
ip igmp mroute-proxy loopback 0
!
interface gigabitethernet 2/0/0
ip address 10.6.1.1 255.255.255.0
```

Additional References for IGMP Proxy

The following sections provide references related to customizing IGMP.

Related Documents

Related Topic	Document Title
For complete syntax and usage information for the commands used in this chapter.	See the IP Multicast Routing Commands section of the <i>Command Reference (Catalyst 9300 Series Switches)</i>
Overview of the IP multicast technology area	“IP Multicast Routing Technology Overview” module
Basic IP multicast concepts, configuration tasks, and examples	“Configuring Basic IP Multicast Routing” module

Standards and RFCs

Standard/RFC	Title
RFC 1112	<i>Host extensions for IP multicasting</i>
RFC 2236	<i>Internet Group Management Protocol, Version 2</i>
RFC 3376	<i>Internet Group Management Protocol, Version 3</i>

MIBs

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

Technical Assistance

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

Feature Information for IGMP Proxy

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

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

Table 1: Feature Information for IGMP Proxy

Feature Name	Releases	Feature Information
IGMP Proxy	Cisco IOS XE Everest 16.5.1a	An IGMP proxy enables hosts in a unidirectional link routing (UDLR) environment that are not directly connected to a downstream router to join a multicast group sourced from an upstream network. This feature was implemented on the following platforms: <ul style="list-style-type: none">• Cisco Catalyst 9300 Series Switches

